Volume 19 March 2002 Numbers 1, 2, 3

PROCEEDINGS
OF THE
ROCHESTER ACADEMY OF SCIENCE

Number 1

THE VASCULAR PLANTS OF THE BERGEN SWAMP,
OR "MUENSCHER, REVISITED."

Number 2

FLORA OF THE ALLEGANY STATE PARK REGION:
AN UPDATE.

Number 3

FALL SCIENTIFIC PAPER SESSIONS: 1998 through 2001
Titles, Authors, Abstracts

ACADEMY OFFICERS AND FELLOWS: 1998 – 2002

Published by the Rochester Academy of Science
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VOLUME TABLE OF CONTENTS

THE VASCULAR PLANTS OF THE BERGEN SWAMP, OR "MUENSCHER, REVISITED"

Franz K. Seischab
Department of Biological Sciences
Rochester Institute of Technology
Rochester, New York 14623

INTRODUCTION

Muenscher (1946) provided us with a valuable contribution to the western New York botanical literature. His *Annotated catalogue of vascular plants in Bergen Swamp*, a section in his paper, has been a necessary tool for both the professional and amateur botanist visiting or working in this ecosystem. Since 1946 many changes in nomenclature have been instituted. It is my intent in this paper to update Muenscher's species list using Mitchell and Tucker's (1997) *Revised Checklist of New York State Plants* as a guide and to include synonyms of Gleason and Cronquist (1991) where appropriate.

No attempt has been made to verify that these species are all still present in Bergen Swamp; however, a few species have been added. These are the species reported by Walker (1974) or by Seischab (1977).

The following notations are used throughout the species list:

1. All genus names, specific epithets, common names and their hyphenations are as listed in Mitchell and Tucker (1997.
2. All original author names, including their abbreviations are as listed in Mitchell and Tucker (1997).
3. Species not previously reported by Muenscher (1946) are followed by an asterisk in parentheses.
4. Those taxa whose presence in the Swamp were questioned by Muenscher and which have not been seen in this community by the author, are followed by a question mark in parentheses.
5. Synonyms, author names and/or abbreviations used by Muenscher (1946), if different from those used by Mitchell and Tucker (1997), are included in brackets followed by an M.
6. In instances where the species names of Mitchell and Tucker (1997) and Gleason and Cronquist (1991) do not agree, the synonym, author name and/or abbreviation used by Gleason and Cronquist (1991) is included in brackets followed by G&C.
7. Codes for species on the Rare Plant Status List for New York State are in bold type in parentheses following the species name. These include **U** (unprotected), **E** (endangered) or **T** (threatened). Also coded in bold type in parentheses following species names are The Nature Conservancy global and state designations. Included are **G1** through **G5** (globally imperiled through globally secure), **GH** (historical sites), **GX** (believed extinct), **S1** through **S5** (critically imperiled through demonstrably secure in the State), **SH** (historical sites) and **SX** (believed extirpated from the State).

CATALOG OF THE VASCULAR PLANTS IN BERGEN SWAMP

Division: Lycopodiophyta
Class: Lycopodiopsida
Order: Lycopodiales

LYCOPODIACEAE (CLUBMOSS FAMILY)

Huperzia lucidula (Michx.) Trev., shining clubmoss
[*Lycopodium lucidulum* Michx.] M, G&C
Lycopodium annotinum L., stiff clubmoss
Lycopodium clavatum L., running cedar
Lycopodium digitatum Dill. ex A. Br., running pine
[*L. complanatum* var. *flabelliforme* Fern.] M
Lycopodium obscurum L., ground pine

Division: Equistophyta
Class: Equisetopsida
Order: Equisetales

EQUISETACEAE (HORSETAIL FAMILY)

Equisetum arvense L., field horsetail
Equisetum fluviatile L., water horsetail
Equisetum hyemale L., scouring rush
Equisetum scirpoides Michx., dwarf scouring rush
Equisetum variegatum Scheich. ex Weber & Mohr, variegated horsetail

Division: Polypodiophyta
Class: Polypodiopsida
Order: Ophioglossales

OPHIOGLOSSACEAE (ADDER'S TONGUE FAMILY)

Botrychium dissectum Spreng., cut-leaf grape fern
Botrychium rugulosum W. Wagner, rugulose grape fern (?) **(E, G3, S1)**
[*B. multifidum ssp. salaifolium* (Presl.) R. T. Clausen] M
Botrychium virginianum (L.) Sw., rattlesnake fern

Order: Polypodiales

OSMUNDACEAE (FLOWERING-FERN FAMILY)

Osmunda cinnamomea L., cinnamon fern
Osmunda claytoniana L., interrupted fern
Osmunda regalis var. *spectabilis* (Willd.) A. Gray, royal fern

PTERIDACEAE (MAIDENHAIR FAMILY)

Adiantum pedatum L., maidenhair fern

DENNSTAEDTIACEAE (BRACKEN FAMILY)

Pteridium aquilinum var. *latiusculum* (Desv.) Underw., bracken fern

THELYPTERIDACEAE (MARSH FERN FAMILY)

Thelypteris noveboracensis (L.) Nieuwl., New York fern
    [*Dryopteris noveboracensis* (L.) Gray] M
Thelypteris palustris Schott, marsh fern
    [*Dryopteris thelypteris* (L.) Gray] M
Thelypteris simulata (Davenp.) Nieuwl., Massachusetts fern (*)

BLECHNACEAE (DEER FERN FAMILY)

Woodwardia virginica (L.) Sm., Virginia chain fern

DRYOPTERIDACEAE (WOOD FERN FAMILY)

Athyrium felix-femina var. *asplenioides* (Michx.) Farw., southern lady fern
Deparia acrostichoides (Sw.) Kato, silvery spleenwort
    [*Athyrium thelypterioides* (Michx.) Desv.], G&C
    [*A. acrostichoides* Sw.] M
Cystopteris bulbifera (L.) Bernh., bladder fern
Cystopteris fragilis (L.) Bernh., fragile fern
Dryopteris carthusiana (Vill.) Fuchs, spinulose wood fern
    [*D. spinulosa* (O. F. Muller) Ktze.] M
Dryopteris carthusiana x *intermedia* = *D.* x *triploiea* Wherry, wood fern
    [*D. spinulosa* var. *intermedia* (Muhl.) Underw.] M
Dryopteris clintoniana (D. Eat. ex A. Gray) Dowell, Clinton's shield fern
    [*D. cristata* var. *clintoniana*] M
Dryopteris cristata (L.) A. Gray, crested wood fern
Dryopteris cristata x *intermedia* = *D.* x *boottii* (Tuckerm.) Underw., Boott's wood fern
    [*D. bootii* (Tuckerm.) Underw.] M
Dryopteris goldiana (Hook. ex Goldie) A. Gray, Goldie's fern
Dryopteris marginalis (L.) A. Gray, marginal wood fern
Gymnocarpium dryopteris (L.) Newm., oak fern
    [*Dryopteris linnaeana* C. Chr.] M
Matteuccia struthiopteris (L.) Todaro, ostrich fern
    [*Pteretis nodulosa* (Michx.) Nieuwl.] M
Onoclea sensibilis L., sensitive fern
Polystichum acrostichoides (Michx.) Schott, christmas fern

POLYPODIACEAE (POLYPODY FAMILY)

Polypodium virginianum L., rock polypody

Division: Pinophyta
Class: Pinopsida
Order: Taxales
TAXACEAE (YEW FAMILY)

Taxus canadensis Marsh., American yew

Order: Pinales
PINACEAE (PINE FAMILY)

Larix laricina (DuRoi.) Koch, tamarack
Picea mariana (Mill.) BSP., black spruce (?)
Pinus strobus L., white pine
Pinus sylvestris L., scotch pine
Tsuga canadensis (L.) Carr., eastern hemlock

CUPRESSACEAE (CYPRESS FAMILY)

Juniperus horizontalis Moench, prostrate juniper **(E, G5, S1)**
Juniperus horizontalis Moench x *J. virginiana* L.
Juniperus virginiana L., eastern red cedar
Thuja occidentalis L., northern white cedar

Division: Magnoliophyta
Class: Magnoliopsida
Subclass: Magnoliidae
Order: Magnoliales
MAGNOLIACEAE (MAGNOLIA FAMILY)

Magnolia acuminata (L.) L., cucumber tree

Order: Laurales
LAURACEAE (LAUREL FAMILY)

Lindera benzoin (L.) Blume, spicebush

Order: Piperales
SAURURACEAE (LIZARD'S-TAIL FAMILY)

Saururus cernuus L., lizard's tail

Order: Aristolochiales
ARISTOLOCHIACEAE (BIRTHWORT FAMILY)

Asarum canadense L., wild ginger

Order: Nymphaeales
NYMPHAEACEAE (WATERLILY FAMILY)

Nuphar advena (Soland. ex Ait.) R. Br. ex Ait. f., spatterdock

CERATOPHYLLACEAE (HORNWORT FAMILY)

Ceratophyllum demersum L., coontail

Order: Ranunculales
RANUNCULACEAE (CROWFOOT FAMILY)

Actaea pachypoda Ell., white baneberry
[*A. alba* (L.) Mill.] M, G&C
Actaea spicata ssp. *rubra* (Ait.) Hulten, red baneberry
[*A. rubra* (Ait.) Willd.] M, G&C
Anemone canadensis L., Canada anemone
Anemone virginiana L., thimbleweed
Aquilegia canadensis L., red columbine
Caltha palustris L., marsh marigold
Clematis virginiana L., virgin's-bower
Coptis trifolia (L.) Salisb., goldthread
[*C. trifolia* ssp. *groenlandicum* (Oerder) Hulten.] M
Hepatica nobilis var. *acuta* (Pursh) Steyerm., sharp-lobed hepatica
[*H. acutiloba* DC.] M, G&C
Hepatica nobilis var. *obtusa* (Pursh) Steyerm., blunt-lobed hepatica
[*H. americana* (DC.) Ker.] M, G&C
Hydrastis canadensis L., golden-seal **(T, G4, S2)**
Ranunculus abortivus L., kidneyleaf crowfoot
Ranunculus acris L., common buttercup
Ranunculus flabellaris Raf. ex Bigel., yellow water-crowfoot
[*R. fragellaris* Raf.] M
Ranunculus hispidus var. *nitidus* (Muhl.) Duncan, swamp buttercup **(E, G5, T, S1)**
[*R. septentrionalis* Poir.] M
Ranunculus recurvatus Poir. ex Lam., hooked buttercup
Ranunculus sceleratus L., cursed crowfoot
Ranunculus trichophyllus Chaix ex Vill., white water-crowfoot
[*R. aquatilis* L.] M
Thalictrum dioicum L., early meadow-rue
Thalictrum pubescens Pursh, tall meadow-rue
[*T. polygamum* Muhl.] M
Thalictrum thalictroides (L.) Eames & Boivin, rue anemone
[*Anemonella thalictroides* (L.) Spach] G&C
[*A. thalictrioides* (L.) Spach] M

BERBERIDACEAE (BARBERRY FAMILY)

Berberis thunbergii DC., Japanese barberry
Berberis vulgaris L., common barberry
Caulophyllum thalictroides (L.) Michx., big blue cohosh
Podophyllum peltatum L., may-apple

MENISPERMACEAE (MOONSEED FAMILY)

Menispermum canadense L., moonseed

Order: Papaverales
PAPAVERACEAE (POPPY FAMILY)

Chelidonium majus L., greater celandine
Sanguinaria canadensis L., bloodroot

FUMARIACEAE (FUMITORY FAMILY)

Dicentra canadensis (Goldie) Walp., squirrel-corn
Dicentra cucullaria (L.) Bernh., dutchman's-breeches

Subclass: Hamamelidae
Order: Hamamelidales
PLATANACEAE (PLANE-TREE FAMILY)

Platanus occidentalis L., sycamore

HAMAMELIDACEAE (WITCH-HAZEL FAMILY)

Hamamelis virginiana L., witch-hazel

Order: Urticales
ULMACEAE (ELM FAMILY)

Ulmus americana L., American elm
Ulmus rubra Muhl., slippery elm

CANNABACEAE (HEMP FAMILY)

Humulus lupulus L., common hop

MORACEAE (MULBERRY FAMILY)

Morus alba L., white mulberry (*)
Morus rubra L., red mulberry

URTICACEAE (NETTLE FAMILY)

Boehmeria cylindrica (L.) Sw., false-nettle
Laportea canadensis (L.) Wedd., wood-nettle
Pilea pumila (L.) A. Gray, richweed
Urtica dioica ssp. *gracilis* (Ait.) Selander, stinging nettle
    [*U. dioica* var. *procera* (Muhl.) Wedd.] G&C
    [*U. procera* Muhl.] M

Order: Juglandales
JUGLANDACEAE (WALNUT FAMILY)

Carya cordiformis (Wang.) Koch, bitternut hickory
Carya glabra (Mill.) Sweet, pignut hickory
Carya ovata (Mill.) Koch, shagbark hickory
Juglans cinerea L., butternut

Order: Myricales
MYRICACEAE (BAYBERRY FAMILY)

Myrica cerifera L., wax-myrtle (*), G&C. Not likely to be in this ecosystem with its preponderance of species with northern affinities.
Myrica pensylvanica Loisel. ex Duhamel, bayberry
    [*M. pennsylvanica* Lois.] M

Order: Fagales
FAGACEAE (BEECH FAMILY)

Fagus grandifolia Ehrh., American beech
Quercus alba L., white oak
Quercus bicolor Willd., swamp white oak
Quercus macrocarpa Michx., bur oak
Quercus rubra L., northern red oak
    [*Q. borealis* var. *maxima* (Marsh.) Sarg.] M

BETULACEAE (BIRCH FAMILY)

Alnus incana (L.) Moench, speckled alder
Betula alleghaniensis Britt., yellow birch
    [*B. lutea* Michx.] M
Betula pendula Roth, European white birch
    [*B. alba* L.] G&C
Betula pumila L., swamp birch **(G5, S2)**
Carpinus caroliniana Walt., hornbeam
Corylus cornuta Marsh., beaked hazel
Ostrya virginiana (Mill.) Koch, hop hornbeam

Subclass: Caryophyllidae
Order: Caryophyllales
PHYTOLACCACEAE (POKEWEED FAMILY)

Phytolacca americana L., pokeweed

CHENOPODIACEAE (GOOSEFOOT FAMILY)

Atriplex patula L., seaside orach
    [*A. patula* var. *hastata* (L.) Gray] M
Chenopodium album L., lamb's quarters
Chenopodium berlandieri Moq., pigweed **(E, G4, S1, S2)**
    [*C. paganum* Reich.] M
Chenopodium glaucum L., oak-leaf goosefoot
Chenopodium simplex (Torrey) Raf., maple-leaf goosefoot
    [*C. gigantospermum* Aellen] G&C
    [*C. hybridum* L.] M

AMARANTHACEAE (AMARANTH FAMILY)

Amaranthus blitoides S. Wats., tumbleweed
    [*A. graecizans* L.] M
Amaranthus hybridus L., green amaranth
Amaranthus retroflexus L., pigweed

PORTULACACEAE (PURSLANE FAMILY)

Claytonia caroliniana Michx., Carolina spring-beauty
Claytonia virginica L., spring-beauty

CARYOPHYLLACEAE (PINK FAMILY)

Agrostemma githago L., corn-cockle
Arenaria serpyllifolia L., thyme-leaf sandwort
Cerastium fontanum, Baumg. *emend* Jalas, common mouse-ear
    [*C. vulgatum* L.] M, G&C
Dianthus armeria L., Deptford pink
Scleranthus annuus L., knawel
Silene latifolia Poir., white campion
    [*Lychnis alba* Mill.] M
Silene noctiflora L., night-flowering catch-fly
Stellaria graminea L., common stitchwort
Stellaria longifolia Muhl. ex Willd. needle-leaf **(E, G5, T S1)**
    [*S. longipes* Goldie] G&C
Stellaria media (L.) Vill., common chickweed

Order: Polygonales
POLYGONACEAE (BUCKWHEAT FAMILY)

Polygonum amphibium L., water smartweed
Polygonum amphibium var. *emersum* Michx., water smartweed
    [*P. coccineum* Muhl.] M
Polygonum aviculare L., knotweed
Polygonum convolvulus L., black bindweed
Polygonum hydropiper L., smartweed
Polygonum hydropiperoides Michx., mild water-pepper
Polygonum lapathifolium L., willow-weed
Polygonum pensylvanicum L., smartweed
    [*P. pennsylvanicum* L.] M
Polygonum persicaria L., lady's thumb
Polygonum punctatum Ell., water smartweed
Polygonum punctatum var. *confertiflorum* (Meisn.) Fassett, water smartweed
    [*P. punctatum* var. *leptostachyum* (Meisn.) Small] M
Polygonum robustius (Small) Fern., large water smartweed
Polygonum sagittatum L., tearthumb
Polygonum scandens L., climbing false-buckwheat
Polygonum virginianum L., jumpseed
Rumex acetosella L., sheep sorrel
Rumex crispus L., curly dock
Rumex obtusifolius L., bitter-dock
Rumex orbiculatus A. Gray, great water dock
    [*R. Brittanica* L.] M
Rumex verticillatus L., swamp dock

Subclass: Dilleniidae
Order: Theales
CLUSIACEAE (MANGOSTEEN FAMILY)

Hypericum boreale (Britt.) Bickn., northern dwarf St. John's-wort
Hypericum perforatum L., St. John's-wort
Hypericum punctatum Lam., St. John's-wort
Triadenum virginicum (L.) Raf., marsh St. John's-wort
    [*Hypericum virginicum* L.] M

Order: Malvales
TILIACEAE (LINDEN FAMILY)

Tilia americana L., basswood

MALVACEAE (MALLOW FAMILY)

Hibiscus moscheutos L., rose-mallow
Malva moschata L., musk-mallow
Malva neglecta Wallr., cheeses

Order: Nepenthales
SARRACENIACEAE (PITCHER-PLANT FAMILY)

Sarracenia purpurea L., pitcher-plant

DROSERACEAE (SUNDEW FAMILY)

Drosera rotundifolia L., sundew

Order: Violales
VIOLACEAE (VIOLET FAMILY)

Viola affinis LeConte, LeConte's violet
    [*V. sororia* Willd.] G&C
Viola arvensis Murr., white pansy
Viola blanda Willd. large-leaf white violet
    [*V. incognita* Brainerd] M
Viola canadensis L., tall white violet
Viola conspersa Reichenb., American dog-violet
Viola macloskeyi ssp. *pallens* (Banks ex DC.) M. Baker, sweet white violet
    [*V. blanda* Willd.] M
    [*V. macloskeyi* var. *pallens* (Banks) C. L. Hitchc.] G&C
    [*V. pallens* (Banks) Brainerd] M
Viola nephrophylla Greene, northern bog violet **(E, G5, S1)**
Viola pubescens Ait., yellow violet
    [*V. eriocarpa* var. *leiocarpa* Fern. & Wieg.] M
Viola renifolia A. Gray, northern white violet
    [*V. renifolia* var. *Brainerdii* Fer.] M
Viola rostrata Pursh, long-spurred violet
Viola rotundifolia Michx., round-leafed violet
Viola sororia Willd., northern blue violet
Viola sororia Willd., marsh blue violet
    [*V. cucullata* Ait.] M

CUCURBITACEAE (GOURD FAMILY)

Echinocystis lobata (Michx.) Torrey & A. Gray, prickly cucumber

Order: Salicales
SALICACEAE (WILLOW FAMILY)

Populus balsamifera L., balsam poplar
[*P. tacamahacca* Mill.] M
Populus balsamifera x *deltoides* = *P.* x *jackii* Sarg., Balm of Gilead
[*P. candicans* Ait.] M
Populus deltoides Bartr., cottonwood
[*P. balsamifera* L.] M
Populus grandidentata Michx., big-tooth aspen
Populus tremuloides Michx., quaking aspen
Salix alba L., white willow
[*S. alba* var. *vitellina* (L.) Koch] M
Salix amygdaloides Anderss., peach-leaf willow
Salix bebbiana Sarg., beaked willow
Salix candida Flugge, hoary willow
Salix cordata Michx. ex Willd., heart-leaf willow
Salix discolor Muhl., pussy-willow
Salix exigua Nutt., sandbar willow
[*S. interior* Rowlee] M
Salix humilis Marsh., prairie willow
Salix lucida Muhl., shining willow
Salix nigra Marsh., black willow
Salix pedicellaris Pursh, bog willow
Salix petiolaris Sm., slender willow
Salix purpurea L., purple willow
Salix sericea Marsh., silky willow
Salix serissima (Bailey) Fern., autumn willow

Order: Capparales
BRASSICACEAE (MUSTARD FAMILY)

Arabis hirsuta (L.) Scop., hairy rock-cress
Armoracia lacustris (A. Gray) Al-Shehbaz & V. Bates, lake-cress **(T, G4, S2)**
[*A. aquatica* (Eat.) Wieg.] M
Armoracia rusticana (Lam.) Gaertn., Meyer & Scherb., horseradish
Barberea vulgaris R. Br. ex Ait., cress
Camelina microcarpa Andrz. ex DC., false flax
Camelina sativa (L.) Crantz, Dutch flax
Capsella bursa-pastoris (L.) Medik., shepherd's-purse
Cardamine bulbosa (Schreb. ex Muhl.) BSP., spring cress
[*C. rhomboidea* (Pers.) DC.] G&C
Cardamine concatenata (Michx.) Schwein., cut-leaf toothwort
[*Dentaria laciniata* Muhl.] M
Cardamine diphylla (Michx.) Wood, two-leafed toothwort
[*Dentaria diphylla* Michx.] M

Cardamine pensylvanica Muhl. ex Willd., Pennsylvania bittercress
[*C. pennsylvanica* Muhl.] M
Cardamine pratensis L., cuckoo-flower
[*C. pratensis* var. *palustris* Wimm. & Grab.] M
Erysimum cheiranthoides L., wormseed-mustard
Hesperis matronalis L., dame's-rocket
Lepidium campestre (L.) R. Br. ex Ait., cow-cress
Rorippa nasturtium-aquaticum (L.) Hayek., watercress
[*Nasturtium officinale* R. Br.] M
Rorippa palustris ssp. *hispida* (Desv.) Jonsell, marsh watercress
[*R. islandica* var. *hispida* Butters & Abbe.] M
[*R. palustris* var. *hispida* (Desv.) Rydb.] G&C
Sinapis arvensis L., wild mustard
[*Brassica kaber* Wheeler] M
Sisymbrium altissimum L., tumble-mustard
Sisymbrium officinale (L.) Scop., hedge-mustard

Order: Ericales
ERICACEAE (HEATH FAMILY)

Chamaedaphne calyculata (L.) Moench, leatherleaf (?)
Chimaphila umbellata (L.) Bart, pipsissewa
Gaultheria hispidula (L.) Muhl., creeping snowberry
[*Chiogenes hispidula* (L.) T. & G.] M
Gaultheria procumbens L., wintergreen
Gaylussacia baccata (Wang.) Koch, black huckleberry
Gaylussacia dumosa (Andr.) Torrey & A. Gray, dwarf huckleberry (*)
Moneses uniflora (L.) A. Gray, one-flowered pyrola
Monotropa uniflora L., Indian-pipe
Orthilia secunda (L.) House, one-sided wintergreen
[*Pyrola secunda* L.] M, G&C
Pyrola americana Sweet, wild lily-of-the-valley
[*P. rotundifolia* var. *americana* (Sweet) Fern.] G&C
Pyrola asarifolia Michx., pink wintergreen **(T, G5, S1S2)**
[*P. aserifolia* var. *incarnata* (Fisch.) Fern.] M
Pyrola chlorantha Sw., green shinleaf
Pyrola elliptica Nutt., shinleaf
Rhododendron groenlandicum (Oeder) Kron & Judd, Labrador tea
[*Ledum groenlandicum* Oeder] M, G&C
Rhododendron periclymenoides (Michx.) Shinners, pinkster-flower
[*R. nudiflorum* var. *roseum* (Lois.) Wieg.] M
Vaccinium angustifolium Ait., lowbush blueberry
Vaccinium corymbosum L., highbush blueberry
Vaccinium macrocarpon Ait., cranberry
Vaccinium myrtilloides Michx., sour-top blueberry
[*V. canadense* Kalm] M

Vaccinium oxycoccos L., small cranberry
Vaccinium stamineum L., deerberry

Order: Primulales
PRIMULACEAE (PRIMROSE FAMILY)

Lysimachia ciliata L., fringed loosestrife
    [*Steironema ciliatum* (L.) Raf.] M
Lysimachia nummularia L., moneywort
Lysimachia terrestris (L.) BSP., swamp-candles
Lysimachia thyrsiflora L., tufted loosestrife
Samolus valerandii ssp. *parviflorus* (Raf.) Hultén, water pimpernel
    [*S. floribundus* HBK.] M, G&C
Trientalis borealis Raf., starflower

Subclass: Rosidae
Order: Rosales
GROSSULARIACEAE (GOOSEBERRY FAMILY)

Ribes americanum Mill., wild black currant
Ribes aureum Pursh, buffalo currant (*)
    [*R. odoratum* Wendl. f. ex Bartl. & Wendl. f.] M, G&C
Ribes cynosbati L., dogberry
Ribes hirtellum Michx., northern gooseberry
Ribes rubrum L., northern red currant
    [*R. sativum* (Reichenb.) Syme] M, G&C
Ribes triste Pallas, wild red currant
    [*R. triste* var. *albinervium* (Michx.) Fern.] M

CRASSULACEAE (SEDUM FAMILY)

Penthorum sedoides L., ditch-stonecrop
Sedum telephium L., live-forever
    [*S. purpureum* (L.) J. A. Schultes] M, G&C

SAXIFRAGACEAE (SAXIFRAGE FAMILY)

Chrysosplenium americanum Schwein. ex Hooker, golden saxifrage
Mitella diphylla L., coolwort
Mitella nuda L., bishop's cap
Parnassia glauca Raf., grass-of-Parnassus
    [*P. caroliniana* Michx.] M
Saxifraga pensylvanica L., swamp saxifrage
    [*S. pennsylvanica* L.] M
Saxifraga virginiensis Michx., early saxifrage
    [*S. virginensis* Michx.] M

Tiarella cordifolia L., foamflower

ROSACEAE (ROSE FAMILY)

Agrimonia gryposepala Wallr., agrimony
Amelanchier arborea (Michx. f.) Fern., shadbush
Amelanchier intermedia Spach. (*A. arborea* x *canadensis*), serviceberry
    [*A. canadensis* (L.) Medik.] G&C
Amelanchier laevis Wieg., smooth shadbush
Aronia arbutifolia (L.) Pers., red chokeberry
    [*Pyrus arbutifolia* L.] M
Aronia melanocarpa (Michx.) Ell., black chokeberry
    [*Pyrus melanocarpa* (Michx.) Willd.] M
Crataegus brainerdii Sarg., hawthorn
    [*C. brainerdi* Sarg.] M
Crataegus punctata Jacq., hawthorn
Crataegus succulenta Schrader. ex Link, hawthorn
    [*C. macrocantha* Lodd.] M
Dalibarda repens L., false-violet
Fragaria vesca L., woodland strawberry
Fragaria virginiana Dcne., wild strawberry
Geum aleppicum Jacq., yellow avens
    [*G. aleppicum* var. *strictum* (Ait.) Fern.] M
Geum canadense Jacq., white avens
Geum rivale L., purple avens
Malus glaucescens Rehd., American crab (?) **(T, G3, G5, S1)**
    [*Pyrus coronaria* L.] G&C
Malus pumila Mill., apple
    [*Pyrus malus* L.] M, G&C
Potentilla argentea L., silver cinquefoil
Potentilla arguta Pursh, tall cinquefoil
Potentilla fruticosa L., shrubby cinquefoil
Potentilla norvegica L., rough cinquefoil
    [*P. norvegica* var. *hirsuta* (Michx.) Lehm.] M
Potentilla palustris (L.) Scop., marsh cinquefoil
Potentilla recta L., sulfer cinquefoil
Prunus avium (L.) L., sweet cherry
Prunus mahaleb L., mahaleb
Prunus pensylvanica L. f., pin-cherry
    [*P. pennsylvanica* L. f.] M
Prunus serotina Ehrh., black cherry
Prunus virginiana L., choke-cherry
Pyrus communis L., pear
Rosa acicularis Lindl., prickly rose **(E, G5, T, S1)**

Rosa carolina L., pasture rose
[*R. Housei* Erlandon] M; listed as *R. baileyanus* Britt. in Fernald 1970. Muenscher (1946) listed both *R. Housei* and *R. carolina.*
Rosa palustris Marsh., swamp rose
Rosa setigera Michx., prairie rose
Rubus allegheniensis Porter ex Bailey, northern blackberry
Rubus flagellaris Willd., American dewberry
Rubus hispidus L., running blackberry
Rubus idaeus ssp. *strigosus* (Michx.) Focke, wild raspberry
[*R. idaeus* var. *strigosus* (Michx.) Maxim.] M G&C
Rubus occidentalis L., black raspberry
Rubus odoratus L., pink thimbleberry
Rubus pubescens Raf., dwarf raspberry
Sorbus aucuparia L., European mountain ash
[*Pyrus aucuparia* L.] M
Spiraea tomentosa L., hardhack (*)
Waldsteinia fragarioides (Michx.) Tratt., barren strawberry

Order: Fabales
FABACEAE (BEAN FAMILY)

Amphicarpaea bracteata (L.) Fern., hog-peanut
Apios americana Medik., groundnut
Desmodium canescens (L.) DC., hoary tick-clover
Desmodium cuspidatum (Muhl. ex Willd.) DC., tick-clover (?)
[*D. bracteosum* (Michx.) DC.] M (?)
Desmodium glutinosum (Muhl. ex Willd.) Wood, sticky tick-clover
Gleditsia triacanthos L., honey-locust
Medicago lupulina L., black medic
Melilotus alba Desr. ex Lam., white sweet-clover
Melilotus altissima Thuill., tall yellow sweet-clover
Melilotus officinalis (L.) Pallas, yellow sweet-clover
Trifolium arvense L., rabbit's foot clover
Trifolium aureum Pollich, yellow clover
[*T. agrarium* L.] M
Trifolium hybridum L., alsike clover
Trifolium pratense L., red clover
Trifolium repens L., white clover

Order: Myrtales
ONAGRACEAE (EVENING PRIMROSE FAMILY)

Circaea alpina L., enchanter's nightshade
Circaea lutetiana ssp. *canadensis* (L.) Aschers. & Magnus, enchanter's nightshade
[*C. latifolia* L.] M
[*C. lutetiana* var. *canadensis* L.] G&C

Epilobium angustifolium L., fireweed
Epilobium ciliatum ssp. *glandulosum* (Lehm.) Hoch & Raven, willow-herb **(E, G5, T2, SH)**
[*E. glandulosum* var. *perplexans* (Trel.) Fern] M
[*E. glandulosum* Lehm.] G&C
Epilobium coloratum Biehl., purple-leaf willow
Epilobium hirsutum L., fireweed
Epilobium strictum Muhl. ex Spreng., downy willow-seed
[*E. densum* Raf.] M
Ludwigia palustris (L.) Ell., water purslane
[*Ludvigia palustris* (L.) Ell.] M
Oenothera biennis L., evening primrose
[*O. biennis* var. *nutans* (Atkins & Bart.) Wieg.] M
[*O. biennis* var. *pycnocarpa* (Atkins & Bart.) Wieg.] M
Oenothera perennis L., sundrops

Order: Cornales
CORNACEAE (DOGWOOD FAMILY)

Cornus alternifolia L. f., green osier
Cornus amomum Mill., silky dogwood
Cornus canadensis L., bunchberry
Cornus foemina ssp. *racemosa* (Lam.) J. Wilson, gray dogwood
[*C. racemosa* Lam.] M, G&C
Cornus rugosa Lam., round-leaf dogwood
Cornus sericea L., red osier
[*C. stolonifera* Michx.] M

Order: Santalales
SANTALACEAE (SANDALWOOD FAMILY)

Comandra umbellata (L.) Nutt., bastard-toadflax

Order: Celastrales
CELASTRACEAE (STAFF-TREE FAMILY)

Celastrus scandens L., American bittersweet
Euonymus atropurpurea Jacq., burning-bush
[*E. atropurpureus* Jacq.] M, G&C

AQUIFOLIACEAE (HOLLY FAMILY)

Ilex verticillata (L.) A. Gray, black alder
Nemopanthus mucronatus (L.) Loesener, mountain holly
[*N. mucronata* (L.) Trel.] M

Order: Euphorbiales
EUPHORBIACEAE (SPURGE FAMILY)

Acalypha virginica var. *rhomboidea* (Raf.) Cooperrider, three-seeded-mercury
[A. rhomboidea (Raf.) Cooperrider] M, G&C **(T, G5, S2)**
Chamaesyce nutans (Lag.) Small, eyebane
[*Euphorbia nutans* Lag.)] M, G&C
Euphorbia esula L., leafy spurge

Order: Rhamnales
RHAMNACEAE (BUCKTHORN FAMILY)

Rhamnus alnifolia L'Hér., alder-leaf buckthorn
Rhamnus cathartica L., common buckthorn

VITACEAE (GRAPE FAMILY)

Parthenocissus quinquefolia (L.) Planch. ex DC., Virginia creeper
Parthenocissus vitacea (L.) Planch. ex DC., Virginia creeper
Vitis palmata Vahl., red grape G&C (*)
Vitis riparia Michx., riverbank grape
[*V. vulpina* L.] M

Order: Polygales
POLYGALACEAE (MILKWORT FAMILY)

Polygala paucifolia Willd., fringed milkwort

Order: Sapindales
ACERACEAE (MAPLE FAMILY)

Acer negundo L., box-elder (*)
Acer nigrum Michx. f., black maple
Acer pensylvanicum L., striped maple
[*A. pennsylvanicum* L.] M
Acer rubrum L., red maple
Acer saccharinum L., silver maple
Acer saccharum Marsh., sugar maple
Acer spicatum Lam., mountain maple

ANACARDIACEAE (SUMAC FAMILY)

Rhus hirta (L.) Sudworth, staghorn sumac
[*Rhus typhina* L.] M, G&C

Toxicodendron radicans (L.) Kuntze, poison ivy
  [*Rhus toxicodendron* L.] M
Toxicodendron vernix (L.) Kuntze, poison sumac
  [*Rhus vernix* L.] M

RUTACEAE (RUE FAMILY)

Zanthoxylum americanum Mill., prickly ash

Order: Geraniales
OXALIDACEAE (OXALIS FAMILY)

Oxalis stricta L., lady's-sorrel
  [*O. stricta* L., *O. europaea* Jord.] M

GERANIACEAE (GERANIUM FAMILY)

Geranium maculatum L., wild geranium
Geranium robertianum L., herb-robert

LIMNANTHACEAE (MEADOW-FOAM FAMILY)

Floerkea proserpinacoides Willd., false-mermaid

BALSAMINACEAE (TOUCH-ME-NOT FAMILY)

Impatiens capensis Meerb., spotted jewelweed
  [*I. biflora* Walt.] M
Impatiens pallida Nutt., pale jewelweed

Order: Apiales
ARALIACEAE (GINSENG FAMILY)

Aralia hispida Vent., bristly sarsaparilla
Aralia nudicaulis L., wild sarsaparilla
Aralia racemosa L., spikenard

APIACEAE (CARROT FAMILY)

Angelica atropurpurea L., alexanders
Carum carvi L., caraway
Cicuta bulbifera L., water-hemlock
Cicuta maculata L., water-hemlock
Conioselinum chinense (L.) BSP., hemlock parsley
Conium maculatum L., poison hemlock
Cryptotaenia canadensis (L.) DC., honewort

Daucus carota L., Queen-Anne's-lace
Heracleum maximum Bartr., cow-parsnip
[*H. lanatum* Michx.] M, G&C
Hydrocotyle americana L., pennywort
Osmorhiza claytonii (Michx.) Clarke, sweet jarvil
[*O. Claytoni* (Michx.) Clarke] M
Pastinaca sativa L., wild parsnip
Sanicula marilandica L., black-snakeroot
Sium suave Walt., water-parsnip

Subclass: Asteridae
Order: Gentianales
GENTIANACEAE (GENTIAN FAMILY)

Gentianopsis crinita (Froel.) Ma, fringed gentian
[*Gentiana crinita* Froel.] M

APOCYNACEAE (DOGBANE FAMILY)

Apocynum androsaemifolium L., spreading dogbane
Apocynum cannabinum var. *cannabinum* L., Indian hemp
[*A. cannabinum* var. *pubescens* (R. Br.) DC.] M

ASCLEPIADACEAE (MILKWEED FAMILY)

Asclepias incarnata L., swamp milkweed
Asclepias quadrifolia Jacq., four-leaf milkweed
Asclepias syriaca L., common milkweed

Order: Solanales
SOLANACEAE (NIGHTSHADE FAMILY)

Physalis heterophylla Nees, clammy ground-cherry
[*P. heterophylla* var. *ambigua* (Gray) Rydb.] M
Physalis longifolia Nutt., long-leaf ground-cherry
[*P. longifolia* var. *subglabrata* (Mackz. & Bush) Cronq.] G&C
[*P. subglabrata* Mackz. & Bush] M
Solanum dulcamara L., trailing nightshade
Solanum nigrum L., black nightshade

CONVOLVULACEAE (MORNING-GLORY FAMILY)

Calystegia sepium ssp. *sepium* (L.) R. Br., hedge bindweed
[*Calystegia sepium* (L.) R. Br.] G&C
[*Convolvulus sepium* L.] M

CUSCUTACEAE (DODDER FAMILY)

Cuscuta gronovii Willd. ex Schultz, dodder

MENYANTHACEAE (BUCKBEAN FAMILY)

Menyanthes trifoliata L., buckbean, bogbean

POLEMONIACEAE (PHLOX FAMILY)

Phlox divaricata L., blue phlox

HYDROPHYLLACEAE (WATERLEAF FAMILY)

Hydrophyllum virginianum L., Virginia waterleaf

Order: Lamiales
BORAGINACEAE (BORAGE FAMILY)

Cynoglossum officinale L., hound's tongue
Hackelia virginiana (L.) Johnst., stickseed
Myosotis laxa Lehm., forget-me-not

VERBENACEAE (VERBENA FAMILY)

Phryma leptostachya L., lopseed
Verbena hastata L., blue vervain
Verbena urticifolia L., white vervain
    [*V. urticaefolia* L.] M

LAMIACEAE (MINT FAMILY)

Clinopodium vulgare L., basil
    [*Satureja vulgaris* (L.) Fritsch.] M, G&C
Collinsonia canadensis L., richweed, horsebalm
Glechoma hederacea L., ground ivy
    [*Nepeta hederacea* (L.) Trev.] M
Hedeoma pulegioides (L.) Pers., mock-pennyroyal
Lamium amplexicaule L., henbit
Leonurus cardiaca L., motherwort
Lycopus americanus Muhl. ex Bart., water-horehound
Lycopus asper Greene, western water-horehound
    [*L. lucidus* var. *americanus* Gray] M
Lycopus rubellus Moench., gypsy-wort (*) **(E, G5, S1)**
Lycopus uniflorus Michx., water-horehound
Mentha aquatica x *spicata* = *M.* x *piperita* L., peppermint
    [*M. piperita* L.] M

Mentha canadensis L., field mint
[*M. arvensis* var. *canadensis* (L.) Kuntze] M, G&C
Mentha spicata L., spearmint
Nepeta cataria L., catnip
Prunella vulgaris L., self-heal, heal-all
Scutellaria galericulata L., common skullcap
[*S. epilobiifolia* Hamil.] M
Scutellaria lateriflora L., mad-dog skullcap
Stachys tenuifolia Willd., creeping hedge-nettle
Teucrium canadense L., wild germander
Teucrium canadense var. *occidentale* (A. Gray) McClintock & Epling, northern germander
[*T. canadense* var. *boreale* (Bickn.) Shinners] G&C
[*T. occidentale* var. *boreale* (Bickn.) Fern.] M

Order: Callitrichales
CALLITRICHACEAE (WATER-STARWORT FAMILY)

Callitriche palustris L., water-starwort

Order: Plantaginales
PLANTAGINACEAE (PLANTAIN FAMILY)

Plantago lanceolata L., buck-horn plantain
Plantago major L., common plantain
Plantago rugelii Dcne., pale plantain

Order: Scrophulariales
OLEACEAE (OLIVE FAMILY)

Fraxinus americana L., white ash
Fraxinus nigra Marsh., black ash
Fraxinus pennsylvanica Marsh., green ash

SCROPHULARIACEAE (FIGWORT FAMILY)

Agalinis paupercula var. *borealis* Pennell, false-foxglove **(E, G5, T2, S3)**
[*Gerardia paupercula* (Gray) Britt.] M
[*Agalinis purpurea* var. *parviflora* (Benth.) B. Boivin] G&C
Agalinis purpurea (L.) Pennell, gerardia
[*Gerardia purpurea* L.] M
Chelone glabra L., turtle-heads
Gratiola neglecta Torrey, mud-hyssop
Linaria vulgaris Mill., butter-and-eggs
Mimulus ringens L., common monkeyflower
Pedicularis canadensis L., lousewort

Penstemon digitalis Nutt., false-foxglove
[*Pentstemon laevigatus* var. *digitalis* (Sweet) Gray] M
Scrophularia lanceolata Pursh, hair-figwort
Verbascum blattaria L., moth-mullein
Verbascum thapsus L., mullein
Veronica americana (Raf.) Schwein. ex Benth., American speedwell
Veronica anagallis-aquatica L., water speedwell
[*V. catenata* var. *glandulosa* (Farw.) Penn.] M
Veronica arvensis L., corn speedwell
Veronica officinalis L., speedwell
Veronica peregrina L., purslane-speedwell
Veronica scutellata L., marsh speedwell
Veronica serpyllifolia L., thyme-leaf speedwell
Veronica spicata L., speedwell
[*V. longifolia* L.] G&C

OROBANCHACEAE (BROOME-RAPE FAMILY)

Epifagus virginiana (L.) Bartr., beech-drops
Orobanche uniflora L., one-flowered cancer-root

LENTIBULARIACEAE (BLADDERWORT FAMILY)

Utricularia intermedia Hayne, milfoil bladderwort
Utricularia macrorhiza LeConte, common bladderwort
[*U. vulgaris* L.] G&C
[*U. vulgaris* var. *americana* Gray] M
Utricularia minor L., bladderwort **(T, G5, S3)**

Order: Campanulales
CAMPANULACEAE (BLUEBELL FAMILY)

Campanula aparinoides Pursh, marsh bellflower
[*C. uliginosa* Rydb.] M
Lobelia cardinalis L., cardinal-flower
Lobelia inflata L., Indian-tobacco
Lobelia kalmii L., Kalm's lobelia
Lobelia siphilitica L., great lobelia
Triodanis perfoliata var. *perfoliata* (L.) Nieuwl., Venus' looking-glass
[*T. perfoliata* (L.) Nieuwl.] G&C
[*Specularia perfoliata* (L.) A. DC.] M

Order: Rubiales
RUBIACEAE (MADDER FAMILY)

Cephalanthus occidentalis L., buttonbush
Galium aparine L., bedstraw, cleavers
Galium asprellum Michx., rough bedstraw
Galium boreale L., northern bedstraw
Galium circaezans Michx., wild licorice
Galium lanceolatum Torrey, wild licorice
Galium trifidum L., small bedstraw
Galium triflorum Michx., sweet-scented bedstraw
Mitchella repens L., partridge-berry

CAPRIFOLIACEAE (HONEYSUCKLE FAMILY)

Diervilla lonicera Mill., bush honeysuckle
Linnaea borealis ssp. *longiflora* (Torrey) Hulten, twinflower
    [*L. borealis* var. *americana* (Forbes) Rehder] M
    [*L. borealis* var. *longiflora* (L.) Torr.] G&C
Lonicera canadensis Bartr., fly honeysuckle
Lonicera dioica L., wild honeysuckle
Lonicera oblongifolia (Goldie) Hooker, swamp fly-honeysuckle
Lonicera tatarica L., Tartarian honeysuckle
Sambucus canadensis L., black elderberry
Sambucus racemosa ssp. *pubens* (Michx.) House, red elderberry
    [*S. pubens* Michx.] M
Triosteum aurantiacum Bickn., wild coffee
    [*T. perfoliatum* var. *aurantiacum* (Bickn.) Wieg.] M
Viburnum acerifolium L., maple-leaf viburnum
Viburnum dentatum var. *lucidum* Ait., arrowwood
    [*V. recognitum* Fern.] M
Viburnum lentago L., sheepberry
Viburnum nudum var. *cassinoides* (L.) Torrey & A. Gray., withe-rod
    [*V cassinoides* L] M
Viburnum opulus var. *americanum* Ait., cranberry-bush

VALERIANACEAE (VALERIAN FAMILY)

Valeriana uliginosa Rydb. ex Britt., marsh valerian **(T, G4, G5, S3)**

Order: Dipsacales
DIPSACACEAE (TEASEL FAMILY)

Dipsacus fullonum L., common teasel
    [*D. sylvestris* Huds.] M, G&C

Order: Asterales
ASTERACEAE (ASTER FAMILY)

Achillea millefolium L., common yarrow
Ambrosia artemisiifolia L., ragweed
Ambrosia trifida L., giant ragweed
Anaphalis margaritacea (L.) Benth. & Hooker f. ex Clarke, pearly-everlasting
Antennaria neglecta Greene, pussy's-toes
    [*A. canadensis* Greene] M
    [*A. neglecta* var. *canadensis* (Greene) Crong.] G&C
    [*A. neglecta* var. *neglecta* Greene] G&C
    [*A. neglecta* var. *neodioica* (Greene) Cronq.] G&C
    [*A. neodioica* Greene] M
    [*A. petaloidea* Fern.] M
Antennaria plantaginifolia (L.) Richards, everlasting
    [*A. fallax* Greene] M
    [*A. petaloidea* Fern.] M
    [*A. plantaginifolia* var. *ambigens* (Greene) Cronq.] G&C
Anthemis arvensis L., corn-chamomile
    [*A. arvensis* var. *agrestis* (Wallr.) DC.] M, G&C
Anthemis cotula L., mayweed
Arctium minus (Hill) Bernh., common burdock
Aster acuminatus Michx., mountain aster
Aster borealis (Torr. & A. Gray) Prov., rush aster (*)**(E, G5, S2)**
Aster cordifolius L., blue wood aster
Aster divaricatus L., white wood aster
Aster lanceolatus Willd., tall white aster
Aster lanceolatus var. *simplex* (Willd.) A. Jones, white wreath aster
    [*A. paniculatus* var. *simplex* (Willd.) Burg.] M
Aster lateriflorus (L.) Britt., calico aster
Aster macrophyllus L., bigleaf aster
Aster novae-angliae L., New England aster
Aster pilosus Willd., heath aster
Aster prenanthoides Muhl. ex Willd., zig-zag aster
Aster puniceus L., purple-stemmed aster
Aster puniceus var. *firmus* (Nees) Torrey & A. Gray, aster **(E, G5, T, S4)**
    [*A. firmus* Nees] G&C
    [*A. lucidulus* (Gray) Wieg.] M
Aster umbellatus Mill., flat-top white aster
Bidens cernua L., stick-tights
Bidens connata Muhl. ex Willd., beggar-ticks
Bidens frondosa L., beggar-ticks
Bidens tripartita L., beggar-ticks
    [*B. comosa* (A. Gray) Wieg.] M
    [*B. connata* Muhl.] G&C
Bidens vulgata Greene, beggar-ticks

Centaurea jacea L., brown knapweed
Centaurea nigrescens Willd., knapweed
    [*C. dubia* Suter] G&C
    [*C. vochinensis* Bernh.] M
Cichorium intybus L., chicory
Cirsium arvense (L.) Scop., Canada thistle
Cirsium muticum Michx., swamp-thistle
Cirsium vulgare (Savi) Tenore, bull thistle
    [*C. lanceolatum* (L.) Hill] M
Conyza canadensis (L.) Cronq., horseweed
    [*Erigeron canadensis* L.] M
Erechtites hieracifolia (L.) Raf. ex DC., fireweed
Erigeron annuus (L.) Pers., daisy-fleabane
Erigeron philadelphicus L., fleabane
Erigeron pulchellus Michx., robin's-plantain
Erigeron strigosus Muhl. ex Willd., daisy-fleabane
Eupatorium maculatum L., spotted Joe-Pye-weed
Eupatorium perfoliatum L., thoroughwort, boneset
Eupatorium purpureum L., sweet Joe-Pye-weed
    [*E. falcatum* Michx.] M
Eupatorium rugosum Houtt., white snakeroot
Eupatorium serotinum Michx., late thoroughwort (*)
Euthamia graminifolia (L.) Nutt. ex Cass., bush or flat-top goldenrod
    [*Solidago graminifolia* (L.) Salisb.] M
Gnaphalium macounii Greene, cudweed
    [*G. viscosum* Greene] M
Gnaphalium obtusifolium L., catfoot
Gnaphalium uliginosum L., low cudweed
Helenium autumnale L., sneezeweed
Helianthus divaricatus L., woodland sunflower
Helianthus strumosus L., wood-sunflower
Heliopsis helianthoides (L.) Sweet, ox-eye
Hieracium aurantiacum L., orange hawkweed
Hieracium caespitosum Dumort, king-devil
    [*H. pratense* Tausch.] M
Inula helenium L., elecampane
Lactuca biennis (Moench) Fern., wild lettuce
    [*L. spicata* (Lam.) Hitchc.] M
Lactuca sativa L., garden lettuce
    [*L. scariola* L.] M
    [*L. serriola* L.] G&C
Leontodon autumnalis L., fall dandelion
    [*Apargia autumnale* (L.) Hoffm.] M
Leucanthemum vulgare Lam., ox-eye daisy
    [*Chrysanthemum leucanthemum* L.] M, G&C
Onopordum acanthium L., Scotch thistle

Petasites frigidus var. *palmatus* (Ait.) Cronq., sweet coltsfoot **(E, G5, T5, S1)**
[*P. palmatus* (Ait.) Gray] M
Polymnia canadensis L., leaf-cup
Polymnia uvedalia L., bear's-foot **(E, G4, G5, S1)**
Prenanthes alba L., white lettuce
Prenanthes altissima L., rattlesnake-root (*)
Prenanthes serpentaria Pursh, lion's-foot (*)
Prenanthes trifoliolata (Cass.) Fern., gall-of-the-earth (*)
Rudbeckia hirta L., black-eyed-susan
Rudbeckia laciniata L., black-eyed-susan
Senecio aureus L., golden ragwort
Senecio pauperculus Michx., balsam groundsel
[*S. pauperculus* var. *balsamitae* (Muhl.) Fern.] M
Solidago arguta Ait., cutleaf goldenrod
Solidago bicolor L., white goldenrod
Solidago canadensis L., Canada goldenrod
Solidago canadensis var. *scabra* (Muhl.) Torrey & A. Gray, Canada goldenrod
[*S. altissima* L.] M
Solidago flexicaulis L., zig-zag goldenrod
[S. latifolia L.] M
Solidago gigantea Ait., late goldenrod
[*S. serotina* Ait. and var. *gigantea* (Ait.) Gray] M
Solidago houghtonii Torrey & A. Gray ex Gray, Houghton's goldenrod **(E, G3, S1)**
Solidago juncea Ait., early goldenrod
Solidago nemoralis Ait., rough goldenrod
Solidago ohioensis Ridd., Ohio goldenrod **(T, G4, S2)**
Solidago patula Muhl. ex Willd., spreading goldenrod
Solidago rugosa Mill., tall hairy goldenrod
Solidago uliginosa Nutt., swamp goldenrod
[*S. uniligulata* (DC.) Porter] M
Solidago ulmifolia Muhl. ex Willd., elm-leaf goldenrod (*)
Sonchus arvensis L., sow-thistle
Sonchus asper (L.) Hill, spiny sow-thistle
Sonchus oleraceus L., sow-thistle
Tanacetum vulgare L., tansy
Taraxacum officinale Weber ex Wiggers, common dandelion
Tragopogon porrifolius L., oyster-plant
Tragopogon pratensis L., yellow goat's-beard
Tussilago farfara L., coltsfoot
Xanthium strumarium L., common cocklebur
[*X. orientale* L.] M

Class: Liliopsida
Subclass: Alismatidae
Order: Alismatales
ALISMATACEAE (WATER-PLANTAIN FAMILY)

Alisma subcordatum Raf., water plantain
    [*A. plantago-aquatica* L.] M
Sagittaria cuneata Sheldon, wapato
Sagittaria latifolia Willd., wapato

Order: Hydrocharitales
HYDROCHARITACEAE (FROG'S-BIT FAMILY)

Elodea canadensis Rich. ex Michx., waterweed
    [*Anacharis canadensis* (Michx.) Planch.] M
Elodea nuttallii (Planch.) St. John, waterweed
    [*Anacharis occidentalis* (Pursh) Marie-Vict.] M

Order: Najadales
SCHEUCHZERIACEAE (SCHEUCHZERIA FAMILY)

Scheuchzeria palustris L., pod-grass

JUNCAGINACEAE (ARROW-GRASS FAMILY)

Triglochin maritimum L., arrow-grass
    [*T. maritima* L.] M
Triglochin palustre L., arrow-grass **(T, G5, S3)**
    [*T. palustris* L.] M

POTAMOGETONACEAE (PONDWEED FAMILY)

Coleogeton pectinatum (L.) D. Les & R. Hayes, sago pondweed
    [*Potamogeton pectinatus* L.] M, G&C
Potamogeton amplifolius Tuckerm., pondweed
Potamogeton crispus L., pondweed
Potamogeton pusillus var. *tenuissimus* Mert. & Koch, pondweed
    [*P. Bechtoldii* Fieber] M
    [*P. pusillus* L.] G&C
Potamogeton zosteriformis Fern., flat-stem pondweed

Subclass: Arecidae
Order: Arales
ARACEAE (ARUM FAMILY)

Acorus americanus (Raf.) Raf., sweetflag
  [*A. Calamus* L.] M
  [*A. calamus* L.] G&C
Arisaema dracontium (L.) Schott ex Schott & Endl., green dragon
Arisaema triphyllum (L.) Schott, jack-in-the-pulpit
Calla palustris L., water arum
Symplocarpus foetidus (L.) Salisb. ex Nutt., skunk cabbage

LEMNACEAE (DUCKWEED FAMILY)

Lemna minor L., duckweed
Lemna trisulca L., star duckweed
Spirodela polyrhiza (L.) Schleid., giant duckweed
Wolffia borealis (Engelm.) Landolt, watermeal
  [*W. punctata* Griseb.] M, G&C
Wolffia columbiana Karst., watermeal

Subclass: Commelinidae
Order: Juncales
JUNCACEAE (RUSH FAMILY)

Juncus acuminatus Michx., rush
Juncus alpinoarticulatus Chaix ex Vill., rush
  [*J. alpinus* var. *fuscescens* Fern.] M
Juncus alpinoarticulatus ssp. *americanus* (Farw.) Hämet-Ahti, alpine rush
  [*J. alpinus* var. *insignis* Fries] M
  [*J. alpinoarticulatus* Chaix] G&C
Juncus articulatus L., jointed rush
Juncus balticus Willd., rush
  [*J. arcticus* Willd.] G&C
Juncus brachycephalus (Engelm.) Buch., rush
Juncus brevicaudatus (Engelm.) Fern., rush
Juncus bufonius L., toad-rush
Juncus canadensis Gay ex LaHarpe, marsh rush
Juncus dudleyi Wieg., Dudley's rush
  [*J. tenuis* var. *dudleyi* (Wieg.) F. J. Herm.] G&C
Juncus effusus var. *solutus* Fern. & Wieg., soft-rush
Juncus marginatus Rostk., grass-rush
Juncus nodosus L., knot-rush
Juncus tenuis Willd., yard rush
  [*J. macer* S. F. Gray] M
Juncus torreyi Cov., rush

Luzula acuminata Raf., woodrush
[*L. saltuensis* Fern.] M

Order: Cyperales
CYPERACEAE (SEDGE FAMILY)

Carex albursina Sheldon, sedge
Carex amphibola var. *turgida* Fern., sedge (?)
[*C. amphibola* Steudel] G&C
[*C. grisea* Wahl.] M
Carex arctata Boott ex Hooker, sedge
Carex atlantica Bailey, sedge
[*C. Howei* Mack. and *C. incomperta* Bickn.] M
Carex aurea Nutt., sedge
Carex bebbii (Bailey) Olney ex Fern., sedge
Carex blanda Dewey, sedge
Carex bromoides Schkuhr ex Willd., sedge
Carex buxbaumii Wahl, sedge **(T, G5, S2)**
Carex communis Bailey, sedge
Carex crawei Dewey ex Torrey, sedge **(T, G5, S2)**
Carex cristatella Britt. ex Britt. & Brown, sedge
Carex cryptolepis Mackz., sedge
Carex diandra Schrank, sedge
Carex disperma Dewey, sedge
Carex eburnea Boott ex Hooker, sedge
Carex echinata Murr., sedge
[*C. angustior* Mack. and *C. cephalantha* var. *angustata* Carey] M
Carex flava L., sedge
Carex gracillima Schwein., sedge
Carex granularis var. *heleana* (Olney) Porter, Porter sedge
[*C. granularis* Muhl.] G&C
Carex gynocrates Wormsk. ex Drej., sedge
[*C. dioica* L.] G&C
Carex hystericina Muhl. ex Willd., sedge
Carex interior Bailey, sedge
Carex lacustris Willd., sedge
[*C. riparia* var. *lacustris* (Willd.) Kueken] M
Carex lasiocarpa Ehrh., sedge
Carex laxiflora Lam., sedge
[*C. anceps* Muhl.] M
Carex leptalea Wahl., sedge
Carex lupulina Muhl., sedge
Carex lurida Wahl., sedge
Carex pallescens L., sedge
Carex pauciflora Lightf., sedge
Carex paupercula Michx., sedge

Carex pedunculata Muhl. ex Willd., sedge
Carex plantaginea Lam., plantain-sedge
Carex prairea Dewey ex Wood., sedge
Carex pseudocyperus L., sedge
Carex rosea Schkuhr ex Willd., sedge
[*C. convoluta* Mack.] M
Carex rostrata Stokes ex With., sedge
Carex scabrata Schwein., sedge
Carex siccata Dewey, sedge
Carex spicata Huds., sedge (*)
Carex sterilis Willd., sedge
Carex stipata Muhl. ex Willd., sedge
Carex stricta Lam., tussock-sedge
Carex tenera Dewey, sedge
Carex trisperma Dewey, sedge
Carex vaginata Taush, sedge
Carex viridula Michx., sedge
Carex vulpinoidea Michx., sedge
Cladium mariscoides (Muhl.) Torrey, bog-rush
Cyperus bipartitus Torrey, cyperus
[*C. rivularis* Kunth.] M
Cyperus diandrus Torrey, cyperus
Dulichium arundinaceum (L.) Britt., three-way sedge
Eleocharis acicularis (L.) R. & S., hairgrass
Eleocharis elliptica var. *elliptica* Kunth, slender spikerush
[*E. acuminata* (Muhl.) Nees] M
[*E. elliptica* Kunth] M
[*E. tenuis* var. *borealis* (Sven.) Gleason] G&C
Eleocharis erythropoda Steud., spikerush
[*E. calva* Torr.] M
[*E. palustris* L.] G&C
Eleocharis intermedia Schultes, spikerush
Eleocharis obtusa (Willd.) Schultes, spikerush
[*E. ovata* (Roth) Roemer & Schultes] G&C
Eleocharis rostellata (Torrey) Torrey, spikerush
Eriophorum virginicum L., tawny cottongrass
Eriophorum viridi-carinatum (Engelm.) Fern., cottongrass
Rhynchospora alba (L.) Vahl, white beakrush
Rhynchospora capillacea Torrey, beakrush
Scirpus acutus Muhl. ex Bigel., hard-stem bulrush
Scirpus americanus Pers., three-square
Scirpus atrocinctus Fern., northern bulrush
[*S. cyperinus* (L.) Kunth.] G&C
Scirpus atrovirens Willd., bulrush

Scirpus cespitosus L., bulrush **(T, G5, S2)**

[*S. caespitosus* L.] M
[*S. cespitosus* var. *delicatulus* Fern.] In Fernald (1970)
Scirpus cyperinus (L.) Kunth, woolgrass
Scirpus pedicellatus Fern., bulrush
[*S. cyperinus* (L.) Kunth.] G&C
Scirpus pendulus Muhl., bulrush
[*S. lineatus* Michx.] M
Scirpus tabernaemontani Gmel., soft-stem bulrush
[*S. validus* Vahl.] M, G&C
Scirpus torreyi Olney, Torrey's rush
Scleria verticillata Muhl., nutrush **(E, G4, S1)**

POACEAE (GRASS FAMILY)

Agrostis stolonifera var. *palustris* (Huds.) Farw., creeping bent
[*A. stolonifera* var. *compacta* Hartm.] M
Alopecurus aequalis Sobol, short-awn foxtail
Anthoxanthum odoratum L., sweet vernalgrass
Arrhenatherum elatius (L.) Beauv. ex Presl & Presl, tall oatgrass
Bromus ciliatus L., fringed brome
Bromus secalinus L., cheat
Calamagrostis canadensis (Michx.) Beauv., bluepoint
Cinna arundinacea L., stout woodreed
Dactylis glomerata L., orchard grass
Deschampsia cespitosa (L.) Beauv., tufted hairgrass
[*D. caespitosa* var. *glauca* (Hartm.) Lindm.] M
Deschampsia flexuosa (L.) Trin., common hairgrass
Echinochloa crusgalli (L.) Beauv., barnyard grass
Echinochloa muricata var. *muricata* (Beauv.) Fern., cockspur grass
[*E. pungens* (Poir.) Rydb.] M
Elymus hystrix L., marsh wild rye
[*Asprella hystrix* (L.) Humb.] M
Elymus trachycaulus (Link) Gould ex Shinners, slender wheatgrass
[*Asprella caninum* (L.) Beauv.] M
Elymus virginicus L., Virginia wild rye
Elytrigia repens (L.) Nevski, quackgrass
[*Agropyron repens* (L.) Beauv.] M
Glyceria grandis S. Wats., reed meadow grass
Glyceria striata (Lam.) Hitchc., fowl mannagrass
Leersia oryzoides (L.) Sw., rice cutgrass
Leersia virginica Willd., whitegrass
Lolium pratense (Hudson) S. Darbyshire, meadow fescue
[*Festuca elatior* L.] M, G&C
Milium effusum L., milletgrass
Muhlenbergia glomerata (Willd.) Trin., spike muhly
[*M. racemosa* (Michx.) BSP.] M, G&C

Muhlenbergia mexicana (L.) Trin., satin-grass
[*M. mexicana* (L.) Trin. and *M. foliosa* Trin.] M
Muhlenbergia tenuiflora (Willd.) BSP., woodland dropseed
Oryzopsis asperifolia Michx., spreading ryegrass
Panicum acuminatum Sw., panic grass
[*P. lanuginosum* var. *Lindheimeri* (Nash) Fern.] M
[*P. lanuginosum* var. *lindheimeri* (Nash) Fern.] G&C
Panicum capillare L., witchgrass
Panicum flexile (Gatt) Scribn., panic grass **(T,G4, G5, S2)**
Phalaris arundinacea L., Reed canary-grass
Phleum pratense L., timothy
Phragmites australis (Cav.) Trin. ex Steud., common reed
[*P. communis* Trin.] M
Poa alsodes A. Gray, speargrass
Poa annua L., speargrass
Poa compressa L., Canada bluegrass
Poa palustris L., fowl bluegrass
Poa pratensis L., Kentucky bluegrass
Schizachne purpurascens (Torrey) Swallen, false melic
Setaria pumila (Poir.) Schultes, yellow foxtail
[*Setaria glauca* (L.) Beauv.] G&C
[*S. lutescens* (Weigel) Hub.] M
Setaria viridis (L.) Beauv., green foxtail
Sorghastrum nutans (L.) Nash ex Small, Indian grass
Sporobolus vaginiflorus (Torrey ex A. Gray) Wood, poverty grass

Order: Typhales
SPARGANIACEAE (BUR-REED FAMILY)

Sparganium erectum L. , bur-reed
[*S. chlorocarpum* Rydb.] M, G&C
Sparganium eurycarpum Engelm. ex A. Gray, bur-reed

TYPHACEAE (CATTAIL FAMILY)

Typha angustifolia L., narrow-leaf cattail
Typha latifolia L., common cattail

Subclass: Liliidae
Order: Liliales
LILIACEAE (LILY FAMILY)

Allium canadense L., wild garlic
Allium tricoccum Ait., wild leek
Allium vineale L., field garlic
Asparagus officinalis L., asparagus

Clintonia borealis (Ait.) Raf., woodlily
Erythronium americanum Ker, troutlily
Hemerocallis fulva (L.) L., orange day-lily
Lilium canadense L., Canada lily
Lilium philadelphicum L., woodlily
Maianthemum canadense Desf., Canada mayflower
Maianthemum racemosum L., false Solomon's-seal
[*Smilacina racemosa* (L.) Desf.] M, G&C
Maianthemum stellatum L., starflower
[*Smilacina stellata* (L.) Desf.] M, G&C
Maianthemum trifolium L., false Solomon's-seal
[*Smilacina trifolia* (L.) Desf.] M, G&C
Medeola virginiana L., Indian cucumber-root
Polygonatum biflorum (Walt.) Ell., small Solomon's-seal (*)
Polygonatum pubescens (Willd.) Pursh, Solomon's-seal
Streptopus roseus Michx., twisted-stalk
Tofieldia glutinosa (Michx.) Pers., false asphodel **(E, G5, S1)**
Trillium erectum L., purple trillium
Trillium grandiflorum (Michx.) Salisb., white trillium
Uvularia grandiflora Sm., bellwort
Uvularia perfoliata L., strawbell
Veratrum viride Ait., false hellebore
Zigadenus elegans ssp. *glaucus* (Nutt.) Hultén, white camass **(T, G5, S2)**
[*Z. chloranthus* Richards] M
[*Z. elegans* var. *glaucus* (Nutt.) Preece] G&C

IRIDACEAE (IRIS FAMILY)

Iris versicolor L., blue flag
Sisyrinchium angustifolium Mill., blue-eyed grass

SMILACACEAE (GREENBRIER FAMILY)

Smilax herbacea L., Jacob's-ladder
Smilax hispida Muhl., bristly greenbrier

Order: Orchidales
ORCHIDACEAE (ORCHID FAMILY)

Arethusa bulbosa L., swamp pink, dragon's mouth **(T, G4, S2)**
Calopogon tuberosus (L.) BSP., grass pink
[*C. pulchellus* (Sw.) R. Br.] M
Calypso bulbosa (L.) Oakes, calypso (?) **(E, G5, SH)**
Coeloglossum viride (L.) Hartm., long-bracted orchid (?)
[*Habenaria bracteata* (Willd.) R. Br.] M
[*Habenaria viridis* (L.) R. Br.] G&C

Corallorhiza maculata (Raf.) Raf., spotted coralroot
Corallorhiza trifida Chat., pale coralroot
Cypripedium acaule Ait., pink ladyslipper
Cypripedium candidum Muhl. ex Willd., small white ladyslipper **(E, G4, S1)**
Cypripedium parviflorum var. *makasin* (Farw.) Sheviak, small yellow ladyslipper
[*C. calceolus* var. *parviflorum* (Salisb.) Fern.] G&C
Cypripedium parviflorum var. *pubescens* (Willd.) Correll, large yellow ladyslipper
[*C. calceolus* var. *pubescens* (Willd.) Correll] M, G&C
Cypripedium reginae Walt., showy ladyslipper
Epipactis helleborine (L.) Crantz, helleborine
[*E. latifolia* (L.) All.] M
Galearis spectabilis (L.) Raf., showy orchis
[*Orchis spectabilis* L.] M, G&C
Goodyera pubescens (Willd.) R. Br., downy rattlesnake plantain
Goodyera repens (L.) R. Br., dwarf rattlesnake plantain
Liparis loeselii (L.) L. Rich., bog twayblade
Listera cordata (L.) R. Br., heartleaf twayblade
Malaxis monophyllos (L.) Sw., white adder's-mouth
[*Microstylis monophyllos* (L.) Lindl.] M
Platanthera blephariglottis (Willd.) Lindl., white fringed orchid
[*Habenaria blephariglottis* (Willd.) Hook] M, G&C
Platanthera dilatata (Pursh) Lindl. ex Beck, bog-candle
[*Habenaria dilatata* (Pursh) Hook] G&C
[*Habenaria dilitata* (Pursh) Hook] M
Platanthera grandiflora (Bigel.) Lindl., large purple fringed orchis
[*Habenaria fimbriata* (Ait.) R. Br.] M
[*Habenaria psycodes* var. *grandiflora* (Bigelow) A. Gray] G&C
Platanthera hookeri (Torrey ex A. Gray) Lindl., tubercled orchid
[*Habenaria hookeri* Torr.] M, G&C
Platanthera hyperborea (L.) Lindl., northern green orchid
[*Habenaria hyperborea* (L.) R. Br.] M, G&C
Platanthera lacera (Michx.) G. Don, ragged fringed orchid
[*Habenaria lacera* (Michx.) Lodd.] M, G&C
Platanthera orbiculata (Pursh) Lindl., small purple fringed orchid
[*Habenaria orbiculata* (Pursh) Torr.] M, G&C
Platanthera psycodes (L.) Lindl., large round-leafed orchid
[*Habenaria psycodes* (L.) Sprengel] M, G&C
Pogonia ophioglossoides (L.) Juss., rose pogonia
Spiranthes cernua (L.) L. Rich., nodding lady's-tresses
Spiranthes lucida (H. Eat.) Ames, wide-leafed lady's-tresses
Spiranthes romanzoffiana Cham., hooded lady's-tresses

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BIBLIOGRAPHY

Fernald M. L. 1970. Gray's manual of botany, 8th ed. Van Nostrand Reinhold Co. p. 1632.

Gleason, H. A. and A. Cronquist. 1991. Manual of vascular plants of northeastern United States and adjacent Canada. The New York Botanical Garden. 910 pp.

Mitchell, R. S. and G. C. Tucker. 1997. Revised checklist of New York State plants. NYS Museum Bull 490. 400 pp

Muenscher, W. C. 1946. The vegetation of Bergen Swamp 1. The vascular plants. Proc. Roch. Acad. Sci. 9: 64-117.

Seischab, F. K. 1977. Plant community development in the Byron-Bergen Swamp; A rheotrophic mire in Genesee County, New York. Ph.D. thesis, SUNY, Col. of Env. Sci. and For. p. 201.

Walker, R. S. 1974. The vascular plants and ecological factors along a transect in Byron-Bergen Swamp. Proc. Roch. Acad. Sci. 12: 241-270.

FLORA OF THE ALLEGANY STATE PARK REGION: AN UPDATE

Franz K. Seischab
Department of Biological Sciences
Rochester Institute of Technology
Rochester, New York 14623

The *Flora of the Allegany State Park Region* (House and Alexander, 1927) with an *Additions and Corrections to the Flora of the Allegany State Park Region, Cattaraugus County, New York (1927-38)* (House and Gordon, 1940) comprise a thorough species list for the region. In order to conduct a survey of today's vegetation and to make a comparison of 1937 and 1993 vegetation to the original survey records it was important to first update the species names. To that end, I have taken the original House and Alexander (1927) and House and Gordon (1940) publications and updated the species names according to Mitchell and Tucker's (1997) *Revised Checklist of New York State Plants* (1997).

No attempt has been made to verify that these species are all still present in the Allegany State Park region.

The following notations are used as a code throughout the species list:

1. All genus names, species epithets, common names and hyphenations are as listed in Mitchell and Tucker (1997).
2. All original author names, including their abbreviations are as listed in Mitchell and Tucker (1997).
3. Synonyms, author names and/or abbreviations used by House and Alexander (1927) or House and Gordon (1940) if different from those used by Mitchell and Tucker (1997) are included in brackets followed by an H&A or H&G.
4. In instances where the species names of Mitchell and Tucker (1997) and Gleason and Cronquist (1991) do not agree, the synonym, author name and/or abbreviation used by Gleason and Cronquist (1991) is indicated in brackets followed by G&C.

The New York State Status codes of **U** (unprotected), **E** (endangered) and **T** (threatened) are included according to Mitchell and Tucker (1997). Likewise, The Nature Conservancy Global and State Ranks are included as indicated in Mitchell and Tucker (1997). These include Global rankings of **G1** (globally imperiled) through **G5** (globally secure), **GH** (historical: no known extant sites) and **GX** (species believed to be extinct. State rankings include **S1** (critically imperiled in the State) through **S5** (demonstrably secure in the State), **SH** (historical: no known extant sites in the State) and **SX** (species believed to be extirpated in the State. All codes are bolded and in parentheses following the species names. Differences in species capitalization or hyphenation are considered trivial and are not included here.

Division: Lycopodiophyta
Class: Lycopodiopsida
Order: Lycopodiales
LYCOPODIACEAE (CLUBMOSS FAMILY)

Huperzia lucidula (Michx.) Trev., shining firmoss or clubmoss
[*Lycopodium lucidulum* Michx.] G&C, H&A
Lycopodium annotinum L., stiff clubmoss
Lycopodium clavatum L., running cedar
Lycopodium digitatum Dill. ex A. Br., running-pine
[*L. complanatum* L. var. *flabelliforme* Fernald] H&A
Lycopodium obscurum L., ground pine
Lycopodium tristachyum Pursh, ground cedar

Division: Equisetophyta
Class: Equisetopsida
Order: Equisetales
EQUISETACEAE (HORSETAIL FAMILY)

Equisetum arvense L., field horsetail
Equisetum fluviatile L., water horsetail
Equisetum hyemale L., scouring rush
Equisetum hyemale var. *affine* (Engelm.) A. Eaton
[*E. prealtum* Raf.] H&G
Equisetum sylvaticum L., wood horsetail

Division: Polypodiophyta
Class: Polypodiosida
Order: Ophioglossales
OPHIOGLOSSACEAE (ADDER'S-TONGUE FAMILY)

Botrychium dissectum Spreng., cut-leaf grape-fern
[*B. obliquum* Muhl. and var. *dissectum* (Spreng.) Clute] H&A
Botrychium lanceolatum var. *angustisegmentum* Pease & Moore
[*B. angustisegmentum* (Pease & Moore) Fernald] H&A
Botrychium matricariifolium (A. Br. ex Döll) A. Br. ex Koch, matricary grape fern
[*B. matricariaefolium* A. Braun] G&C
[*B. ramosum* (Roth) Aschers.] H&A
Botrychium multifidum (Gmel.) Rupr., leathery grape-fern
[*B. ternatum* var. *intermedium* D. C. Eaton] H&A
Botrychium virginianum (L.) Sw., rattlesnake fern
Ophioglossum pusillum Raf., northern adder's-tongue
[*Ophioglossum vulgatum* L.] H&A, G&C

Order: Polypodiales
OSMUNDACEAE (FLOWERING-FERN FAMILY)

Osmunda cinnamomea L., cinnamon fern
Osmunda claytoniana L., interrupted fern
Osmunda regalis L., royal fern

PTERIDACEAE (MAIDENHAIR FAMILY)

Adiantum pedatum L., maidenhair fern

DENNSTAEDTIACEAE (BRACKEN FAMILY)

Dennstaedtia punctilobula (Michx.) Moore, hay-scented fern
Pteridium aquilinum (L.) Kuhn ex Decken, bracken
Pteridium aquilinum var. *latiusculum* (Desv.) Underw. ex Heller (L.)
[*P. latiusculum* (Desv.) Maxon] H&A

THELYPTERIDACEAE (MARSH FERN FAMILY)

Phegopteris connectilis (Michx.) Watt, long beech fern
[*Thelypteris phegopteris* (L.) Slosson] H&A, G&C
Phegopteris hexagonoptera (Michx.) Fee, broad beech fern
[*Thelypteris hexagonoptera* (Michx.) Weatherby] H&A, G&C
Thelypteris noveboracensis (L.) Nieuwl., New York fern
Thelypteris palustris Schott, marsh fern

BLECHNACEAE (DEER FERN FAMILY)

Woodwardia virginica (L.) Sm.,Virginia chain fern

DRYOPTERIDACEAE (WOOD FERN FAMILY)

Athyrium filix-femina var. *asplenioides* (Michx.) Farw., lady-fern
[*A. angustum* var. *rubellum* (Gilbert) Butters, *A. angustum* var. *elatius* (Link) Butters] H&A
Cystopteris fragilis (L.) Bernh., common fragile fern
Deparia acrostichoides (Sw.) Kato, silvery spleenwort
[*Athyrium thelypterioides* (Michx.) Desv.] G&C
[*Athyrium acrostichoides* (Sw.) Diels.] H&A
Diplazium pycnocarpon (Spreng.) M. Broun., glade fern
[*Athyrium angustifolium* (Michx.) Milde] H&A
Dryopteris carthusiana (Vill.) Fuchs, spinulose wood fern
[*Thelypteris spinulosa* (O. F. Müll.) Nieuwl.] H&A
Dryopteris clintoniana (D. Eat. ex A. Gray) Dowell, Clinton's wood fern
[*Thelypteris cristata* var. *Clintoniana* (D. C. Eaton) Weatherby] H&A

Dryopteris cristata (L.) A. Gray, crested wood fern
[*Thelypteris cristata* (L.) Nieuwl.] H&A
Dryopteris goldiana (Hooker ex Goldie) A. Gray, Goldie's fern
[*Thelypteris Goldiana* (Hook.) Nieuwl.] H&A
[*T. goldiana* var. *clintoniana* (D. C. Eaton) Weatherly] H&A
Dryopteris intermedia (Muhl. ex Willd.) A. Gray, common wood fern
[*Thelypteris spinulosa* var. *intermedia* (Muhl.) Weatherby] H&A
Dryopteris marginalis (L.) A. Gray, marginal wood fern
[*Thelypteris marginalis* (L.) Nieuwl.] H&A
Gymnocarpium dryopteris (L.) Newm., oak fern
[*Thelypteris Dryopteris* (L.) Slossen] H&A
Matteuccia struthiopteris (L.) Todaro, ostrich fern
[*Pteretis nodulosa* (Michx.) Nieuwl.] H&A
Onoclea sensibilis L., sensitive fern
Polystichum acrostichoides (Michx.) Schott, Christmas fern

POLYPODIACEAE (POLYPODY FAMILY)

Polypodium virginianum L., rock polypody

Division: Pinophyta
Class: Pinopsida
Order: Taxales
TAXACEAE (YEW FAMILY)

Taxus canadensis Marsh., American yew

Order: Pinales
PINACEAE (PINE FAMILY)

Abies balsamea (L.) Mill., balsam fir
Larix laricina (DuRoi) Koch, tamarack
Picea mariana (Mill.) BSP., black spruce
Pinus rigida Mill., pitch pine
Pinus strobus L., white pine
Tsuga canadensis (L.) Carr., hemlock

CUPRESSACEAE (CYPRESS FAMILY)

Juniperus virginiana L., eastern red cedar

Division: Magnoliophyta
Subclass: Magnoliidae
Class: Magnoliopsida
Order: Magnoliales

MAGNOLIACEAE (MAGNOLIA FAMILY)

Liriodendron tulipifera L., tulip tree
Magnolia acuminata (L.) L., cucumber tree

Order: Laurales

LAURACEAE (LAUREL FAMILY)

Lindera benzoin (L.) Blume., spicebush
    [*Benzoin aestivale* (L.) Nees] H&A
Sassafras albidum (Nutt.) Nees, sassafras
    [*S. officinale* Nees & Eb.] H&A

Order: Aristolochiales

ARISTOLOCHIACEAE (BIRTHWORT FAMILY)

Asarum canadense L., wild ginger
    [Both *A. canadense* L. and A. *reflexum* Bicknell are listed.] H&A

Order: Nymphaeales

NYMPHAEACEAE (WATERLILY FAMILY)

Nuphar advena (Soland. ex Ait.) R. Br. ex Ait. f., yellow pond lily
    [*Nuphar advena* (Ait.) Ait. f.] G&C
    [*Nymphaea advena* Ait.] H&A
Nymphaea odorata Dryand. ex Ait., white water-lily
    [*Castalia odorata* (Ait.) Woodville & Wood] H&A

CABOMBACEAE (WATER-SHIELD FAMILY)

Brasenia schreberi Gmel., water-shield

CERATOPHYLLACEAE (HORNWORT FAMILY)

Ceratophyllum demersum L., coontail

Order: Ranunculales

RANUNCULACEAE (CROWFOOT FAMILY)

Actaea pachypoda Ell., white baneberry
    [*A. alba* (L.) Mill.] H&A, G&C

Actaea spicata L., red baneberry
[*Actaea rubra* (Ait.) Willd.] H&G, G&C
Anemone canadensis L., Canada anemone
Anemone quinquefolia L., wood anemone
Anemone virginiana L., thimbleweed
Aquilegia canadensis L., red columbine
Caltha palustris L., marsh marigold
Cimicifuga racemosa (L.) Nutt., black snakeroot
Clematis virginiana L., virgin's-bower
Coptis trifolia (L.) Salisb., goldthread
Hepatica nobilis var. *acuta* (Pursh) Steyerm., sharp-lobed hepatica
[*H. acutiloba* DC.] H&A, G&C
Hepatica nobilis var. *obtusa* (Pursh) Steyerm., blunt-lobed hepatica
[*H. americana* (DC.) Ker.] H&A, G&C
Ranunculus abortivus var. *eucyclus* Fern., kidneyleaf crowfoot
Ranunculus acris L., common buttercup
Ranunculus hispidus Michx., buttercup
Ranunculus hispidus var. *caricetorum* (Greene) Duncan, swamp buttercup
[*R. septentrionalis* Poir.] H&A
Ranunculus longirostris Godr., white water-crowfoot
Ranunculus pensylvanicus L. f., bristly buttercup
[*R. pennsylvanicus* L. f.] H&A
Ranunculus recurvatus Poir. ex Lam., hooked buttercup
Ranunculus texensis Engelm., water plaintain (This synonym is that of Gleason and Cronquist. This taxon is not listed in Mitchell. The synonym *R. laxicaulis* (T. & G.) Darby is used by House and by Fernald (1970).)
Thalictrum dioicum L., early meadow-rue
[*Thalicturm dioicum* L.] H&A
Thalictrum pubescens Pursh, tall meadow-rue
[*Thalicturm polygamum* Muhl.] H&A
Thalictrum thalictroides (L.) Eames & Boivin, rue anemone
[*Anemonella thalictroides* (L.) Spach] H&A, G&C

BERBERIDACEAE (BARBERRY FAMILY)

Caulophyllum thalictroides (L.) Michx., blue cohosh
Podophyllum peltatum L., may-apple

MENISPERMACEAE (MOONSEED FAMILY)

Menispermum canadense L., moonseed

Order: Papaverales
PAPAVERACEAE (POPPY FAMILY)

Sanguinaria canadensis L., bloodroot

FUMARIACEAE (FUMITORY FAMILY)

Adlumia fungosa (Ait.) Greene ex BSP., Allegheny vine
Corydalis sempervirens (L.) Pers., pink corydalis
Dicentra canadensis (Goldie) Walp., squirrel-corn
Dicentra cucullaria (L.) Bernh., dutchmen's-britches

Subclass: Hamamelidae
Order: Hamamelidales
PLATANACEAE (PLANE-TREE FAMILY)

Platanus occidentalis L., sycamore

HAMAMELIDACEAE (WITCH-HAZEL FAMILY)

Hamamelis virginiana L., witch-hazel

Order: Urticales
ULMACEAE (ELM FAMILY)

Ulmus americana L., American elm
Ulmus rubra Muhl., slippery elm
[*U. fulva* Michx.] H&A

CANNABACEAE (HEMP FAMILY)

Humulus lupulus L., common hop

URTICACEAE (NETTLE FAMILY)

Boehmeria cylindrica (L.) Sw., false-nettle
Laportea canadensis (L.) Wedd., wood nettle
Pilea pumila (L.) A. Gray, richweed
[*P. pumila* var. *Deamii* (Lunell) Fern.] H&G
Urtica dioica var. *gracilis* (Ait).) Selander, stinging nettle
[*U. gracilis* Ait.] H&A
[*U. procera* Muhl.] H&G

Order: Juglandales
JUGLANDACEAE (WALNUT FAMILY)

Carya cordiformis (Wang.) Koch, bitternut hickory
Carya glabra (Mill.) Sweet, pignut hickory
Carya ovalis (Wang.) Sarg., sweet pignut

Carya ovata (Mill.) Koch, shagbark hickory
Juglans cinerea L., butternut
Juglans nigra L., black walnut

Order: Myricales
MYRICACEAE (BAYBERRY FAMILY)

Comptonia peregrina (L.) Coult., sweet-fern
    [*Myrica asplenifolia* L.] H&A

Order: Fagales
FAGACEAE (BEECH FAMILY)

Castanea dentata (Marsh.) Borkh., American chestnut
Fagus grandifolia Ehrh., American beech
Quercus alba L., white oak
Quercus alba x *montana* = *Q.* x *saulii* Schneid., oak
    [*Quercus Saulii* Schneider] H&G
Quercus bicolor Willd., swamp white oak
Quercus montana Willd., chestnut oak
    [*Q. prinus* L.] G&C
Quercus prinoides Willd., dwarf chestnut oak
Quercus rubra L., red oak
Quercus velutina Lam., black oak

BETULACEAE (BIRCH FAMILY)

Alnus incana (L.) Moench, speckled alder
Betula alleghaniensis Britt., yellow birch
    [*B. lutea* Michx. f.] H&A
Betula lenta L., black birch
Carpinus caroliniana Walt., hornbeam
Corylus americana Walt., hazelnut
Corylus cornuta Marsh., beaked hazel
Ostrya virginiana (Mill.) Koch, hop hornbeam

Subclass: Caryophyllidae
Order: Caryophyllales
PHYTOLACCACEAE (POKEWEED FAMILY)

Phytolacca americana L., pokeweed

CHENOPODIACEAE (GOOSEFOOT FAMILY)

Atriplex patula L., seaside orach
Chenopodium album L., lamb's-quarters

Chenopodium berlandieri Moq., pigweed
Chenopodium botrys L., Jerusalem-Oak
Chenopodium capitatum (L.) Aschers., strawberry-blight
Chenopodium pratericola Rydb., narrow-leaf goosefoot
    [*C. leptophyllum* Nutt.] H&A, G&C
Chenopodium simplex (Torrey) Raf., maple-leaf goosefoot
    [*C. gigantospermum* Aellen.] G&C
    [*C. hybridum* L.] H&A

AMARANTHACEAE (AMARANTH FAMILY)

Amaranthus retroflexus L., redroot pigweed

PORTULACACEAE (PURSLANE FAMILY)

Claytonia caroliniana Michx., Carolina spring-beauty
Claytonia virginica L., spring-beauty
Portulaca oleracea L., purslane

MOLLUGINACEAE (CARPETWEED FAMILY)

Mollugo verticillata L., carpetweed

CARYOPHYLLACEAE (PINK FAMILY)

Agrostemma githago L., corn-cockle
Cerastium fontanum Baumg. *emend* Jalas, common mouse-ear
    [*C. vulgatum* L.] H&A, G&C
Moehringia lateriflora (L.) Fenzl, grove sandwort
    [*Arenaria lateriflora* L.] H&A, G&C
Myosoton aquaticum (L.) Moench, giant chickweed
    [*Stellaria aquatica* (L.) Scop.] H&A, G&C
Paronychia canadensis (L.) Wood, forked chickweed
    [*Anychia canadensis* (L.) BSP.] H&G
Saponaria officinalis L., bouncing-bet
Silene antirrhina L., sleepy catch-fly
Silene latifolia Poir., white campion
    [*Lychnis alba* Mill.] H&A
Silene noctiflora L., night-flowering catch-fly
Silene stellata (L.) Ait. f., starry campion
Spergula arvensis L., corn-spurry
Stellaria alsine Grimm, bog starwort
    [*S. uliginosa* Murr.] H&A
Stellaria graminea L., common stitchwort
Stellaria longifolia Muh. ex Willd., needle-leaf starwort
Stellaria media (L.) Vill., common chickweed

Order: Polygonales
POLYGONACEAE (BUCKWHEAT FAMILY)

Fagopyrum esculentum Moench, buckwheat
Polygonum amphibium var. *emersum* Michx., water smartweed
 [*P. coccineum* Muhl.] H&A
Polygonum arifolium L., arrowleaf
Polygonum aviculare L., knotweed
Polygonum cilinoda Michx., fringed bindweed
Polygonum convolvulus L., black bindweed
Polygonum cuspidatum Sieb. & Zucc., Japanese knotweed
Polygonum erectum L., erect knotweed **(U, G5, SX)**
Polygonum hydropiper L., common smartweed
Polygonum hydropiperoides Michx., mild water-pepper
Polygonum lapathifolium L., willow-weed
 [*Polygonum lapathifolium* var. *incanum* (Roth) Koch, listed as *P. scabrum* Moench in H&A while H&G state "*Polygonum scabrum* as recorded in House and Alexander's Flora (p. 70) should be deleted..."]
Polygonum pensylvanicum L., smartweed
 [*P. pennsylvanicum* L.] H&A
Polygonum persicaria L., lady's-thumb
Polygonum sagittatum L., tearthumb
Polygonum scandens L., climbing false-buckwheat
Polygonum virginianum L., jumpseed
Rumex acetosella L., sheep sorrel
Rumex crispus L., curly dock
Rumex obtusifolius L., bitter-dock
Rumex orbiculatus A. Gray, great water dock
 [*R. Britannica* L.] H&A
Rumex verticillatus L., swamp dock

Subclass: Dilleniidae
Order: Theales
CLUSIACEAE (MANGOSTEEN FAMILY)

Hypericum ascyron L., great St. John's-wort
 [*H. pyramidatum* Ait.] G&C
Hypericum ellipticum Hooker, pale St. John's-wort
Hypericum mutilum L., dwarf St. John's-wort
Hypericum perforatum L., common St. John's-wort
Hypericum punctatum Lam., St. John's-wort
Triadenum virginicum (L.) Raf., marsh St. John's-wort
 [*Hypericum virginicum* L.] H&A

Order: Malvales
TILIACEAE (LINDEN FAMILY)

Tilia americana L., basswood

MALVACEAE (MALLOW FAMILY)

Malva moschata L., musk-mallow
Malva neglecta Wallr., cheeses
    [*M. rotundifolia* L.] H&A

Order: Nepenthales
SARRACENIACEAE (PITCHER-PLANT FAMILY)

Sarracenia purpurea L., pitcher-plant

DROSERACEAE (SUNDEW FAMILY)

Drosera rotundifolia L., round-leaf sundew

Order: Violales
VIOLACEAE (VIOLET FAMILY)

Viola arvensis Murr., wild pansy
Viola blanda Willd., sweet white violet
    [*V. incognita* Brainerd] H&A
Viola canadensis L., tall white violet
Viola conspersa Reichenb., American dog-violet
Viola macloskeyi ssp. *pallens* (Banks ex DC.) M. Baker, sweet white violet
    [*V. blanda* Willd. and *V. pallens* (Banks) Brainerd] H&A
Viola palmata L., early blue violet
    [*V. Lovelliana* Brainerd] H&G
Viola pubescens Ait., yellow violet
    [*V. eriocarpa* Schw.] H&A
    [*V. eriocarpa* var. *leiocarpa* (Fern. & Wieg.) Seym.] H&G
    [*V. pubescens* var. *eriocarpa* (Schwein.) Russell] H&G
    [*V. pubescens* var. *Peckii* House] H&A
Viola rostrata Pursh, long-spurred violet
Viola rotundifolia Michx., round-leaf violet
Viola selkerkii Pursh ex Goldie, great spurred violet
Viola septentrionalis Greene, northern blue violet
    [*V. sororia* Willd.] G&C
Viola sororia Willd., common violet
    [*V. cucullata* Ait.] H&A
    [*V. latiuscula* Greene] H&G
Viola striata Ait., pale violet

CUCURBITACEAE (GOURD FAMILY)

Echinocystis lobata (Michx.) Torrey & A. Gray, prickly cucumber

Order: Salicales
SALICACEAE (WILLOW FAMILY)

Populus balsamifera L., balsam poplar
Populus grandidentata Michx., big-tooth aspen
Populus tremuloides Michx., quaking aspen
Salix bebbiana Sarg., beaked willow
Salix cordata Michx., heart-leaf willow (**E, G5, S1**)
Salix discolor Muhl., pussy-willow
Salix exigua Nutt., sandbar willow
    [*S. interior* Rowlee] H&G
Salix humilis Marsh., prairie willow
Salix humilis var. *tristis* (Ait.) Griggs, dwarf upland willow
    [*S. tristis* Ait.] H&A
    [*S. occidentalis* Walter] G&C
Salix lucida Muhl., shining willow
Salix nigra Marsh., black willow
Salix pedicellaris Pursh, bog willow
Salix sericea Marsh., silky willow

Order: Capparales
BRASSICACEAE (MUSTARD FAMILY)

Arabis drummondii A. Gray, rock cress (**E, G5, S3**)
Arabis laevigata (Muhl. ex Willd.) Poir. ex Lam., smooth rock-cress
Arabis lyrata L., lyre-leaf rock cress
Armoracia rusticana (Lam.) Gaertn., Meyer & Scherb., horseradish
Barbarea vulgaris R. Br. ex Ait., yellow rocket
Brassica juncea (L.) Czern., brown mustard
Brassica nigra (L.) Koch, black mustard
Brassica rapa L., field mustard
Capsella bursa-pastoris (L.) Medik., shepherd's-purse
Cardamine bulbosa (Schreb. ex Muhl.) BSP., spring cress
    [*C. rhomboidea* (Pers.) DC.] G&C
Cardamine concatenata (Michx.) Schwein., cut-leaf toothwort
    [*Dentaria laciniata* Muhl.] H&A
Cardamine diphylla (Michx.) Wood, two-leaved toothwort
    [*Dentaria diphylla* Michx.] H&A
Cardamine douglassii Britt., purple cress

Cardamine pensylvanica Muhl. ex Willd., Pennsylvania bittercress
[*C. pennsylvanica* Muhl.] H&A
Cardamine rotundifolia Michx., mountain watercress (**E, G4, S1**)
Lepidium campestre (L.) R. Br. ex Ait., cow-cress
Lepidium densiflorum Schrad., bird's peppergrass
Rorippa nasturtium-aquaticum (L.) Hayek., watercress
[*Nasturtium Nasturtium-aquaticum* (L.) Karst.] H&A
Rorippa palustris (L.) Besser, marsh watercress
[*Roripa palustris* (L.) Bess.] H&A
Sinapis arvensis L., charlock
[*Brassica arvensis* (L.) Kuntze] H&A
Sisymbrium altissimum L., tumble-mustard
Sisymbrium officinale (L.) Scop., hedge mustard

Order: Ericales
ERICACEAE (HEATH FAMILY)

Andromeda glaucophylla Link., bog rosemary
Chamaedaphne calyculata (L.) Moench, leatherleaf
Chimaphila umbellata (L.) Bart., pipsissewa
Epigaea repens L., trailing arbutus
Gaultheria hispidula (L.) Muhl. ex Bigel., creeping snowberry
[*Chiogenes hispidula* (L.) Torrey & A. Gray] H&A
Gaultheria procumbens L., wintergreen
Gaylussacia baccata (Wang.) Koch, black huckleberry
Kalmia latifolia L., mountain laurel
Monotropa hypopithys L., pinesap
[*M. Hypopitys* L.] H&A, H&G
Monotropa uniflora L., Indian-pipe
Orthilia secunda (L.) House, one-sided wintergreen
[*Pyrola secunda* L.] H&A, G&C
Pyrola americana Sweet, wild lily-of-the-valley
[*P. rotundifolia* var. *americana* (Sweet) Fern.] G&C
Pyrola elliptica Nutt., shinleaf
Rhododendron groenlandicum(Oeder) Kron & Judd, Laborador tea
[*Ledum groenlandicum* Oeder] G&C
Rhododendron maximum L., great laurel
Rhododendron periclymenoides (Michx.) Shinners, pinkster-flower
[*Azalea nudiflora* L.] H&A
Vaccinium angustifolium Ait., lowbush blueberry
[*V. pennsylvanicum* Lam.] H&A
[*V. pennsylvanicum* var. *nigrum* Wood] H&G
Vaccinium corymbosum L., highbush blueberry
[*V. atrococcum* (A. Gray) Heller] H&A
Vaccinium macrocarpon Ait., large cranberry

Vaccinium myrtilloides Michx., sour-top blueberry
[*V. pennsylvanicum* var. *myrtilloides* Fern. and *V. canadense* Kalm.] H&A
Vaccinium oxycoccos L., small cranberry
Vaccinium pallidum Ait., sugar huckleberry
[*V. vacillans* Kalm ex Torrey] H&A
Vaccinium stamineum L., deerberry

Order: Primulales

PRIMULACEAE (PRIMROSE FAMILY)

Lysimachia ciliata L., fringed loosestrife
[*Steironema ciliatum* (L.) Raf.] H&A
Lysimachia nummularia L., moneywort
Lysimachia punctata L., garden loosestrife
Lysimachia quadrifolia L., whorled loosestrife
Lysimachia terrestris (L.) BSP., swamp-candles
Trientalis borealis Raf., starflower

Subclass: Rosidae

Order: Rosales

GROSSULARIACEAE (GOOSEBERRY FAMILY)

Ribes americanum Mill., wild black currant
Ribes cynosbati L., dogberry
Ribes glandulosum Grauer, skunk currant
[*R. prostratum* L'Her.] H&A
Ribes lacustre (Pers.) Poir., bristly black currant
Ribes triste Pallas, wild red currant
[*R. triste* var. *albinervium* (Michx.) Fern.] H&A

CRASSULACEAE (SEDUM FAMILY)

Penthorum sedoides L., ditch-stonecrop
Sedum telephium L., live-forever
[*S. purpureum* (L.) J. A. Schultes] G&C
[*S. triphyllum* (Haw.) S. F. Gray] H&A

SAXIFRAGACEAE (SAXIFRAGE FAMILY)

Chrysosplenium americanum Schwein. ex Hooker, golden saxifrage
Mitella diphylla L., miterwort
Saxifraga pensylvanica L., swamp saxifrage
[*S. pennsylvanica* L.] H&A
Tiarella cordifolia L., foamflower

ROSACEAE (ROSE FAMILY)

Agrimonia gryposepala Wallr., common agrimony
Agrimonia striata Michx., agrimony
Amelanchier canadensis (L.) Medik., shadbush
Amelanchier intermedia Spach, serviceberry
Amelanchier laevis Wieg., smooth shadbush
Aronia arbutifolia (L.) Pers., red chokeberry
Aronia melanocarpa (Michx.) Ell., black chokeberry
Crataegus beata Sarg., hawthorn
  [*C. flabellata* (Bosc.) K. Koch] G&C
Crataegus brainerdii Sarg., hawthorn
  [*C. Brainerdi* var. *Egglestoni* (Sarg.) Robins] H&A
Crataegus calpodendron (Ehrh.) Medik., blackthorn
Crataegus coccinioides Ashe, hawthorn
  [*C. coccinoides* var. *dilitata* (Sarg.) Eggleston] H&A
Crataegus holmesiana Ashe, hawthorn
  [*C. coccinea* L.] G&C
Crataegus intricata Lange, hawthorn
  [*C. Boyntoni* Beadle] H&A
Crataegus macrosperma Ashe, hawthorn
  [*C. flabellata* (Bosc.) K. Koch] G&C
Crataegus pedicellata Sarg., hawthorn
  [*C. coccinea* L.] G&C
  [*C. coccinea* var. *Ellwangeriana* (Sarg.) Egglest., scarlet thorn] H&A
  [*C. pedicellata* var. *Ellwangeriana* (Sarg.) Egglest.] G&C
Crataegus pruinosa (Wendl. f.) Koch, hawthorn
  [*C. leiophylla* Sarg.] H&G
Crataegus punctata Jacq., dotted haw
Crataegus succulenta Schrad. ex Link, hawthorn
Dalibarda repens L., false-violet
Filipendula rubra (Hill) B. Robinson, queen-of-the-prairie
Filipendula ulmaria (L.) Maxim., queen-of-the-meadow
Fragaria vesca ssp. *americana* (Porter) Staudt, woodland strawberry
  [*F. vesca* var. *americana* Porter] H&A
Fragaria virginiana Dcne., wild strawberry
  [*F. virginica* Duchesne] H&A
Geum aleppicum Jacq., yellow avens
  [*G. strictum* Ait.] H&A
  [*G. aleppicum* var. *strictum* (Ait.) Fern.] H&G
Geum canadense Jacq., white avens
Geum laciniatum Murr., rough avens
  [*G. laciniatum* var. *Murrayanum* Fern.] H&G
Geum rivale L., purple avens
Geum virginianum L., rough avens (**E, G5, S1**)
Malus coronaria (L.) Mill., American crab

Malus glaucescens Rehd., American crab (**T,G3, G5, S1**)
Malus pumila Mill., common apple
[*Pyrus malus* L.] G&C
Porteranthus trifoliatus (L.) Britt., Indian physic
[*Gillenia trifoliata* (L.) Moench]
Potentilla arguta Pursh, tall cinquefoil
Potentilla canadensis L., dwarf cinquefoil
Potentilla norvegica ssp. *monspeliensis* (L.) Aschers. & Gräbn., rough cinquefoil
[*P. monspeliensis* L.] H&A
Potentilla recta L., sulfer cinquefoil
Potentilla simplex Michx., old-field cinquefoil
Prunus americana Marsh., hedge-plum
Prunus pensylvanica L. f., pin-cherry
[*P. pennsylvanica* L. f.] H&A
Prunus serotina Ehrh., black cherry
Prunus virginiana L., choke-cherry
Pyrus communis L., pear
Rosa arkansana var. *suffulta* (Greene) Cockerell, small prickly rose
[*R. Bushii* Rydb.] H&A
Rosa carolina L., pasture rose
[*R. obovata* Raf., and *R. carolina* var. *glandulosa* Farwell] H&A
Rosa palustris Marsh., swamp rose
Rubus allegheniensis Porter ex Bailey *sensu lato*, northern blackberry
Rubus canadensis L., blackberry
[*Rubus pergratus* Blanch.] H&A
Rubus flagellaris Willd., northern dewberry
Rubus hispidus L. *sensu lato*, swamp dewberry
Rubus idaeus ssp. *strigosus* (Michx.) Focke, wild raspberry
[*R. idaeus* var. *strigosus* (Michx.) Maxim.] G&C
[*R. strigosus* Michx.] H&A
Rubus occidentalis L., black raspberry
Rubus odoratus L., pink thimbleberry
Rubus pensilvanicus Poir. ex Lam. *sensu lato*, high-bush blackberry
[*R. heterophyllus* Willd.] H&G
Rubus pubescens Raf., dwarf raspberry
Sanguisorba canadensis L., Canadian burnet
Sorbus americana Marsh., mountain ash
Spiraea alba DuRoi, meadow-sweet
Waldsteinia fragarioides (Michx.) Tratt., barren strawberry

Order: Fabales
FABACEAE (BEAN FAMILY)

Amphicarpaea bracteata (L.) Rickett & Stafleu, hog-peanut
[*A. monoica* (L.) Ell.] H&A

Apios americana Medik., groundnut
[*A. tuberosa* Moench.] H&A
Baptisia tinctoria (L.) Vent., wild indigo
Desmodium canadense (L.) DC., giant tick-clover
Desmodium cuspidatum (Muhl. ex Willd.) DC. ex Loud., tick-clover
[*D. bracteosum* (Michx.) DC.] H&A
Desmodium glutinosum (Muhl. ex Willd.) Wood, sticky tick-clover
[*D. grandiflorum* (Walt.) DC.] H&A
Desmodium nudiflorum (L.) DC., tick-trefoil
Desmodium paniculatum (L.) DC., tick-trefoil
Desmodium rotundifolium DC., tick-clover
Lathyrus ochroleucus Hooker, creamy wild-pea
Lespedeza capitata Michx., lespedeza
Lespedeza hirta (L.) Hornem., bush clover
Lespedeza intermedia (S. Wats.) Britt., lespedeza
Lupinus perennis L., wild lupine
Medicago lupulina L., black medic
Medicago sativa L., alfalfa
Melilotus alba Desr. ex Lam., white sweet-clover
Melilotus officinalis (L.) Pallas, yellow sweet-clover
Robinia pseudo-acacia L., black locust
Trifolium aureum Pollich, yellow clover
[*T. agrarium* L.] H&A
Trifolium hybridum L., alsike clover
Trifolium pratense L., red clover
Trifolium repens L., white clover
Vicia caroliniana Walt., wood-vetch
Vicia cracca L., cow-vetch

Order: Myrtales
LYTHRACEAE (LOOSESTRIFE FAMILY)

Decodon verticillatus (L.) Ell., water-willow
Lythrum alatum Pursh, winged loosestrife

THYMELACEACEAE (MEZEREUM FAMILY)

Dirca palustris L., leatherwood

ONAGRACEAE (EVENING-PRIMROSE FAMILY)

Circaea alpina L., dwarf enchanter's nightshade
Circaea lutetiana ssp. *canadensis* (L.) Aschers. & Magnus, enchanter's nightshade
. [*C. latifolia* Hill] H&A
Epilobium angustifolium L., fireweed

Epilobium ciliatum ssp. *ciliatum* Raf., willow-herb
[*E. glandulosum* var. *adenocaulon* (Haussk.) Fern.] H&A
Epilobium coloratum Biehl., purple-leaf willow-herb
Epilobium hirsutum L., European fireweed
Epilobium strictum Muhl. ex Spreng., downy willow-weed
[*E. densum* Raf. and *E. molle* Torr.] H&A
Ludwigia palustris (L.) Ell., marsh purslane
[*Ludvigia palustris* (L.) Ell.] H&A
Oenothera biennis L., common evening-primrose
Oenothera fruticosa L., sundrops
[*O. tetragona* Roth] H&A
Oenothera parviflora var. *parviflora* L., evening-primrose
[*O. muricata* L.] H&A
Oenothera perennis L., sundrops

Order: Cornales
NYSSACEAE (TUPELO FAMILY)

Nyssa sylvatica Marsh., black gum, pepperidge

CORNACEAE (DOGWOOD FAMILY)

Cornus alternifolia L. f., green osier
Cornus amomum Mill., silky dogwood
Cornus canadensis L., bunchberry
Cornus florida L., flowering dogwood
Cornus foemina ssp. *racemosa* (Lam.) J. Wilson, gray dogwood
[*C. candidissima* Marsh.] H&A
[*C. racemosa* Lam.] G&C
Cornus rugosa Lam., round-leaf dogwood
Cornus sericea L., red osier
[*C. stolonifera* Michx.] H&A

Order: Santalales
SANTALACEAE (SANDALWOOD FAMILY)

Comandra umbellata (L.) Nutt., bastard-toadflax

Order: Celastrales
CELASTRACEAE (STAFF-TREE FAMILY)

Celastrus scandens L., American bittersweet
Euonymus obovata Nutt., running strawberry-bush
[*Evonymus obovatus* Nutt.] H&A, G&C

AQUIFOLIACEAE (HOLLY FAMILY)

Ilex montana Torrey & A. Gray ex A. Gray, mountain winterberry
[*I. monticola* Gray] H&A
Ilex verticillata (L.) A. Gray, black alder
Nemopanthus mucronatus (L.) Loesener ex Koehne, mountain holly
[*N. mucronata* (L.) Trelease] H&A

Order: Euphorbiales
EUPHORBIACEAE (SPURGE FAMILY)

Acalypha virginica L., three-seeded-mercury
Chamaesyce maculata (L.) Small, eyebane
[*Euphorbia maculata* L.] H&A, G&C
Chamaesyce nutans (Lag.) Small, upright spurge
[*Euphorbia nutans* Lag.] H&A, G&C
Chamaesyce vermiculata (Raf.) House, hairy spurge
[*Euphorbia hirsuta* (Torr.) Wiegand] H&A
[*E. vermiculata* Raf.] G&C
Euphorbia cyparissias L., cypress spurge

Order: Rhamnales
RHAMNACEAE (BUCKTHORN FAMILY)

Ceanothus americanus L., New Jersey tea
Rhamnus alnifolia L'Her., alder-leaf buckthorn

VITACEAE (GRAPE FAMILY)

Parthenocissus quinquefolia (L.) Planch. ex DC., Virginia creeper
[*Psedera quinquefolia* (L.) Greene] H&A
Vitis aestivalis Michx., summer grape
Vitis riparia Michx., frost grape, riverbank grape
[*V. vulpina* L.] H&A

Order: Polygales
POLYGALACEAE (MILKWORT FAMILY)

Polygala paucifolia Willd., gay-wings
Polygala sanguinea L., rose milkwort
[*P. viridescens* L.] H&A
Polygala senega L., Seneca snakeroot
Polygala verticillata L., whorled milkwort
Polygala verticillata var. *ambigua* (Nutt.) Wood
[*P. ambigua* Nutt.] H&G, G&C

Order: Sapindales
STAPHYLEACEAE (BLADDERNUT FAMILY)

Staphylea trifolia L., bladdernut

ACERACEAE (MAPLE FAMILY)

Acer negundo L., box-elder
Acer nigrum Michx. f., black maple
Acer pensylvanicum L., striped maple
    [*A. pennsylvanicum* L.] H&A
Acer rubrum L., red maple
Acer saccharinum L., silver maple
Acer saccharum Marsh., sugar maple
Acer spicatum Lam., mountain maple

ANACARDIACEAE (SUMAC FAMILY)

Rhus copallinum L., dwarf sumac
    [*R. copallina* L.] H&A
Rhus glabra L., smooth sumac
Rhus hirta (L.) Sudworth, staghorn sumac
    [*R. typhina* L.] G&C
Toxicodendron radicans (L.) Kuntze, poison ivy
    [*Rhus Toxicodendron* L.] H&A
Toxicodendron vernix (L.) Kuntze, poison sumac
    [*Rhus vernix* L.] H&A

SIMAROUBACEAE (QUASSIA FAMILY)

Ailanthus altissima (Mill.) Swingle, tree-of-heaven

Order: Geraniales
OXALIDACEAE (OXALIS FAMILY)

Oxalis montana Raf., common wood-sorrel
    [*Oxalis acetosella* L.] G&C
Oxalis stricta L., lady's-sorrel
    [*O. europea* Jord.] H&A

GERANIACEAE (GERANIUM FAMILY)

Geranium dissectum L., cutleaf cranesbill
Geranium maculatum L., wild geranium

LIMNANTHACEAE (MEADOW-FOAM FAMILY)

Floerkea proserpinacoides Willd., false-mermaid

BALSAMINACEAE (TOUCH-ME-NOT FAMILY)

Impatiens capensis Meerb., spotted touch-me-not
[*I. biflora* Walt.] H&A
Impatiens pallida Nutt., pale jewelweed

Order: Apiales
ARALIACEAE (GINSENG FAMILY)

Aralia hispida Vent., bristly sarsaparilla
Aralia nudicaulis L., wild sarsaparilla
Aralia racemosa L., spikenard
Aralia spinosa L., Hercules'-club
Panax quinquefolius L., ginseng
[*P. quinquefolium* L.] G&C
Panax trifolius L., dwarf ginseng
[*P. trifolium* L.] H&A, G&C

APIACEAE (CARROT FAMILY)

Angelica atropurpurea L., alexanders
Angelica venenosa (Greenway) Fern., hairy angelica
[*A. villosa* (Walt.) BSP.] H&A
Carum carvi L., caraway
Cicuta bulbifera L., water-hemlock
Cicuta maculata L., water-hemlock
Conioselinum chinense (L.) BSP., hemlock-parsley
Cryptotaenia canadensis (L.) DC., honewort
Daucus carota L., Queen-Anne's-lace
Heracleum maximum Bartr., cow-parsnip
[*Heracleum lanatum* Michx.] H&A, G&C
Hydrocotyle americana L., pennywort
Osmorhiza claytonii (Michx.) Clarke, sweet jarvil
[*O. Claytoni* (Michx.) Clarke]
Osmorhiza longistylis (Torrey) DC., anise-root
Pastinaca sativa L., wild parsnip
Sanicula marilandica L., black snakeroot
Sanicula oderata (Raf.) Pryer & Phillippe, sanicle
[*Sanicula gregaria* Bickn.] H&A, G&C
Sanicula trifoliata Bickn., sanicle
Sium suave Walt., water-parsnip
Taenidia integerrima (L.) Drude, yellow pimpernel

Thaspium barbinode (Michx.) Nutt., meadow-parsnip
Zizea aptera (A. Gray) Fern., golden alexanders
[*Z. cordata* (Walt.) DC.] H&A
Zizea aurea (L.) Koch, golden alexanders

Subclass: Asteridae
Order: Gentianales
GENTIANACEAE (GENTIAN FAMILY)

Bartonia virginica (L.) BSP., bartonia
Gentiana andrewsii Griseb., closed gentian
Gentianella quinquefolia (L.) Small, stiff gentian
[*Gentiana quinquefolia* L.] H&A

APOCYNACEAE (DOGBANE FAMILY)

Apocynum androsaemifolium L., spreading dogbane
Apocynum cannabinum L., Indian hemp

ASCLEPIADACEAE (MILKWEED FAMILY)

Asclepias exaltata L., poke milkweed
[*A. phytolaccoides* Pursh] H&A
Asclepias incarnata L., swamp milkweed
Asclepias quadrifolia Jacq., four-leaf milkweed
Asclepias syriaca L., common milkweed
Cynanchum laeve (Michx.) Pers., honey-vine
[*Ampelamus albidus* (Nutt.) Britt.] H&G, G&C

Order: Solanales
SOLANACEAE (NIGHTSHADE FAMILY)

Physalis longifolia Nutt., long-leaf ground-cherry
[*P. longifolia* var. *subglabrata* (Mackz. & Bush) Cronq.] G&C
[*P. subglabrata* Mackz. & Bush] H&G
Solanum carolinense L., horse-nettle
Solanum dulcamara L., climbing nightshade
Solanum nigrum L., black nightshade

CONVOLVULACEAE (MORNING-GLORY FAMILY)

Calystegia sepium (L.) R. Br., hedge bindweed
[*Convolvulus sepium* L.] H&A
Calystegia spithamea (L.) Pursh, low bindweed
[*Convolvulus spithamaeus* L.] H&A
Ipomoea pandurata (L.) Meyer, wild potato-vine, (**E, G4, G5, S2**)

CUSCUTACEAE (DODDER FAMILY)

Cuscuta epithymum (L.) L., clover-dodder
Cuscuta gronovii Willd. ex Schultz, common dodder

MENYANTHACEAE (BUCKBEAN FAMILY)

Menyanthes trifoliata L., buckbean

POLEMONIACEAE (PHLOX FAMILY)

Phlox divaricata L., blue phlox
Phlox maculata L., wild sweet-william (**T, G5, S1**)
Phlox paniculata L., fall phlox
Polemonium reptans L., Jacob's ladder

HYDROPHYLLACEAE (WATERLEAF FAMILY)

Hydrophyllum canadense L., Canada waterleaf
Hydrophyllum virginianum L., Virginia waterleaf

Order: Lamiales
BORAGINACEAE (BORAGE FAMILY)

Borago officinalis L., borage
Cynoglossum officinale L., hound's-tongue
Cynoglossum virginianum var. *boreale* (Fern.) Cooperrider, wild comfrey, (**T, G5, S1**)
    [*Cynoglossum boreale* Fern.]
Hackelia virginiana (L.) Johnst., beggar-lice
    [*Lappula virginiana* (L.) Greene] H&A
Lappula squarrosa (Retz.) Dumort., stickseed
    [*L. echinata* Gilib.] H&A
Mertensia virginica (L.) Pers. ex Link, Virginia bluebells
Myosotis laxa Lehm., wild forget-me-not
Myosotis scorpioides L., forget-me-not
Symphytum officinale L., comfrey

VERBENACEAE (VERBENA FAMILY)

Phryma leptostachya L., lopseed
Verbena hastata L., blue vervain
Verbena urticifolia L., white vervain
    [*Verbena urticaefolia* L.] H&A

LAMIACEAE (MINT FAMILY)

Agastache scrophulariifolia (Willd.) Kuntze, purple giant-hyssop
 [*A. scrophulariaefolia* (Willd.) Kuntze] G&C
Blephilia hirsuta (Pursh) Benth., wood mint
Clinopodium vulgare L., basil
 [*Satureja vulgaris* (L.) Fritsch.] G&C
Collinsonia canadensis L., richweed
Galeopsis tetrahit L., hemp-nettle
Glechoma hederacea L., ground-ivy, gill-over-the-ground
 [*Nepeta hederacea* (L.) Trev.] H&A
Hedeoma pulegioides (L.) Pers., mock-pennyroyal
Lamium amplexicaule L., henbit
Leonurus cardiaca L., motherwort
Lycopus americanus Muhl. ex Bart., water-horehound
Lycopus uniflorus Michx., water-horehound
Lycopus virginicus L., water-horehound
Mentha aquatica x *spicata* = *M.* x *piperita* L., peppermint
 [*M. piperita* L.] H&A
Mentha canadensis L., field mint
 [*M. arvensis* var. *canadensis* (L.) Briq.] H&A, G&C
Mentha spicata L., spearmint
Monarda clinopodia L., basil-balm
Monarda didyma L., bee-balm
Monarda fistulosa L., wild bergamot
Nepeta cataria L., catnip
Prunella vulgaris L., self-heal
Pycnanthemum virginianum (L.) Durieu & Jacks. ex Fern. & B. Robinson, mountain mint
Scutellaria galericulata L., common skullcap
Scutellaria incana Biehl., hoary skullcap (**E, G5, SH**)
 [*S. canescens* Nutt.] H&A
Scutellaria lateriflora L., mad-dog skullcap
Stachys palustris L., woundwort
 [*S. arenicola* Britt.] H&G
Stachys tenuifolia Willd., hedge-nettle
 [*S. tenuifolia* var. *aspera* (Michx.) Fern.] H&A
Teucrium canadense L., wild germander

Order: Callitrichales
CALLITRICHACEAE (WATER-STARWORT FAMILY)

Callitriche heterophylla Pursh, water-starwort

Order: Plantaginales
PLANTAGINACEAE (PLANTAIN FAMILY)

Plantago lanceolata L., buck-horn plantain
Plantago major L., common plantain
Plantago psyllium L., flaxseed plantain
    [*P. arenaria* Waldst. & Kit.] H&G
Plantago rugelii Dcne., pale plantain

Order: Scrophulariales
OLEACEAE (OLIVE FAMILY)

Fraxinus americana L., white ash
Fraxinus nigra Marsh., black ash

SCROPHULARIACEAE (FIGWORT FAMILY)

Aureolaria flava var. *flava* (L.) Farw., yellow false-foxglove
    [*A. flava* (L.) Farw.] G&C
    [*A. glauca* (Eddy) Raf.] H&A
Aureolaria virginica (L.) Pennell, downy false-foxglove
Chaenorrhinum minus (L.) Lange, dwarf snapdragon
    [*Linaria minor* (L.) Desf.] H&A
Chelone glabra L., turtle-heads
Gratiola neglecta Torrey, mud-hyssop
Linaria vulgaris Mill., butter-and-eggs
Lindernia dubia var. *dubia* (L.) Pennell, false-pimpernel
    [*Ilysanthes dubia* (L.) Barnh.] H&A
Melampyrum lineare Desr., cow-wheat
Mimulus moschatus Dougl. ex Lindl., muskflower
Mimulus ringens L., common monkeyflower
Pedicularis canadensis L., lousewort
Scrophularia lanceolata Pursh, hare-figwort
Scrophularia marilandica L., carpenter's-square
Verbascum blattaria L., moth-mullein
Verbascum thapsus L., mullein
Veronica americana (Raf.) Schwein. ex Benth., American speedwell
Veronica chamaedrys L., bird's-eye speedwell
Veronica officinalis L., speedwell
Veronica peregrina L., neckweed
Veronica scutellata L., marsh speedwell
Veronica serpyllifolia L., thyme-leaf speedwell
Veronicastrum virginicum (L.) Farw., Culver's-root
    [*Veronica virginica* L.] H&A

OROBANCHACEAE (BROOME-RAPE FAMILY)

Conopholis americana (L.) Wallr., squawroot
Epifagus virginiana (L.) Bartr., beech-drops
Orobanche uniflora L., one-flowered cancer-root

LENTIBULARIACEAE (BLADDERWORT FAMILY)

Utricularia macrorhiza LeConte, common bladderwort
 [*U. vulgaris* L.] G&C

Order: Campanulales
CAMPANULACEAE (BLUEBELL FAMILY)

Campanula americana L., tall bellflower
Campanula rapunculoides L., creeping bellflower
Lobelia cardinalis L., cardinal-flower
Lobelia inflata L., Indian-tobacco
Lobelia siphilitica L., great lobelia
Lobelia spicata Lam., pale-spiked lobelia
Triodanis perfoliata var. *perfoliata* (L.) A. DC., Venus' looking-glass
 [*Specularia perfoliata* (L.) A. DC.] H&G

Order: Rubiales
RUBIACEAE (MADDER FAMILY)

Cephalanthus occidentalis L., buttonbush
Galium aparine L., bedstraw
Galium asprellum Michx., rough bedstraw
Galium boreale L., northern bedstraw
Galium circaezans Michx., wild-licorice
Galium lanceolatum Torrey, wild-licorice
Galium mollugo L., white bedstraw
Galium palustre L., ditch bedstraw
Galium tinctorium (L.) Scop., bedstraw
 [House lists this species as both *G. tinctorium* L. and as *G. Claytoni* Michx.] H&A
Galium triflorum Michx., sweet-scented bedstraw
Houstonia caerulea L., bluets
 [*Hedyotis caerulea* (L.) Hooker] G&C
Mitchella repens L., partridge-berry

CAPRIFOLIACEAE (HONEYSUCKLE FAMILY)

Diervilla lonicera Mill., bush honeysuckle
Lonicera canadensis Bartr., fly honeysuckle

Lonicera dioica L., mountain honeysuckle
Lonicera dioica var. *glaucescens* (Rydb.) Butters, mountain honeysuckle
Lonicera villosa (Michx.) R. & S., waterberry
    [*L. caerulea* var. *villosa* (Michx.) T. & G.] G&C
    [*L. villosa* var. *tonsa* Fern.] H&G
Sambucus canadensis L., black elderberry
Sambucus racemosa L., red elderberry
    [*S. racemosus* L.] H&A
Symphoricarpos albus (L.) Blake, snowberry
Triosteum aurantiacum Bickn., wild coffee
    [*T. perfoliatum* L. var. *aurantiacum* (Bick.) Wiegand] H&A
Viburnum acerifolium L., maple-leaf viburnum
Viburnum dentatum L., southern arrowwood
Viburnum lantanoides Michx., hobblebush
    [*V. alnifolium* Marsh.] H&A, G&C
Viburnum lentago L., sheepberry
Viburnum nudum var. *cassinoides* (L.) Torrey & A. Gray, withe-rod
    [*V. cassinoides* L.] H&A
Viburnum opulus L., cranberry-bush

Order: Dipsacales
DIPSACACEAE (TEASEL FAMILY)

Dipsacus fullonum L., common teasel
    [*D. sylvestris* Huds.] H&A, G&C
Scabiosa columbaria L., pincushion flower
    [*S. atropurpurea* L.] H&G

Order: Asterales
ASTERACEAE (ASTER FAMILY)

Achillea millefolium L., common yarrow
Ambrosia artemisiifolia L., ragweed
Ambrosia trifida L., giant ragweed
Anaphalis margaritacea (L.) Benth. & Hooker f. ex Clarke, pearly everlasting
Antennaria neglecta Greene, everlasting
    [*A. canadensis* Greene] H&A
    [*A. neglecta* var. *neodioica* (Greene) Cronq.] G&C
    [*A. neodioica* Greene] H&A
Antennaria plantaginifolia (L.) Richards., pussy's-toes
    [*A. ambigens* (Greene) Fern.] H&G
    [*A. fallax* (Greene) and *A. occidentalis* Greene] H&A
    [*A. Parlinii* Fern.] H&A
    [*A. plantaginifolia* var. *ambigens* (Greene) Cronq.] G&C
Anthemis cotula L., mayweed
Arctium minus (Hill) Bernh., common burdock

Artemisia absinthium L., wormwood
Artemisia biennis Willd., sage-weed
Aster acuminatus Michx., mountain aster
Aster cordifolius L., blue wood aster
Aster divaricatus L., white wood aster
Aster infirmus Michx., cornel-leaved aster
[*Doellingeria infirma* (Michx.) Greene] H&G
Aster laevis L., smooth blue aster
Aster lanceolatus var. *lanceolatus* Willd., tall white aster
[*A. paniculatus* Lam.] H&A
Aster lateriflorus (L.) Britt., calico aster [Includes var. *hirsuticaulis* (Lindl.) Porter]
[*A. tradescantii* L.] H&A, G&C
Aster lowrieanus Porter, Lowrie's aster
Aster macrophyllus L., bigleaf aster
Aster novae-angliae L., New England aster
Aster novi-belgii var. *tardiflorus* (L.) A. Jones, New York aster
[*A. novi-belgii* L.] G&C
[*A. tardiflorus* L.] H&A
Aster paternus Cronq., white-topped aster
[*Sericocarpus asteroides* (L.) BSP.] H&A
Aster praealtus Poir., willow aster
[*A. salicifolius* Lam.] H&A
Aster prenanthoides Muhl. ex Willd., zig-zag aster
Aster puniceus L., purple-stemmed aster
Aster sagittifolius Wedem. ex Willd., arrow-leaf aster
Aster schreberi Nees, large-leaf aster
Aster umbellatus Mill., flat-top white aster
Aster undulatus L., wavy-leaf aster [Includes var. *loriformis* Burgess]
Bidens cernua L., stick-tights
Bidens frondosa L., beggar-ticks
Bidens vulgata Greene, beggar-ticks
Cacalia atriplicifolia L., pale Indian-plantain
Cacalia suaveolens L., sweet-scented Indian-plantain (**E, G3, S1**)
Centaurea nigra L., black knapweed
Cichorium intybus L., chickory
Cirsium arvense (L.) Scop., Canada thistle
Cirsium muticum Michx., swamp-thistle
Cirsium pumilum (Nutt.) Spreng., small bull-thistle
[*Cirsium odoratum* (Muhl.) Britt.] H&A ["should be deleted..."] H&G
Cirsium vulgare (Savi) Tenore, bull-thistle
[*C. lanceolatum* (L.) Hill] H&A
Conyza canadensis var. *canadensis* (L.) Cronq., horseweed
[*Erigeron canadensis* L.] H&A
Erechtites hieracifolia (L.) Raf. ex DC., fireweed
Erigeron annuus (L.) Pers., daisy-fleabane
Erigeron pulchellus Michx., robin's-plantain

Erigeron strigosus Muhl. ex Willd., daisy fleabane
[*E. ramosus* (Walt.) BSP.] H&A
Eupatorium maculatum L., spotted joe-pye-weed
Eupatorium perfoliatum L., thoroughwort
Eupatorium purpureum L., sweet joe-pye-weed
[Also listed as *E. falcatum* Michx.] H&A
Eupatorium rugosum Houtt., white snakeroot
[*E. urticaefolium* Reich.] H&A
Euthamia graminifolia (L.) Nutt. ex Cass., flat-top goldenrod
[*Solidago graminifolia* (L.) Salisb. and *S. graminifolia* var. *Nuttallii* (Greene) Fern.] H&A
Galinsoga parviflora Cav., quickweed
Galinsoga quadriradiata Ruiz & Pavon., quickweed
[*G. ciliata* (Raf.) Blake.] H&A
Gnaphalium macounii Greene, cudweed
[*G. decurrens* Ives] H&A
Gnaphalium obtusifolium L., catfoot
Gnaphalium uliginosum L., low cudweed
Helenium autumnale L., sneezeweed
Helianthus decapetalus L., thin-leaf sunflower
Helianthus divaricatus L., woodland sunflower
Helianthus strumosus L., wood-sunflower
Helianthus tuberosus L., Jerusalem artichoke
Heliopsis helianthoides (L.) Sweet, ox-eye
Hieracium aurantiacum L., orange hawkweed
Hieracium caespitosum Dumort., king-devil
[*H. pratense* Tausch] H&G
Hieracium gronovii x *venosum* = *H.* x *marianum* Willd., hawkweed
[*H. Greenii* Porter & Britt.] H&A
[*H. trailii* Greene] G&C
Hieracium kalmii var. *kalmii* L., Canada hawkweed
[*H. canadense* Michx.] H&A
Hieracium paniculatum L., hawkweed
Hieracium piloselloides Vill., king-devil
[*H. florentinum* All.] H&A
Hieracium scabrum Michx., hawkweed
Hieracium venosum L., rattlesnake-weed
Inula helenium L., elecampane
Lactuca biennis (Moench) Fern., wild lettuce
[*L. spicata* (Lam.) Hitch.] H&A
Lactuca canadensis L., wild lettuce
[Includes var. *integrifolia* (Bigel) Gray] H&A
[*L. canadensis* var. *obovata* Wieg.] H&G
Lactuca serriola L., prickly lettuce
[*L. scariola* L.] H&A

Leontodon autumnalis L., fall-dandelion
[*Apargia autumnale* (L.) Hoffm.] H&G
Leucanthemum vulgare Lam., ox-eye daisy
[*Chrysanthemum Leucanthemum* L.] H&A, G&C
Matricaria discoidea DC., pineapple-weed
[*M. matricarioides* (Less.) Porter] G&C
[*M. suaveolens* (Pursh) Buchen.] H&G
Prenanthes alba L., white lettuce
Prenanthes altissima L., rattlesnake-root
Prenanthes trifoliolata (Cass.) Fern., gall-of-the-earth
Rudbeckia hirta L., black-eyed-susan
[*R. hirta* var. *monticola* (Small) Fern.] H&G
Rudbeckia laciniata L., cut-leaf coneflower
Senecio aureus L., golden ragwort
Senecio obovatus Muhl. ex Willd., ragwort
Solidago arguta Ait., cutleaf goldenrod
Solidago bicolor L., white goldenrod
Solidago caesia L., wreath goldenrod
Solidago canadensis L., Canada goldenrod
Solidago canadensis var. *hargeri* Fern.
Solidago canadensis var. *scabra* (Muhl.) Torrey & A. Gray, tall goldenrod
[*S. altissima* L.] H&A
Solidago flexicaulis L., zig-zag goldenrod
Solidago gigantea Ait., late goldenrod
[*S. serotina* var. *gigantea* (Ait.) Gray] H&A
Solidago hispida Muhl. ex Willd., goldenrod
Solidago juncea Ait., early goldenrod
Solidago nemoralis Ait., rough goldenrod
Solidago patula Muhl. ex Willd., spreading goldenrod
Solidago rugosa Mill., tall hairy goldenrod
Solidago squarrosa Muhl., ragged goldenrod
Solidago uliginosa var. *uliginosa* Nutt., swamp goldenrod
[*S. uliginosa* Nutt.] G&C
[*S. uniligulata* var. *neglecta* (Torrey & A. Gray) Fern.] H&G
Solidago ulmifolia Muhl. ex Willd., elm-leaf goldenrod
Sonchus arvensis L., sow-thistle
Sonchus asper (L.) Hill, spiny sow-thistle
Sonchus oleraceus L., sow-thistle
Tanacetum vulgare L., tansy
Taraxacum laevigatum (Willd.) DC., red-seeded dandelion
Taraxacum officinale Weber ex Wiggers, common dandelion
[*Leontodon Taraxacum* L.] H&A
Taraxacum palustre (Lyons) Symons, marsh dandelion
Tragopogon porrifolius L., oyster-plant
Tragopogon pratensis L., yellow goat's-beard
Tussilago farfara L., coltsfoot

Vernonia gigantea (Walt.) Trel. ex Brann. & Cov., tall ironweed (**E, G5, S1**)
[*V. altissima* Nutt.] H&G
Xanthium strumarium var. *canadense* (Mill.) Torrey & A. Gray., common cocklebur
[*Xanthium pennsylvanicum* Wallr.] H&G

Class: Liliopsida
Subclass: Alismatidae
Order: Alismatales
ALISMATACEAE (WATER-PLANTAIN FAMILY)

Alisma subcordatum Raf. water-plantain
Sagittaria latifolia Willd., wapato
[*S. latifolia* forma *hastata* (Pursh) Robinson] H&G
[*S. latifolia* var. *obtusa* (Muhl. ex Willd.) Sm.] H&A
Sagittaria rigida Pursh, arrowhead
[*S. heterophylla* Pursh] H&G

Order: Hydrocharitales
HYDROCHARITACEAE (FROG'S-BIT FAMILY)

Elodea canadensis Rich. ex Michx., waterweed
Elodea nuttallii (Planch.) St. John, waterweed
[*E. occidentalis* (Pursh) St. John] H&G

Order: Najadales
POTAMOGETONACEAE (PONDWEED FAMILY)

Potamogeton crispus L., pondweed
Potamogeton epihydrus Raf., pondweed
Potamogeton pusillus L., pondweed
[*P. panormitanus* Biv.] H&G

Subclass: Arecidae
Order: Arales
ARACEAE (ARUM FAMILY)

Acorus americanus (Raf.) Raf., sweetflag
[*A. calamus* L.] H&A, G&C
Arisaema dracontium (L.) Schott ex Schott & Endl., green dragon
Arisaema triphyllum (L.) Schott ex Schott & Endl., jack-in-the-pulpit
Calla palustris L., wild calla
Symplocarpus foetidus (L.) Salisb. ex Nutt., skunk-cabbage

LEMNACEAE (DUCKWEED FAMILY)

Lemna minor L., duckweed

Lemna trisulca L., star duckweed
Spirodela polyrhiza (L.) Schleid., giant duckweed
Wolffia columbiana Karst., watermeal

Subclass: Commelinidae
Order: Commelinales
XYRIDACEAE (YELLOW-EYED GRASS FAMILY)

Xyris difformis Chapm., yellow-eyed grass
    [*X. caroliniana* Walt.] H&G

Order: Juncales
JUNCACEAE (RUSH FAMILY)

Juncus acuminatus Michx., rush
    ["must be deleted from the list until such time as positive identification can be made"] H&G
Juncus articulatus L., jointed rush
Juncus brachycephalus (Engelm.) Buch., small-headed rush
Juncus brevicaudatus (Engelm.) Fern., narrow-panicled rush
Juncus bufonius L., toad-rush
Juncus canadensis Gay ex LaHarpe, marsh rush
    ["must be deleted from the list until such time as positive identification...can be made"] H&G
Juncus effusus L., soft rush
Juncus tenuis Willd., yard-rush
    [*J. tenuis* var. *anthelatus* Wieg.] H&A
Luzula acuminata Raf., woodrush
    [*L. saltuensis* Fern.] H&A
Luzula campestris var. *multiflora* (Retz.) Lej., common woodrush
    [*L. campestris* L.] G&C

Order: Cyperales
CYPERACEAE (SEDGE FAMILY)

Carex aenea Fern., sedge (**E, G5, S1**)
    [*C. foenea* Willd.] G&C
Carex aestivalis Curtis ex A. Gray, sedge
Carex amphibola var. *turgida* Fern., sedge
    [*C. amphibola* Steud.] G&C
    [*C. grisea* Wahl.] H&A
Carex annectens (Bickn.) Bickn., sedge
    [*C. annectans* Bickn.] H&A
    [*C. vulpinoidea* Michx.] G&C

Carex annectens var. *xanthocarpa* (Bickn.) Wieg., sedge
[*C. brachyglossa* Mackz.] H&A
[*C. vulpinoidea* Michx.] G&C
Carex arctata Boott. ex Hooker, drooping wood sedge
Carex atlantica ssp. *atlantica* Bailey, sedge
[*C. incomperta* Bickn.] H&A
Carex aurea Nutt., sedge
Carex baileyi Britt., sedge
Carex bromoides Schkuhr ex Willd., sedge
Carex brunnescens (Pers.) Poir. ex Lam., sedge
Carex canescens L., sedge
Carex cephaloidea (Dewey) Dewey, sedge
[*C. sparganioides* var. *cephaloidea* (Dewey) Carey] G&C
Carex cephalophora Muhl. ex Willd., sedge
Carex communis Bailey, sedge
Carex comosa Boott, sedge
Carex crinita Lam., sedge
Carex debilis var. *rudgei* Bailey, sedge
[*C. flexuosa* Muhl.] H&A
Carex deweyana Schwein., sedge
Carex digitalis Willd., sedge
Carex disperma Dewey, sedge
Carex echinata Murr., sedge
[*C. angustior* Mackz.] H&A
Carex emoryi Dewey ex Torrey, sedge (**E, G5, S1**)
Carex foenea Willd., sedge
Carex folliculata L., sedge
Carex gracillima Schwein., sedge
Carex granularis var. *haleana* (Olney) Porter, sedge
Carex grayi Carey, sedge
[*C. Asa-Grayi* Bailey] H&G
Carex gynandra Schwein., sedge
Carex hirtifolia Mackz., sedge
Carex hystericina Muhl. ex Willd., sedge
[*C. hystricina* Muhl.] H&A
Carex interior Bailey, sedge
Carex intumescens Rudge, sedge
Carex lacustris Willd., sedge
Carex laxiculmis Schwein., sedge
Carex laxiflora Lam., sedge
[*C. heterosperma* Wahl., *C. anceps* Muhl., *C. laxiflora* var. *patulifolia* (Dewey) Carey] H&A
Carex leptalea Wahl., sedge
Carex leptonervia (Fern.) Fern., sedge
Carex lupulina Muhl. ex Willd., sedge
Carex lurida Wahl., sedge

Carex normalis Mackz., sedge
[*C. mirabilis* Mackz.] G&C
Carex pallescens L., sedge
Carex paupercula Michx., sedge
Carex pedunculata Muhl. ex Willd., sedge
Carex pensylvanica Lam., sedge
[*C. pennsylvanica* Lam.] H&A
Carex plantaginea Lam., plantain-sedge
Carex platyphylla Carey, broad-leaf sedge
Carex prasina Wahl., sedge
Carex projecta Mackz., sedge
Carex radiata (Wahl.) Small, sedge
Carex rosea Schkuhr ex Willd., sedge
[*C. convoluta* Mackz.] H&A
Carex scabrata Schwein., sedge
Carex scoparia Schkuhr ex Willd.
Carex sparganioides Muhl. ex Willd., sedge
Carex sterilis Willd., sedge
[*C. incomperta* Bickn.] H&A
Carex stipata Muhl. ex Willd., sedge
Carex swanii (Fern.) Mackz., sedge
Carex tenera Dewey., sedge
Carex tincta Fern., sedge **(E, G4, G5, SH)**
[Either *C, tincta* Fern. Or *C. foenea* Willd. Are synonyms for H&A *C. normalis* Mackz.]
[*C. normalis* Mackz.] G&C
Carex torta Boott ex Tuckerm., sedge
Carex tribuloides Wahl., sedge
Carex trichocarpa Schkuhr ex Willd., sedge
Carex trisperma var. *billingsii* Knight
Carex tuckermanii Dewey, sedge
[*C. Tuckermani* Boott] H&A
Carex virescens Muhl. ex Willd., sedge
Carex vulpinoidea Michx., sedge
Cyperus esculentus L., yellow nut-grass
Cyperus strigosus L., galingale
Dulichium arundinaceum (L.) Britt., three-way sedge
Eleocharis acicularis (L.) R. & S., hairgrass
Eleocharis obtusa var. *ovata* (Roth) Drap. & Mohl., spikerush, **(T, G5, S1, S2)**
[*E. ovata* (Roth) Roemer & Schultes] G&C
Eleocharis palustris (L.) R. & S., creeping spikerush
Eriophorum tenellum Nutt., rough cottongrass
Eriophorum vaginatum L., hare's-tail, cottongrass
Eriophorum viridi-carinatum (Engelm.) Fern., cotton-grass
Rhynchospora alba (L.) Vahl, white beakrush
[*Rynchospora alba* (L.) Vahl] H&A
Scirpus atrocinctus Fern., northern bulrush

[*S. cyperinus* (L.) Kunth] G&C
Scirpus atrovirens Willd., bulrush
[*S. atrovirens* Muhl.] H&A
Scirpus cyperinus (L.) Kunth, woolgrass
Scirpus pedicellatus Fern., bulrush
[*S. cyperinus* (L.) Kunth] G&C
Scirpus polyphyllus Vahl, leafy bulrush
Scirpus tabernaemontani Gmel., soft-stem bulrush
[*S. validus* Vahl] H&A, G&C

POACEAE (GRASS FAMILY)

Agrostis canina L., velvet bentgrass
Agrostis gigantea Roth, redtop
[*A. alba* L.] H&A
Agrostis hyemalis (Walt.) BSP., southern hairgrass
Agrostis perennans (Walt.) Tuckerm., autumn bent
Alopecurus aequalis Sobol, short-awn foxtail
Andropogon gerardii Vitman, big bluestem
[*A. furcatus* Muhl.] H&G
Anthoxanthum odoratum L., sweet vernalgrass
Arrhenatherum elatius (L.) Beauv. ex Presl & Presl, tall oatgrass
Avena fatua ssp. *sativa* (L.) Thell., oats
[*A. sativa* L.] H&A
Brachyletrum erectum (Schreb. ex Spreng.) Beauv., bearded short-husk
[*Brachylytrum erectum* (Schreb.) Beauv.] H&A
[*Brachyelytrum erectum* (Schreber) P. Beauv.] G&C
Bromus ciliatus L., fringed brome
Bromus inermis Leyss., smooth brome
Bromus latiglumis (Shear) Hitchc., Canada brome
[*B. altissimus* Pursh] H&A
[*B. incanus* (Shear) Hitchc.] H&G
Bromus pubescens Muhl. ex. Willd., Canada brome
[*B. purgans* L.] H&A
Bromus secalinus L., cheat
Calamagrostis canadensis (Michx.) Beauv., bluejoint grass
Cinna arundinacea L., stout woodreed
Cinna latifolia (Trev. ex Goepp.) Griseb., drooping woodreed
Dactylis glomerata L., orchard grass
Danthonia compressa Austin, northern oatgrass
Danthonia spicata (L.) Beauv. ex R. & S., poverty-grass
Deschampsia flexuosa (L.) Trin., common hairgrass
Digitaria ischaemum (Schreb. ex Schweig.) Schreb. ex Muhl., smooth crabgrass
Digitaria sanguinalis (L.) Scop., tall crabgrass
Echinochloa crusgalli (L.) Beauv., barnyard grass
Echinochloa crusgalli ssp. *edulis* Hitchc., Japanese millet

[*E. crusgalli* var. *frumentacea* (Roxb.) Wight.] H&G, G&C
Elymus canadensis L., Canada wild-rye
Elymus hystrix var. *hystrix* L., bottlebrush
[*Hystrix patula* Moench] H&G, G&C
Elymus riparius Wieg., marsh wild-rye
Elymus trachycaulus ssp. *subsecundus* (Link) Barkworth & D. Dewey, slender wheatgrass
[*Agropyron trachycaulum* var. *glaucum* (Pease & Moore) Malte] H&G
[*A. canium* (L.) Beauv.] H&A
Elymus villosus Muhl. ex Willd., wild-rye
Elymus virginicus var. *virginicus* L., Virginia wild-rye
[*E. australis* Scribn. & Ball.] H&A
[*E. virginicus* var. *glabriflorus* (Vasey) Bush] H&G
Elymus wiegandii Fern., Wiegand wild-rye
Elytrigia repens (L.) Nevski, quackgrass
[*Agropyron repens* (L.) Nevski] H&A
Eragrostis cilianensis (All.) Mosher, stinkgrass
Eragrostis hypnoides (Lam.) BSP., lovegrass
Eragrostis minor Host, lovegrass
[*E. poaeoides* Beauv.] H&G
Eragrostis pectinacea (Michx.) Nees, lovegrass
Eragrostis pilosa (L.) Beauv., India lovegrass
[*E. peregrina* Wiegand] H&A
Festuca filiformis Pourret, hair fescue
[*F. capillata* Lam.] H&A
Festuca subverticillata (Pers.) E. Alexe'ev, nodding fescue
[*F. nutans* Spreng.] H&A
Festuca trachyphylla (Hackel) Krajina, sheep fescue
[*F. ovina* var. *duriuscula* (L.) Koch] H&G
Glyceria canadensis (Michx.) Trin., rattlesnake grass
Glyceria grandis S. Wats., reed meadowgrass
Glyceria melicaria (Michx.) Hubb., slender mannagrass
Glyceria striata (Lam.) Hitchc., fowl mannagrass
[*G. nervata* (Willd.) Trin.]
Holcus lanatus L., velvet grass
Hordeum jubatum L., foxtail barley
Leersia oryzoides (L.) Sw., rice cutgrass
Leersia virginica Willd., whitegrass
Lolium arundinaceum (Schreb.) S. Darbyshire, tall fescue
[*Festuca elatior* L.] H&A
Lolium perenne L., English or perennial ryegrass
Milium effusum L., milletgrass
Oryzopsis asperifolia Michx., spreading ricegrass
Panicum acuminatum Sw. *sensu lato*, panic grass
[*P. huachucae* var. *silvicola* Ashe.] H&A
[*P. implicatum* Nash.] H&A
[*P. lanuginosum* var. *fasciculatum* (Torr.) Fern.] H&G, G&C

[*P. lanuginosum* var. *implicatum* (Scribn.) Fern.] H&G, G&C
Panicum capillare L., witchgrass
Panicum clandestinum L., deer-tongue grass
Panicum dichotomum L., panic grass
Panicum latifolium L., panic grass
Panicum linearifolium Scribn. ex Nash, panic grass
[*P. linearifolium* var. *Werneri* (Scribn.) Fern.] H&G
Panicum virgatum L., switchgrass
Phalaris arundinacea L., reed canary-grass
Phalaris canariensis L., canary-grass
Phleum pratense L., timothy
Phragmites australis (Cav.) Trin. ex Streud., common reed
[*P. communis* Trin.] H&G
Poa alsodes A. Gray, speargrass
Poa annua L., speargrass
Poa compressa L., Canada bluegrass
Poa nemoralis L., wood bluegrass
Poa palustris L., fowl bluegrass
Poa pratensis L., Kentucky bluegrass
Poa saltuensis Fern. & Wieg., old-pasture bluegrass
Schizachne purpurascens (Torrey) Swallen, false melic
[*Melica striata* (Michx.) Hitchc.] H&A
Setaria pumila (Poir.) Schultes, yellow foxtail
[*S. glauca* (L.) Beauv.] G&C
[*S. lutescens* (Weigel) Hub.] H&A
Setaria viridis (L.) Beauv., green foxtail
Spartina pectinata Link, freshwater cordgrass
Torreyochloa pallida var. *pallida* (Torrey) Church, pale mannagrass
[*Glyceria pallida* (Torrey) Trin.] H&A
[*Pucinellia pallida* (Torrey) R. T. Clausen] G&C

Order: Typhales
SPARGANIACEAE (BUR-REED FAMILY)

Sparganium americanum Nutt., bur-reed
Sparganium angustifolium Michx., bur-reed
[*S. chlorocarpum* Rydb.] H&G, G&C
Sparganium eurycarpum Engelm. ex A. Gray, bur-reed

TYPHACEAE (CAT-TAIL FAMILY)

Typha latifolia L., common cat-tail

Subclass: Liliidae
Order: Liliales
PONTEDERIACEAE (PICKEREL-WEED FAMILY)

Heteranthera dubia (Jacq.) MacM., water stargrass
    [*Zosterella dubia* (Jacq.) Small] G&C

LILIACEAE (LILY FAMILY)

Allium canadense L., wild garlic
Allium tricoccum Ait., wild leek
Allium vineale L., field garlic
Chamaelirium luteum (L.) A. Gray, blazing-star **(T, G5, S2)**
Clintonia borealis (Ait.) Raf., woodlily
Clintonia umbellulata (Michx.) Morong, speckled or white woodlily
Disporum lanuginosum (Michx.) Nichols., yellow mandarin
Erythronium americanum Ker, yellow adder's-tongue
Hemerocallis fulva (L.) L., orange day-lily
Lilium canadense L., Canada lily
Lilium philadelphicum L., woodlily
Lilium superbum L., Turk's-cap lily
Maianthemum canadense Desf., false lily-of-the-valley
Maianthemum racemosum L., false Solomon's-seal
    [*Smilacina racemosa* (L.) Desf.] H&A, G&C
Maianthemum stellatum L., starflower
    [*Smilacina stellata* (L.) Desf.] H&A, G&C
Medeola virginiana L., Indian cucumber-root
Polygonatum commutatum (Schultes & Schultes) Dietr., large Solomon's-seal
    [*P. biflorum* (Walter) Elliott] G&C
    [*P. giganteum* Dietr.] H&A
Polygonatum pubescens (Willd.) Pursh, Solomon's-seal
Streptopus roseus Michx., rose mandarin
Trillium erectum L., purple trillium
Trillium grandiflorum (Michx.) Salisb., white trillium
Trillium undulatum Willd., painted trillium
Uvularia grandiflora Sm., bellwort
Uvularia perfoliata L., strawbell ["*U. perfoliata* is as yet unknown from the region" H&G]
Uvularia sessilifolia L., wild-oats, bellwort
Veratrum viride Ait., false or white hellebore

IRIDACEAE (IRIS FAMILY)

Iris versicolor L., blue-flag
Sisyrinchium angustifolium Mill., blue-eyed grass
    [*S. gramineum* Curtis] H&A

SMILACACEAE (GREENBRIER FAMILY)

Smilax herbacea L., Jacob's-ladder
Smilax hispida Muhl. ex Torrey, bristly greenbrier

DIOSCOREACEAE (YAM FAMILY)

Dioscorea villosa L., wild yam

Order: Orchidales
ORCHIDACEAE (ORCHIS FAMILY)

Calopogon tuberosus (L.) BSP., grass pink
    [*C. pulchellus* (Sw.) R. Br.] H&G
Corallorhiza maculata (Raf.) Raf., spotted coralroot
Corallorhiza trifida Chat., pale coralroot
Cypripedium acaule Ait., pink ladyslipper
Cypripedium parviflorum var. *parviflorum* Salisb., small yellow ladyslipper
    [*Cypripedium calceolus* var. *parviflorum* (Salisb.) Fern.] G&C
    [*C. parviflorum* Salisb.] H&A
Cypripedium reginae Walt., showy ladyslipper
Galearis spectabilis (L.) Raf., showy orchis
    [*Orchis spectabilis* L.] H&A, G&C
Goodyera pubescens (Willd.) R. Br., downy rattlesnake-plantain
    [*Epipactis pubescens* (Willd.) A. A. Eaton] H&A
Goodyera repens (L.) R. Br., dwarf rattlesnake-plantain
    [*Epipactis repens* var. *ophioides* (Fern.) Eat.] H&G
Goodyera tesselata Lodd., rattlesnake-plantain
    [*Epipactis tesselata* (Lodd.) A. A. Eaton] H&G
Isotria verticillata (Muhl. ex Willd.) Raf., large whorled pogonia
Liparis loesellii (L.) Rich., bog twayblade
Listera cordata (L.) R. Br., heartleaf twayblade
Malaxis unifolia Michx., green adder's-mouth
    [*Microstylis unifolia* (Michx.) BSP.] H&A
Platanthera blephariglottis (Willd.) Lindl., white fringed orchid
    [*Habenaria blephariglottis* (Willd.) Torr.] H&G, G&C
Platanthera clavellata (Michx.) Luer, green woodland orchid
    [*Habenaria clavellata* (Michx.) Spreng.] H&A, G&C
Platanthera flava var. *herbiola* (R. Br.) Luer., tubercled orchid
    [*Habenaria flava* var. *virescens* (Muhl.) Fern.] H&G, G&C
Platanthera grandiflora (Bigel.) Lindl., large purple fringed orchid
    [*Habenaria fimbriata* (Ait.) R. Br.] H&A
    [*H. psycodes* var. *grandiflora* (Bigelow) A. Gray] G&C
Platanthera hookeri (Torrey ex A. Gray) Lindl., Hooker's orchid **(E, G5, S1, S2)**
    [*H. Hookeriana* Torr.] H&A
    [*Habenaria hookeri* Torr.] G&C

Platanthera lacera (Michx.) G. Don, ragged fringed orchid
[*Habenaria lacera* (Michx.) R. Br.] H&A, G&C
Platanthera orbiculata (Pursh) Lindl., round-leaved orchid
[*Habenaria orbiculata* (Pursh) Torr.] H&A, G&C

Platanthera psycodes (L.) Lindl., small purple fringed orchid
[*Habenaria psycodes* (L.) Sw.] H&A, G&C
Pogonia ophioglossoides (L.) Juss., rose pogonia
Spiranthus cernua (L.) Rich., nodding lady's-tresses
Spiranthes lacera var. *gracilis* (Bigel.) Luer, slender lady's-tresses
[*Spiranthes gracilis* (Bigel.) Hook.] H&A

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BIBLIOGRAPHY

Fernald, M. L. 1970. Gray's manual of botany, 8th ed. VanNostrand Reinhold Co. 1632 pp.
Gleason, H. A. and A. Cronquist. 1991. Manual of vascular plants of northeastern United States and adjacent Canada, 2nd ed. NY Botanical Garden. 910 pp.
House H. D. and W. P. Alexander. 1927. Flora of the Allegany State Park region. NYS Museum handbook 2. 225 pp.
House, H. D. and R. B. Gordon. 1940. Additions and corrections to the flora of the Allegany State Park region, Cattaraugus County, New York (1927-38). NYS Museum circular 24:3-24.
Mitchell, R. S. and G. C. Tucker 1997. Revised checklist of New York State plants. NYS Museum Bull. 490. 400 pp.

TWENTY-FIFTH ANNUAL SCIENTIFIC PAPER SESSION

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LARRY J. KING MEMORIAL LECTURE

Chemical Ecology of Beavers

Dietland Muller-Schwarze
Department of Environmental and Forest Biology
SUNY-Environmental Science & Forestry, Syracuse, NY

ABSTRACTS OF PAPERS

Abstracts are listed alphabetically by first author. Abstracts have been included with minimal editing exactly as submitted. Whether a submission was a poster or oral presentation is indicated at the end of each abstract.

ANALYSIS OF COPPER, IRON, AND ZINC IN SEDIMENTS OF THOMAS CREEK ABOVE AND BELOW A LANDFILL.

Joseph Armer, Nazareth College of Rochester, 4245 East Ave., Rochester, NY 14618.

Thomas Creek is a part of the Irondequoit Creek watershed in the town of Fairport, county of Monroe. This creek is of importance because an abandoned, uncapped landfill that was made into a baseball field is situated along the creek. The purpose of this research is to determine if any metals are leaching into the creek from the landfill. Sediment samples were taken above the landfill, and at two locations below it. Samples were analyzed by extracting the metals from sediment with a solution made up of 0.05N HCl in 0.025N H_2SO_4. Samples were then analyzed using flame atomic absorption. Copper levels in the sediments remained stable above and below the landfill. Iron and zinc concentrations below the landfill were higher than above, suggesting leaching. (oral presentation)

A NOVEL OPERANT CHAMBER FOR ASSESSING MOTOR DEFICITS IN RATS.

Mark Bauter[1], Matthew Sharpe[2] and Terence Bazzett[2]
[1]Dept. of Environmental Medicine, University of Rochester, Rochester, NY.
[2]Dept. of Psychology, SUNY College at Geneseo, Geneseo, NY 14454.

Behavioral analysis of damage to rodent central nervous system structures controlling movement has been incorporated into a wide range of research. Recent development of genetic models using knockout rodents has also increased the demand for sensitive behavioral testing methods. In developing a reliable and valid test of motor deficits, several protocol features require attention. First, the method should be relatively simple, yet sensitive enough to measure subtle effects of neural damage. Second, the method should be able to differentiate motor abnormalities from task errors produced by learning and memory deficits. Finally, methods should be easily incorporated into a range of laboratories, especially those where behavioral

testing is not the primary focus of the work. Forepaw reaching tasks have played an important role in assessing motor deficits. Several variations of this task have been reported in the literature, each with specific advantages and disadvantages. We now report the development of a forepaw reaching chamber that is simple and inexpensive to construct. The chamber may be used for data collection by experimenter observers, or automated to assess latencies and accuracy by adding a photo-cell data collection mechanism. Simple protocol alterations can be incorporated to assess global damage or specific unilateral damage. Finally, the chamber can be used to assess strictly motor deficits, or may be used to assess these deficits in combination with some cognitive tasks. Construction protocol for this chamber, as well as findings from a series of experiments using this chamber, are reported. (poster presentation)

CONODONTS IN THE CHATTANOOGA SHALE OF THE APPALACHIAN AND BLACK WARRIOR BASINS OF WESTERN AND CENTRAL TENNESSEE.

Mary Rose Bayer, Department of Geological Sciences, SUNY College at Geneseo, Geneseo, NY 14454.

Conodonts are found throughout the Upper Devonian Chattanooga Shale of the southern Appalachian Basin and its equivalent in the Black Warrior Basins of western and central Tennessee. Conodonts are the phosphatic tooth-like remains of an extinct eel-like organism that are utilized extensively in biostratigraphy. Strata of the Chattanooga Shale were measured, collected, and processed to find conodonts. Processing of conodonts included scanning samples under a microscope, as well as washing, bleaching, and dissolving the shale and sandstone specimens. These processes allowed for the retrieval of biostratigraphically significant conodonts that were utilized in the assignment of biostratigraphic intervals to rock strata. *Palmatolepis winchelli* found in the Dowelltown member of the Chattanooga Shale indicates that this stratigraphic unit is essentially uninterrupted. An unconformity is indicated at the Frasnian-Famennian boundary due to the absence of zone-defining conodonts, such as *Palnuitolepis triangularis*. Several hiatuses occur in the Gassaway Member of the Chattanooga Shale, indicated by the absence of biostratigraphically significant conodonts. Current research study is concerned with the determination of the environment of deposition, as well as the extent and duration of the hiatuses present in the Chattanooga Shale. (poster presentation)

AN ENVIRONMENTAL SCIENCE RESEARCH PROJECT INVOLVING ELEMENTARY THROUGH UNDERGRADUATE STUDENTS.

Mark L. Biermann, Department of Physics and Earth Science, Houghton College, Houghton, NY 14744.

A research project involving elementary through undergraduate students was carried out during the fall and winter of 1997-1998. The project provides a useful model for collaborative work involving primary, secondary and college faculty and students. The purpose of the research project was to study temperature and wind microclimates in and around the city of Storm Lake, IA. Wind and temperature data were collected at six sites in and around Storm Lake from October of 1997 to March of 1998. The data was then analyzed to provide results such as average wind-chill, temperature, and windspeed at each project site. Comparisons of the data were made to test the validity of a number of hypotheses that had been formulated regarding small-scale climate effects in Storm Lake.

The data collection sites were Buena Vista University and five area K-12 schools. The data collection was carried out by students and teachers at all locations. The data analysis was

carried out primarily at Buena Vista University. Participating schools were encouraged to design and carry out experiments appropriate to their location and abilities. The project was coordinated at Buena Vista University. While the presentation will deal primarily with the project at Storm Lake, it is notable that a similar project has just been undertaken in and near Houghton, NY. The ongoing project focuses on temperature microclimates in the vicinity of Houghton, NY, with a particular emphasis placed on microclimates as a function of elevation. The current project involves four data collection sites. (oral presentation)

MEDIUM-DEPENDENT PRODUCTION OF SECONDARY METABOLITES FROM *STREPTOMYCES* WHICH INDUCE APOPTOSIS IN CULTURED MAMMALIAN CELLS.

Brandi Blumling, Mark Gallo, Jean Gallo, Jeff Moll, and Robert Greene, DePaul Hall, Niagara University, NY 14109.

Several *Streptomyces* isolates from Niagara County were screened for their potential to produce apoptotic compounds when grown under various conditions. Cultures were supplemented with different carbon sources. Upon incubation, a number of the organisms began to produce several compounds, some of which were pigmented, as evidenced by significant color changes in the broths. The extracts were chemically analyzed via TLC for the presence of novel compounds and assayed for their ability to induce apoptosis in radiation-induced fibroblast (RIF) cells. (poster presentation)

THE EFFECTS OF VIRALLY TRANSFECTED BDNF ON CELL DEATH IN THE ZEBRA FINCH BRAIN.

M. B. Bruns[1], T. D. Singh[1], A. Brooks[2], H. J. Federoff[2], K. W. Nordeen[1], E. J. Nordeen[1]
[1]Department of Brain and Cognitive Sciences, University of Rochester, Rochester, NY 14627.
[2]Division of Molecular Medicine and Gene Therapy, Department of Neurology, University of Rochester, Rochester, NY 14642.

Many developing neurons require specific molecules for their survival. These "neurotrophins" are secreted from a variey of sources; some are target-derived, some are provided by afferent innervation, and some are secreted by associated glial cells. Thus, it is thought that target removal or loss of afferent input triggers neuronal death by decreasing availability of these neurotrophic molecules. We have designed a series of experiments to investigate if virally mediated gene transfer can rescue neurons deprived of neurotrophic support through the loss of their afferent input.

The studies exploit an instance of naturally-occuring neuronal death associated with the sexual differentiation of brain regions controlling avian song. In zebra finches (*Poephila guttata*), only males sing and several vocal control regions exhibit dramatic sex differences in neuron number that result from sexually dimorphic neuron death. In one such region, the robust nucleus of the archistriatum (RA), nearly 75% of neurons die in females between 20 and 45 days. This dramatic death of RA cells in females correlates with a marked loss of afferent input from another song region, the lateral magnocellular nucleus of the anterior neostriatum (lMAN). These lMAN derived inputs normally are believed to provide neurotrophic support to RA neurons by producing and secreting the neurotrophic molecule brain-derived neurotrophic factor (BDNF). Thus, it has been hypothesized that the dramatic death of RA cells in females results from decreased availability of BDNF due to loss of lMAN input.

We will test this hypothesis by using a virus vector to overexpress BDNF in female lMAN neurons during the period of naturally occurring RA neuron death. Expression of BDNF is accomplished by transduction with HSVbdnflac into lMAN neurons. We believe that these neurons will subsequently synthesize and anterogradely transport a supply of BDNF to their target neurons in RA. This allows for the extended presence of the trophic factor, and the cells' own machinery is utilized to control the release in a highly regulated manner. This vector has proven to successfully infect mammalian neural systems, and preliminary work has shown this to be true also for avian neurons. In situ hybridization techniques will confirm whether BDNF expression has been successfully boosted in lMAN. Histochemical methods will also be utilized to confirm our infection sites. Counts of apoptotic cells in RA will serve to determine whether there is a decrease in cell death in response to increased BDNF expression. (oral presentation)

SOME CAUTIONARY REMARKS AT THE RAS 25th ANNUAL PAPER SESSION.

James J. Carr, 14 Tall Meadow, Painted Post, NY 14870-9105.

In the April 1998 issue of the Rochester Academy of Science (RAS) Bulletin, President Matt Sinacola expressed his concern for the well-being of the Academy. "if the Academy is to carry on into the next century, it must be re-energized with more involvement from ... its members" said Sinacola in the President's Report.

Yes, quite true, but much more than membership involvement is necessary such as intellectual integrity, scholarly commitment, academic curiosity, a certain level of ambition - and most important, esprit de corps.

An unfortunate prospect could be the eventual discontinuation of yearly paper sessions. During the late 1970's, through the 1980's and into the early 1990's, both attendance and session papers were two or three times what they have been in recent years. At the ten-year anniversary, in 1983, Brockport hosted the session which ran full morning and afternoon presentations with roughly 80 papers in total. Hundreds attended lunch, accompanied by a piano and two strings playing a classical interlude. Nine years later in 1992, the nineteenth annual paper session, held at the Rochester Institute of Technology, consisted of 43 papers. In 1996 Brockport again hosted the twenty-third session where 32 papers were presented. Last year, St. John Fisher College ran the twenty-fourth annual Fall scientific paper session that barely lasted the morning and featured a total of 26 papers. Brunch was served with the campus coeds in the cafeteria.

These endeavors usually require a necessary minimum effort in order to succeed. When efforts fall too short, processes simply collapse. Such is the impending fate for the RAS paper sessions. What a shame to witness the ruin of a fine tradition. This presentation is an attempt to heighten membership awareness of the situation and the benefits paper presentations offer in promoting the scientific ideal. (oral presentation)

THE USEFULNESS OF DEMONSTRATION-LECTURES IN SCIENCE EDUCATION WITH APPLICATIONS TO THE PHYSICS OF AIR IN MOTION.

James J. Carr, 14 Tall Meadow, Painted Post, NY 14870; C. Frank Mooney, 6135 Dugway Road, Canandaigua, NY 14424.

There is growing discord within some science circles about the trend toward entertainment in science education. Objections are many and varied, but usually debate ensues over the degree to which science educators, and the subject itself, should be entertaining. After all, learning is frequently a trying process if it is to be worthwhile - not always fun when done right.

But the science demonstration, or better yet, the demonstration-lecture is a time honored practice in the best traditions of the scientific enterprise. When conducted prudently, working demonstrations engage, amuse and entertain the student while supporting and reinforcing the intended points of instruction.

The purpose of this presentation is to highlight a few demonstration techniques and provide some examples. The example exercises, it is hoped, will rouse audience interest and evince familiar aerodynamic phenomena.

Demonstration features include: a common experience that actually reveals the random mixing motions of molecular air - diffusion; a simple practicum illustrating airplane lift - the Bernoulli effect; a fascinating result from the reaction momentum of speeding air molecules on impact - the basis of Kinetic Theory; a grammar school prop that shows the components of wind storms - the Coriolis effect; and finally, a respiratory device (spirometer) employed by hospitals to assess patient readiness for discharge - a clever design again utilizing the Bernoulli effect. (oral presentation)

DISPERSAL BEHAVIOR OF ADULT AND FLEDGLING EASTERN BLUEBIRDS (*SIALIA SIALIS*) AND TREE SWALLOWS (*TACHYCINETA BICOLOR*).

C. Cassady, H. French, A. Terninko, and J.Van Niel, Environmental Conservation Department, Finger Lakes Community College, 4355 Lake Shore Drive, Canandaigua, New York 14424.

The purpose of this study was to determine the dispersal behavior of adult and fledgling Eastern bluebirds (*Sialia sialis*) and tree swallows (*Tachycineta bicolor*). This was accomplished by banding adults and chicks during the nesting season. Adult Eastern bluebirds were captured on the nest by covering the nest box entrance with a person's hand or a trapping device. Adult female tree swallows were also captured on the nest. Males however, could be baited into the nest box using white feathers, because tree swallows prefer white feathers to line their nests. Chicks of both species were accessible directly from the nest. All birds were banded, aged, sexed when possible, and released. Band numbers and nest box numbers were recorded. One hundred and seventy-seven boxes were inventoried each year for a three year period. During this time, sixty-one Eastern bluebirds and three hundred and eight tree swallows were banded. Thirteen birds were recaptured, all of which were tree swallows, banded as adults in previous years. To date, no Eastern bluebirds have been recaptured. Early results have indicated that tree swallows will attempt to return to the same nest box each year. If unable to return to the initial box, they will occupy one close to the original. (oral presentation)

ELECTRON PARAMAGNETIC RESONANCE STUDY OF PHOTOCHEMISTRY IN SYNTHETIC ZEOLITES.

Dan Cheswick and Dave Dwyer, Department of Chemistry, SUNY College at Brockport, Brockport, NY 14420.

In previous work from our laboratory we have characterized the molecular motion of phenalenyl in the supercage of alkali metal cation exchanged X- and Y-zeolites using Continuous Wave-Electron Paramagnetic Resonance (CW-EPR) and Pulsed-EPR techniques. Our recent work involving an EPR study of phenalenyl in these zeolite hosts provides direct evidence for an interaction between phenalenyl and the alkali cations, aluminum atoms, and protons in the zeolite supercage. These interactions can be used to describe the location of phenalenyl in the zeolite cage. In the present study we have started a investigation of the photoreduction of phenalenone to the hydroxyphenalenyl radical by hydrogen atom donating alcohols of different sizes in the same zeolite hosts. Preliminary CW- and Pulsed-EPR data indicates the existence of two unique cage sites for the hydroxyphenalenyl radical along with the possibility of a separate photoproduct forming in the NaX zeolite host. Our recent EPR data on triplet molecular oxygen, which we have discovered in a stable zeolite host site, will also be discussed. (oral presentation)

FROM ISOLATION TO INTEGRATION: STUDENT JOURNEYS IN THE FIELD.

R-M. Chierici, Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

A grassroots development in Borgne, Haiti, offers hands-on opportunities to train students in the dynamics of development work within the context of local communities. Mentored experiences facilitate the intellectual awakening of the students as they begin to link theory to field reality, test assumptions and construct their own understanding of the other. Mentorship is also beneficial for anthropologists who learn new ways of looking at what had become familiar and reexamine their own assumptions. Mentorship often mark the beginning of long term associations between students and anthropologists as they continue to reflect and analyze the field experience. (oral presentation)

MANAGED HABITAT FOR SHRUBLAND BIRDS.

John Confer, Carrie Cloutier, Mark Erickson, Christopher Dougherty, Biology Department, Ithaca College, 953 Danby Rd., Ithaca, NY 14850.

An avian survey conducted under power line right of ways (ROW) in Massachusetts, New Hampshire, and Rhode Island in the summer of 1998 showed an unusually high abundance of shrubland species. Such species are in serious decline throughout the northeastern U.S., according to the North American Breeding Bird Surveys. The ROW's provide the spectrum of shrub density needed for the shrubland bird species. The estimates of preferred and avoided shrub densities for the species were derived and habitat selection by seven of the most common shrubland species was documented.

Surveys conducted in Sterling Forest State Park, New York in the summers of 1997 and 1998 provided a density estimate of the Golden-winged Warbler. The warbler, according to BBS data, has declined by 7.6% per year for 31 years. The abundance of the species is extraordinarily high in the park and has been stable for a century. The most suitable habitats for the species were found in swamps, under low and high voltage ROW's, and by disturbed roadside areas. (oral presentation)

INTERACTIVE FRESHWATER MACROINVERTEBRATE INDENTIFICATION GUIDE.

Matthew Conheady, Box 773, Nazareth College, P.O. Box 18900, Rochester, NY 14618-0900.

Macroinvertebrates were collected from various locales in Rochester area streams. Using a Hitachi digital camera and photo-editing software, the specimens as well as their most common distinguishing features were photographed. Using Roger Wagner Publishing's HyperStudio software, a stack was created with each card linked to another in the form of a flow diagram which provides easy navagition throughout the stack. The result is an interactive identification guide, organized in a simple hierarchy that allows students to identify common macroinvertabrates with ease. The flexibility of the stack format that Hyperstudio provides allows future expansion and customization of the guide. (poster presentation)

A NOD TO THE ANCESTORS: INNOVATION IN CONTEMPORARY PUEBLO POTTERY.

Kristin L. Dowell, University of Rochester, CPU Box 276635, Rochester, NY 14627-6635.

Pottery is an artistic and cultural tradition that has existed for over a thousand years among the Pueblo peoples of Arizona and New Mexico. This art has traditionally been upheld by women and passed on through female relatives. Art has become a way for Native American women to sustain their families and communities economically, at the same time maintaining cultural practices. Research on Pueblo pottery and Native American art led me to Arizona where I spent five months interviewing Native American women making contemporary pottery. I was interested in learning the importance of the art to the women who make it as well as looking at anthropological debates on art and appropriation, the role of the art market and the construction of categories such as "traditional".

The process of making pottery is more important to many potters than the end product. It is through this process that they are able to sustain connections to their cultural heritage as well as social relationships with female relatives. This art provides women a space and time for contemplation, reflection and creativity, expressed by potters as essential to their lives. Innovation and individual freedom to create new designs, forms and styles have become increasingly important to contemporary Pueblo potters. Contemporary Pueblo potters maintain connections to their cultural heritage by practicing an ancient tradition that has remained a vital cultural resource for their communities. Contemporary potters engage the clay in new dialogues, experimenting with designs and styles that illustrate individual innovation and creativity. Contemporary Pueblo potters' engagement in innovative artistic practices reflects an interaction and dialogue with Western art, and continues to serve as an important cultural tradition. (oral presentation)

CONODONTS OF THE NEW ALBANY SHALE OF THE ILLINOIS BASIN, INDIANA AND KENTUCKY.

Amy Gentilcore, Department of Geological Sciences, SUNY College at Geneseo, Geneseo, NY 14454

The New Albany Shale is predominantly an organic-rich brownish-black and grayish-black shale that is Late Devonian to Early Carboniferous in age. It is present throughout the Illinois Basin in Indiana and Kentucky, and is bordered by the Cincinnati Arch to the east and the Mississippi River Arch to the west. Conodonts are the phosphatic tooth-like remains of an extinct eel-like organism that are utilized extensively in biostratigraphy. The New Albany Shale yielded abundant Conodonts. The identification of these Conodonts is important in determining the age of the lower New Albany Shale which consists of three members; oldest to youngest: the Blocher, Selmier, and Morgan Trail. The conodont faunas found precisely date these members. The Selmier Member is entirely Frasnian in age. The position of the Frasnian-Famennian boundary is at the base of the Morgan Trail determined by the appearance of *Palmatolepis triangularis*. Current research is concerned with the stratigraphy correlation of the New Albany Shale between the Illinois, Michigan and Appalachian Basins. (poster presentation)

CONSEQUENCES OF A CATASTROPHIC FIRE ON ALVAR COMMUNITY STRUCTURE.

Bruce Gilman, Department of Environmental Conservation/Outdoor Recreation, Finger Lakes Community College, 4355 Lakeshore Drive, Canandaigua, NY 14424-8395 (gilmanba@snyflcc.fingerlakes.edu). (poster presentation)

Alvar landscapes contain direct evidence of historic fires (e.g., burned stumps, charcoal in soil, external fire scars at living tree bases and internal fire scars detected in increment cores), but it is uncertain whether fires are an important component of natural disturbance regimes that may help maintain alvar plant communities. A releve of the Perch River Barrens, extensively burned about 50 years ago, had reduced species richness and lower total vegetative cover when compared to a control plot at the nearby Limerick Cedars. Non-native species comprised a nearly equal percentage (-20%) of the flora at both locations. There was little vertical stratification (overlap among vegetative strata) at either site. Potential indicators of fire recovery were *Betula papyrifera* (paper birch), *Minuartia michauxii* (rock sandwort), *Solidago hispida* (goldenrod), *Trichostema brachiatum* (false pennyroyal) and several nonvascular species. (poster presentation)

GUY BAILEY OF GENESEO.

Benarta (Bonnie) Glickman, Biology Department, Monroe Community College, Rochester NY 14623.

Guy A. Bailey was a biology professor at the New York State Normal School at Geneseo (now SUNY College at Geneseo). He was also a writer, photographer, businessman, farmer, and family man. This slide presentation will serve as an introduction to this fascinating scholar, for whom the Biological Sciences Building at SUNY College at Geneseo is named. Some of Guy Bailey's own photographs (part of the New York State Education Department's Visual Instruction Collection) will be included. (oral presentation)

RE-DISCOVERING AN EDUCATIONAL TREASURE: "MAGIC LANTERN" SLIDES (AN UPDATE).

Benarta (Bonnie) Glickman, Biology Department, Monroe Community College, Rochester NY 14623.

In the 1920's, under the directorship of geographer Alfred W. Abrams, the Visual Instruction Division of the New York State Education Department amassed a collection of some 17,000 glass lantern slides (now in the NYS Archives) on topics ranging from travel to the arts, agriculture, sciences and technologies, for loan to schools and educational groups. In addition, complete sets were given to each of the State Colleges. Over 1300 slides cover the Natural Sciences; 771 are of birds. During the summers of 1989 and 1991, Monroe Community College photographer Ray Treat and the author photographed the slides onto 2x2" Ektachrome slides. (Lantern slides are about 3x4", 1/4" thick, and being glass, are heavy, bulky to carry about and subject to breakage.) These copies make up most of this program. As of 1991, we have copies of almost all of the bird slides, as well some of the geographical collection so that natural habitats can be shown. The bird slides are particularly well-documented, usually giving the name of the photographer, location, common and scientific names, and the date the photo was taken. A book entitled "Study 29: Birds of New York State" was published in 1933 to accompany the bird slides, giving a description of each slide plus lecture outlines on a variety of topics. In the introduction to Study 29, Abrams specifically acknowledges two photographers who each contributed over 200 slides: Guy A. Bailey (Geneseo Normal School, now SUNY College at Geneseo) and Dr. Arthur A. Allen (Cornell University). Some of the other photographers included Verdi Burtch and Clarence Stone of Branchport NY, Roland Beebe of Arcade NY, and ornithologist Frank Chapman. It is hoped that the entire collection will be made available on CD/ROM and the Internet because of the myriad applications to education and research in cultural history, natural history, ecology, anthropology, literature, etc. (oral presentation)

EFFECT OF RESVERATROL ON H_20_2 PRODUCTION IN PAM- STIMULATED ENDOTHELIAL AND NEUTROPHIL CELLS.

Benjamin Houghtaling and Ming-Mei Chang Department of Biology, SUNY College at Geneseo, 1 College Circle, Geneseo, NY 14454.

Resveratrol, a chemical commonly found in red wines, has brought great interest to scientists due to its potential health benefits in preventing heart disease and cancer. For heart disease, the elevated NADPH oxidase activity in cells is thought to play an important role in the process of atherosclerosis (a chronic cardiovascular disorder in which plaques develop on the inner walls of arteries and narrow the passage). Previous studies indicate that over-production of reactive oxygen species (such as H_2O_2 and 0_2) by NADPH oxidase may induce atherosclerosis. In the present study, we investigated the effect of resveratrol on atherosclerosis by measuring its inhibition on reactive oxygen production, such as H_2O_2. The endothelial and neutrophil cells were stimulated with PMA (phorbol 12- myristate 13- acetate) to increase their reactive oxygen production that was detected with specific fluorescent dyes. Some of the stimulated cells were also incubated with various concentrations of resveratrol to determine its inhibitory effect on H_2O_2 production. Our preliminary results indicate that the production of H_2O_2 in the PMA-stimulated endothelial cells is inhibited by resveratrol, whereas the inhibition in neutrophils is only observed in cells with significantly elevated H_2O_2 production after PMA treatment. (poster presentation)

FOOD PRODUCTION IN A YUCATEC MAYA COMMUNITY: RETHINKING A SUSTAINABLE SYSTEM FOR MICRO-LEVEL HOUSEHOLD KITCHEN GARDENS.

Ellen R. Kintz. Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

This paper will examine gender and capital investment as components of micro-level food production in the Yucatec Maya community of Cobá, Q.R., Mexico. On the household level, kitchen gardens were constructed by males and tended by females, required small capital investment, and were highly productive. This traditional system of household production has been dramatically modified. Opportunities for work outside the community have displaced male labor. This reduction has, in turn, crippled the ability of women to maintain sufficient levels of kitchen garden production.

The capital returns from male wage labor are inadequate and capital investment on the household level is impossible. Dialogue with Yucatec Maya women concerning the disruption of this traditional system has recreated a sustainable system for kitchen garden productivity. (oral presentation)

EXPERIMENTATION AND MODELLING OF DRY MATTER PRODUCTION IN CONCORD GRAPES.

Maithreyi Krishnaswami[1], Dr.Alan N. Lakso[2]
[1]Department of Biology, Hobart & William Smith Colleges, Geneva, NY 14456.

[2]Department of Horticultural Sciences, NYS Agricultural Experiment Station, Cornell University, Geneva, NY 14456.

Models allow the quantitative integration of information gained from instantaneous or short-term readings. Carbon balance and dry matter production based on submodels of photosynthesis, respiration and leaf area development are common types of models. In this project a carbon balance model originally developed for healthy, non-stressed apple trees (Lakso and Johnson, 1990, *Acta Hort.* 276:141) was adapted to model the growth and carbon balance of Concord grapes grown in NY for fresh grape juice. The requirements for crop specific inputs identified gaps in the physiological database for this crop. Growth patterns and gas exchange responses of leaf and fruit were estimated from the literature and previous measurements in this lab-to generate quantitative input values for the model. The discontinuous, layered canopies required a different approach to estimation of light interception. We are also comparing the physiological responses of normally pruned and unpruned vines. Gaps remained in quantitative understanding of the respiration parameters and the root component. Experimental data on growth and gas exchange were collected to partially fill gaps in the data. This research project is still in progress. (poster presentation)

DETERMINATION OF THE PATTERN AND LEVEL OF NOCTURNAL PLASMA TESTOSTERONE IN MALE JAPANESE QUAIL.

Katrina J. Lawrence and Dr. Joel Kerlan, Department of Biology, Hobart and William Smith Colleges, Geneva, NY 14456.

Maximal spermatogenesis in fowl occurs during the night (Riley, 1940). Since the activity level of Japanese quail is lowest during the night (Wada, 1981), energy used for daylight activities such as crowing, mating, and aggressive behavior may be partially redirected to spermatogenesis. Elevated testicular testosterone levels are essential for promoting spermatogenesis (McLachlan et al., 1996). If blood testosterone levels reflect testicular levels, then blood testosterone levels will be elevated at night. Literature reports of the timing of blood testosterone peaks in Japanese quail are contradictory. Ottinger and Follett (1986) reported a rise in testosterone levels at 2000 hr. followed by a steady fall until dawn. Alternately, Ottinger (1982) observed a significant nocturnal peak in serum testosterone levels at 0200 hr. To determine the level and pattern of variation of testosterone levels during the dark period, peripheral blood was collected within 3 minutes of removing each bird from its cage. An opaque hood placed over the head of the bird served as a light shield while sampling in a lighted room during the dark period Sampling (7 males each time with each male sampled once) started ½ hour before the lights were turned off and ended ½ hour after the lights were turned on. Collection times were 2130, 2300, 0030, 0200, 0330, 0500, and 0630 hr. If there is a nocturnal testosterone peak, then more frequent sampling may distinguish between one broad peak and multiple pulses. Plasma testosterone levels will be determined with double antibody radioimmunoassay kits purchased from ICN Pharmaceuticals Inc. (Costa Mesa, CA) which have been previously adapted and validated for use with quail plasma in this laboratory. (poster presentation)

ANALYSIS OF ALTERATIONS TO SUBUNIT II OF CYTOCHROME *C* OXIDASE.

Quentin Machingo, Michael Mazourek, Vicki Cameron, Biology Department, Ithaca College, Ithaca, NY 14850.

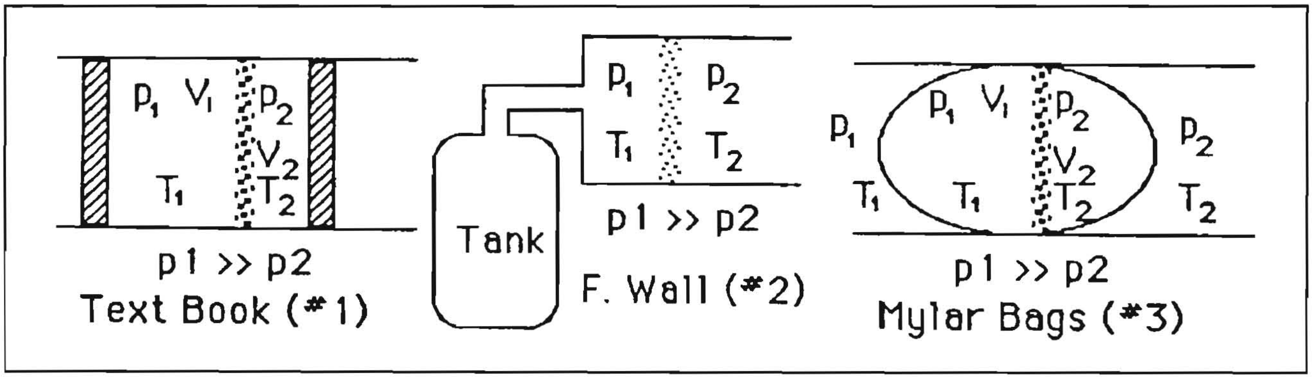
Cytochrome *c* oxidase is the final member of the electron transport chain and is required for the transfer of electrons to molecular oxygen. The enzyme complex in yeast is composed of 13 subunits; ten of the subunits are encoded on nuclear DNA and the remaining 3 subunits are encoded on mitochondrial (mt) DNA. Subunit II of this protein complex is encoded on (mt)DNA by the gene *COX2*. The major function of *COX2p* is to accept electrons from cytochrome *c* and to provide a pathway for their entry into the oxidase complex. To study the role of specific amino acids in this protein, we identified a yeast strain with a mutation in the *COX2* gene. The mutation in this strain, m5351, resulted in a loss of the ability to respire. The inability for m5351 to respire was due to a single amino acid substitution in which threonine was replaced by isoleucine at position 163 in the polypeptide chain. We then identified and characterized revertants of this mutant strain that had recovered the ability to respire. A total of 60 revertants were recovered and studied. These revertants fell into 14 different categories ranging from same site revertants to extragenic suppressors. Each of these categories will be described. (oral presentation)

ENTHALPY = THE INTERNAL ENERGY OF A GAS.

C. Frank Mooney, 6135 Dugway Road, Canandaigua, NY 14424.

Almost all physicists insist that the internal energy of ideal gas is only molecular kinetic energy (sensible heat), because ideal molecules cannot interact in any way. This would disallow cushioning energy of nearly ideal- (air in my favorite pillow), and it ignores the independent but common agenda of molecules – (colligatively to bump things in proportion to their number). They cooperate statically to inflate, kinetically to move wind, and dynamically to lift roofs.

Aeronautics and chemistry use enthalpy H routinely as thermal plus compressive energy - but not mass energy mc^2, elevation energy mgh, or wind energy $mu^2/2$. The enthalpy h of an average diatomic molecule is, $h = (5/2)kT + pv$. Because physics misreads the Joule-Thomson porous-plug experiment, it discounts enthalpy (as having no specific significance).



Many books (not only physics texts) treat the Joule-Thomson experiment as a ho-hum work-energy example. All texts show pistons in order to derive $h_1 = h_2$, with which they all agree.

$$h_1 = (5/2)kT_1 + p_1v_1 = (5/2)kT_2 + p_2v_2 = h_2.$$

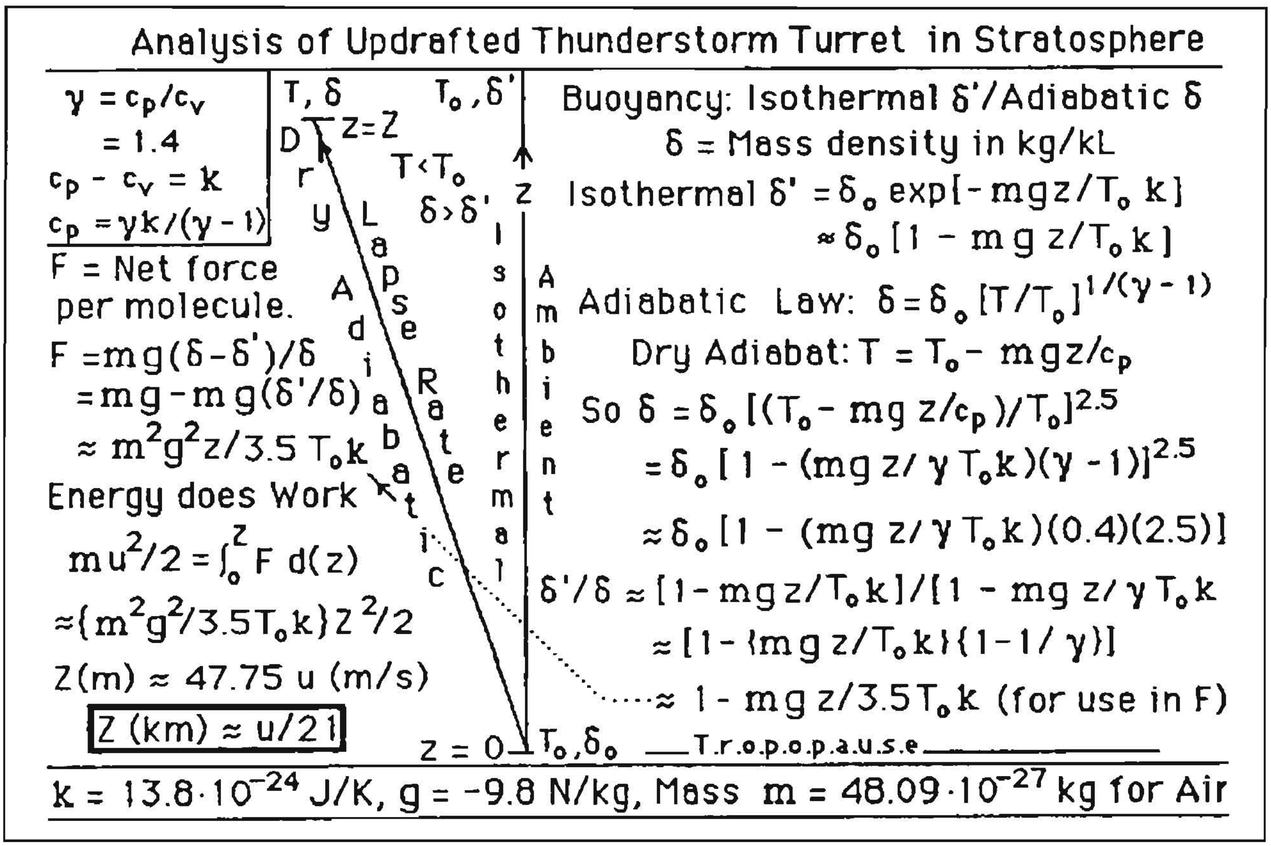
Pistons keep track of volume; they just go along for the ride. The "convenient way" (F. Wall, *Chemical Thermodynamics*) to find $(dT/dp)_H$ is to measure T of moving gas on each side of the porous-plug. Pistons are optional but give an illusion of work being done. Their main "work" is to confuse most people, but Thomson who became Lord Kelvin was not confused. (oral presentation)

VONNEGUT-MILLER THEORY OF TORNADOES.

C. Frank Mooney, 6135 Dugway Road, Canandaigua, NY 14424.

Bernard Vonnegut told me that he and Charles Miller had concluded that only electrical heating by lightning could energize "prester" (main-stream) tornadoes and downbursts. Latent heat of condensation/fusion could not. He claimed that updrafting of joule-heated air could rocket over 5 km into an isothermal stratosphere. Extreme overload then avalanches frigid air - either as a downburst (Labor Day) or as a tornado.

Analysis of Updrafted Thunderstorm Turret in Stratosphere



This analysis shows that an upward speed u (m/s) will rocket a tower to a height of u/ 21 (kilometers). He had pictures of turrets over 5 km high, so u would exceed 100 m/s (220 mph). In the Labor Day Storm, lightning was the "loudest" of 1998 - with dry-front proclivities of dry air over wet air south of a warm lake, compounded by Bernoulli-lowered pressure under a strong polar jet-stream, and lifting by a sharp coldfront.

We lack an adequate horror-inspiring word for downbursts. (oral presentation)

MIGRATIONS TO MIGRANTS; EXCAVATIONS AT CRUSOE HOUSE, SAVANNAH, NEW YORK.

A.E.W. Morton, Department of Anthropology, St. John Fisher College, 3690 East Avenue, Rochester, NY 14618.

Crusoe House, located on Route 89 in the town of Savannah, Wayne County, New York, is a multi-phase, multi-component site with a site history stretching back approximately 10,000 years. Preliminary excavations in the summer of 1998 hoped to reveal information about the earlier (prehistoric) periods of occupation on the site.

While some prehistoric material was recovered, as much, or more was discovered about the latest phases of occupation - the recent past of migrant farm labor. The summer 1998 fieldschool at Crusoe House was also an interesting exercise in "shoestring" excavation and integrating community involvement into cultural resource management work. (oral presentation)

TREE-RING DATING.

Emma P. Mount, and Dr. Peter I. Kuniholm Department of Biology, SUNY College at Geneseo, Geneseo, NY 14454; Department of History of Art and Archeology, Cornell University, Ithaca, NY 14853.

The Cornell Aegean Dendrochronology Project, headed by Dr. Peter I. Kuniholm, is an ongoing study of the chronological sequence of annual growth rings of trees in the Aegean area for the purpose of determining specific climate patterns and ultimately dating historical structures. Wood sections are collected annually from forests and other sites in several countries on the Mediterranean seaboard. Growth rings of samples of known age are measured, and after processing the data is entered into the database CORINA (Cornell Ring Analysis Program). CORINA compiles the growth patterns of all the measured wood samples of known age, species and origin, and pieces them together into chronologies that span hundreds of years. This information can be used to match growth patterns of unknown wood samples from archeological sites to determine their origin and absolute age.

While working on the Dendro Project my objective was to measure 10 sections of *Pinus silvestris* (Scots pine) collected from a forest in Eastern Turkey near Sarikamis, and add my processed data to CORINA. After preparing the samples, I measured each visible ring of growth to a hundredth of a millimeter. I plotted line graphs of this data and compared it to graphs from other samples of previously measured trees. I found that the growth pattern of my samples closely matched the growth patterns of trees from nearby forests, but did not closely match those of trees from forests that were farther away. With the aid of the statistical analysis program in CORINA I determined the year that corresponded with the final ring of growth for each sample. I found all samples but one were cut down in 1992. The processed information was entered into CORINA. The end product was a combination of all the data from my 10 samples to form a small chronology that was incorporated into the master chronology in CORINA. (poster presentation)

GEOLOGIC MAP OF GENESEO 7 1/2" QUADRANGLE, WESTERN NEW YORK.

Bridget Mulvey, Dept. of Geological Sciences SUNY College at Geneseo, Geneseo, NY 14454.

This project is a basic geologic map of the Geneseo 7 1/2" Quadrangle. Field checked outcrops are marked on the map and used in conjunction with well locations and bore hole data to produce the map. Formation contacts were determined at exposures and through interpretation of gamma ray logs and completion reports of area wells. The program CAD was used to project depth of contacts. North-south and east-west cross sections display the approximate thickness and dip of the rock formations. The purpose of this project was to provide a detailed geologic map of the Geneseo Quadrangle; the most recent geologic map for the area is at too small a scale (1:250,000) to be suitable for local use. (poster presentation)

THE IMPACT OF VARIOUS LEVELS OF PHOSPHATE ON STREAM BENTHIC MACROINVERTEBRATE DENSITY AND DIVERSITY BELOW SEWAGE TREATMENT PLANT EFFLUENT IN SPRINGBROOK CREEK.

Sr. Agnesia Mweta, Nazareth College, 4245 East Avenue, Rochester, NY 14618.

The impact of phosphate that is discharged into Springbrook Creek from the sewage treatment plant (STP) in Lima on stream benthic macroinvertebrates was studied. Water samples were collected from five sites along the stream above and below the STP. Phosphate tests were conducted in the laboratory by using the Ascorbic Acid Method, and the results were recorded. Surber samples were also collected from each site, and they were preserved in jars with 95% alcohol. In the laboratory, the stream benthic macroinvertebrates were sorted and identified to their major taxonomic groups, and all organisms in the sample were counted. The total index value (TIV), which indicates the macroinvertebrates diversity, and percent model affinity (PMA), which indicates the levels of water quality, were calculated from the number of macroinvertebrates found at each site. The result showed that there is a relationship among levels of phosphate and the density and diversity of sensitive organisms along the stream. The concentration of phosphate, TIV, and PMA trends showed that there might be non-point sources of phosphate that have their impact on the ecological health of the stream, more than the STP. The chemical and physical characteristics at each site; that is, the dissolved oxygen, temperature, velocity, width, and depth, were measured and recorded in the stream data sheets. (poster presentation)

CAVE ARCHAEOLOGY IN BELIZE.

Christopher Newell, St. John Fisher College, Rochester, NY 14618.

During June, 1998 the author took part in the Belize Valley Archaeological Reconnaissance Project (BVAR) directed by Dr. Jamie Awe of the University of New Hampshire. The BVAR Project is investigating the use of caves in the Cayo District of Western Belize by what appears to be Early to Terminal Classic Maya. Cave archaeology presents several challenges and modifications to archaeological methods. This paper will discuss the nature of excavating inside caves, in particular wet caves, and give a brief overview of the project's objectives and implications to current theories of Mayan ritual. The results of these difficult excavations, in time, should yield a greater understanding of the role and use of caves in Mayan society. (oral presentation)

ANALYSIS OF *CALLITRICHE HETEROPHYLLA* FOR HEAVY METAL SPECIES OF COPPER, ZINC, AND IRON AT THOMAS CREEK LANDFILL, FAIRPORT, NY.

Daniel L. Olmstead, Nazareth College of Rochester, PO Box 18900, Rochester, NY 14618.

Callitriche heterophylla, common water starwort, was collected at four sites located up and downstream from Thomas Creek Landfill, located just east of the village of Fairport, NY, to test for elevated levels of zinc, iron, and copper. Tissue samples were analyzed using atomic absorption spectrometry, and data were interpreted with Systat 7.0 using the Wilcoxen non-parametric test. Significant differences in zinc concentrations were found in site to site comparisons. Iron levels were very high, compared to other elements tested, and significant differences were found between sites. No significant differences were detected in the amounts copper found. Further interpretation of the results reveals a possible point source of copper contamination even though results were not significant. Results of the zinc testing were somewhat ambiguous because the findings were the inverse of what was predicted. Zinc concentration decreased at each site moving downstream. Iron levels decreased from Site 1 to Site 2, but then increased from Site 2 to Site 3 and Site 4. The findings of this study suggest that there are significant differences in zinc and iron concentrations between given sites, but it is questionable as to whether or not this is due to leachate from Thomas Creek Landfill. (oral presentation)

CENTER HILL ASH AND OTHER UPPER DEVONIAN VOLCANIC ASH BEDS IN NEW YORK AND TENNESSEE.

D. Jeffrey Over, Jocelyn Sessa, Tiffany Hopkins, Jill Lavallie, and Laura Sheehan, Department of Geological Sciences, SUNY College at Geneseo, Geneseo, NY 14454.

Advances in dating techniques utilizing phenocrysts in ash beds make precise stratigraphic positioning and relative dating of these beds critical for correlation and time scale adjustment. The Center Hill Ash Bed in the upper Dowelltown Member of the Chattanooga Shale is one of several ash beds in the Upper Devonian of the Appalachian Basin. It is exposed in central Tennessee and has been reported in equivalent strata as distant as northwestern Pennsylvania in the subsurface. At the type exposure, and the primary reference section for the Chattanooga Shale near Hurricane Bridge, bed by bed samples above and below the ash horizon were collected. Strata below the ash bed contain *Palmatolepis hassi s.s.*, *P. juntianensis* and *P. winchelli* indicative of MN Zone 13 and the highest Frasnian. The 28 cm dark shale bed immediately above the ash bed contains *P. winchelli* and numerous diminutive conodonts. The next 6 cm of light and dark shale yielded only diminutive specimens. The base of the Gassaway Member, 34 cm above the Center Hill Ash Bed, contains *P. subperlobata* and *P. triangularis* indicative of no lower than the Lower *triangularis* Zone in the Famennian.

In western New York one ash bed and several other very thin pasty recessive weathering beds have been described from the Java Formation. An ash layer at the base of a black shale bed in the upper Hanover Shale that corresponds to the Upper Kellwasser Interval is in the same stratigraphic interval as the Center Hill Ash Bed. Conodonts below and just above this ash bed are indicative of MN Zone 13; the Frasnian-Famennian boundary is 75 cm higher in the section. An ash bed in the lower portion of the Pipe Creek Shale Member has previously been reported in the subsurface; at Beaver Meadow Creek a possible ash bed in the lower Pipe Creek was recently discovered. Conodonts indicate that this bed is not the Center Hill Ash. (oral presentation)

DOWNREGULATION OF PKC AND PKA ALONG WITH UPREGUALTION OF DNA FRAGMENTATION ARE INDUCED BY PHOTODYNAMIC THERAPY.

Robert F. Parry, Robert S. Greene, Department of Biology, Niagara University, Niagara University, NY 14109.

We have investigated the effects of photodynamic therapy on the induction of programmed cell death (apoptosis) in cancer cells. Apoptotically induced cells show characteristics of DNA fragmentation that correlate with inactivation of PKA and PKC pathways. Radiation-induced fibrosarcoma (RIF) cells were treated with Photofrin II (PII) and incubated for 24 hours before irradiation with UV light source. The cells were then collected at different time intervals and tested for apoptosis. The morphological changes induced by apoptosis could be determined by DNA fragmentation isolation and PKA and PKC assays. Apoptotic DNA fragmentation was observed 60 min after radiation using PII, and there was a coincident downregulation of PKC and PKA activity. DNA fragmentation was also observed at 24 hours after radiation, along with complete PKC and PKA inactivity. Results indicate that PII activation triggers a rapid downregulation of PKC and PKA that occurs coincident with upregulation of DNA fragmentation and apoptotic cell death. (poster presentation)

THE USE OF GREEN MANURE AND THE CYANIDE CONTENT IN PLANT TISSUE TO SUPRESS POPULATIONS OF *MELOIDOGYNE HAPLA* (THE NORTHERN ROOT-KNOT NEMATODE).

Mrinalini Patwardhan[1] and Dr. Timothy Widmer[2]
[1]Biology Department, Hobart and William Smith Colleges, Geneva, NY.
[2]Department of Plant Pathology, Cornell University, NYS Agricultural Experiment Station, Geneva, New York

The purpose of this experiment was to determine the cyanide content in plant extracts made from Sudangrass hybrids and other potential cover crops such as flax and clover. The cyanide level was then correlated to the effectiveness of the green manure to suppress *Meloidogyne hapla* infection of lettuce roots. The results of the experiment indicated that cyanide was indeed the primary factor responsible for the reduction in the nematode populations. Flax, clover and Sudangrass plants, when incorporated into the soil as green manure were effective in suppressing *M. hapla* populations.

In experiments performed by Viaene and Abawi (1998), on the management of *M. hapla* on lettuce in organic soil from areas in New York State, the use of cover crops and green manure has been demonstrated to be effective in reducing nematode populations. This experiment confirms these findings and also investigates the possible use of flax and clover as green manure.

Vegetable production is a very important industry to the state of New York. The plant parasitic nematode, *Meloidogyne hapla* (the Northern Root Knot Nematode) inhabits the soil and penetrates the roots causing root galling, stunting and deformation. These symptoms reduce the uptake of water and nutrients to the plant, thereby affecting the size and quality of the vegetables and causing economic losses to the farmers. *Meloidogyne hapla* is able to survive the winters in New York and this makes it difficult to control. In an attempt to control the nematode population, application of nematicides, crop rotation and the use of cover crops are some of the common practices adopted by the farmers. (poster presentation)

MODELING ETHNOGRAPHIC RESEARCH IN CLASS PROJECTS.

John Rhoades, Dept. of Anthropology, St. John Fisher College, Rochester, NY 14618

The Fisher anthropology program includes three capstone courses, one in physical anthropology, one in archaeology, and one in ethnology: Theory and Method in Cultural Anthropology. This latter course must survey developments in anthropology theory and provide useful grounding in ethnographic methods in one semester. Students in this course complete ten projects; three of these which deal specifically with ethnographic practice will be described. The objective of each of these projects is not the achievement of actual research nor the experience of participant observation - both worthy goals - but rather the opportunity to grapple with issues of operationalization, observation, mapping, concept definition, and research design. Several of the problems and advantages of this type of approach to teaching about ethnography will be discussed based on the author's own experiences. (oral presentation)

THE GEOLOGY OF THE CORNELL UNIVERSITY CAMPUS, ITHACA, NEW YORK.

Mariana L. Rhoades, St. John Fisher College, Chemistry Department, 3690 East Avenue, Rochester, New York 14618.

The Cornell University campus demonstrates abundant examples of glacial processes, sedimentation, ancient and present-day stream processes, crustal structures and rare mantle rock deposition. Geologic research of the Ithaca area began early in the 19th century with L. Vanuxem (1837) studying kimberlite dikes and continues into the 1990's, with T. Engelder (1990) studying the Ithaca region's foreland fold and thrust belt.

Bedrock units exposed on campus illustrate why agriculture (crops, dairy, vineyards) is a prevalent industry in New York State. Deep rock gorges, waterfalls, glacial features and abundant vegetation on and near the Cornell campus demonstrate why tourism is the second largest industry in New York State.

The purpose of this paper is to report on an up-to-date compilation of geologic references and resources that concentrate on the geology of the Cornell campus. The second purpose is to describe and outline a geologic walking tour of the campus. (oral presentation)

A REVIEW OF TWENTY-FIVE YEARS OF FISH IMPINGEMENT AT ROCHESTER GAS AND ELECTRIC'S GINNA NUCLEAR POWER STATION.

Paul M. Sawyko, Rochester Gas and Electric, 89 East Avenue, Rochester, NY 14649.

RG&E's Ginna Station, located approximately 20 miles east of Rochester, NY, on Lake Ontario, utilizes on the order of 500 mgd of Lake water for cooling purposes in a once-through cooling system. During this operation, fish and water-borne debris are inadvertently withdrawn from the Lake and subsequently removed from this water flow by traveling screens located at the shoreline on the plant site. As part of on-going environmental evaluations, the washings from these screens are routinely sampled and analyzed for fish species and abundance. Over the long term, these studies can provide a monitoring method for evaluating changes in the Lake Ontario fish community. It is from this perspective that the subject review has been prepared, attempting to highlight major shifts within the fish community as found through 25 continuous years of fish impingement sampling (1973 through 1997) at Ginna Station.

More than 65 fish species have been collected during this 25-year period, with the most in one year, nearly 40 species, being collected during 1977. After showing annual diversities of 30-40 species during the 1973 to 1984 period, diversity began to decline into the teens, and reached only 10 species during 1997. Eight species have been present during each of the 25 years: alewife, rainbow smelt, spottail shiner, mottled sculpin, lake chub, threespine stickleback, rock bass, and trout-perch.

In addition to species diversity, relative abundance is also available from this data, thus allowing investigation of population trends over this time period. Alewife have been the most abundant species impinged in 17 of the 25 years, while smelt were most abundant in 6 years, stickleback in 2 years and spottail shiner in 1 year. Population trends will be discussed, as will comparisons between impingement observations and the more notable Lake Ontario ecological events during this period, such as salmonid stocking, pollution control efforts, and zebra mussels. (oral presentation)

REFINEMENT OF THE GEOLOGIC TIMESCALE IN THE DEVONIAN PERIOD.

Jocelyn Sessa, Dept. of Geological Sciences, SUNY College at Geneseo NY, 14454.

Several of the dates of the geologic time scale are currently unrefined and controversial at a high resolution where stage boundary dates have been estimated by various methods. These variations hinder the understanding of evolution rates and the use of cyclic stratigraphy for refined correlations. New radioisotope dating techniques that utilize zircon crystals ($ZrSiO_4$) where uranium has substituted for zirconium allow precise dating of strata containing the zircons. Zircons are a common accessory mineral in volcanic ashes. Precision for upper Devonian strata is about 0.1 Ma.

In 1997 and 1998 ash beds were collected in New York and Tennessee from Upper Devonian black shales. The ashes studied are sedimentalogically and chemically similar to each other. Zircons were recovered from two ash beds in Tennessee - the Belpre and Center Hill ashes. Their equivalents in New York State are found in the lower Rhinestreet Shale (Levin & Kirchgasser, 1994), and the upper Hanover Shale, respectively. The Belpre Ash was dated by Tucker et al. (1998) to 380.8 Ma; the Center Hill Ash has not yet been dated. (poster presentation)

BORN UNDER THE FULL MOON.

Charles Spoelhof, 5 Mullett Drive, Pittsford, NY 14534.

There is a common belief that the moon has a mysterious influence over our lives, causing strange behavior at full moon. Furthermore, it is commonly claimed that the moon even influences the time of birth of humans, causing more to be born during the full moon than at any other time of the month. The doubting author of this paper, challenged to prove this is not true by the mother of his two grandsons born near full moon, gathered birth statistics from two very different societies. Daily birth rates of Mkar, Nigeria and Rochester were evaluated relative to the lunar cycle as well as other natural cycles. The results were surprising. (oral presentation)

EFFECT OF 5-ALPHA-REDUCTASE INHIBITOR ON CLOACAL GLAND SIZE IN PHOTOCASTRATED ADULT MALE JAPANESE QUAIL.

Lee Stirling, Joel Kerlan, and David Craig, Departments of Biology and Chemistry, Hobart and William Smith Colleges, Geneva, NY 14456.

The growth of the cloacal gland, a secondary sex character of male Japanese quail, is stimulated by 5-alpha-dihydrotestosterone (DHT). The enzyme 5-alpha-reductase catalyzes the conversion of testosterone (T) to 5-alpha-DHT. This study was done to determine the effectiveness of 4-methyl-4-aza-5-alpha-androstan-3-one (4-ma), a 5-alpha-reductase inhibitor, on changing the cloacal gland area of adult male Japanese quail. Subjected to short days (8L: 16D; on 0600) and divided equally into four treatment groups, twenty sexually immature males were given two intramuscular injections at 0700 and 1300 hours daily. Test groups received 1 mg T, 1 mg T+1 mg 4-ma, 1 mg T+5 mg 4-ma, or 1 mg T+10 mg 4-ma dissolved in 200 microliters of sesame oil. Every other day beginning on day two through day 20, the cloacal gland size was measured to the nearest 0.1 mm. This study showed that 1 mg 4-ma was statistically ineffective at inhibiting cloacal gland growth. However, 5 mg 4-ma was statistically effective at inhibiting cloacal gland growth. The 10 mg dose proved to be toxic and injections were discontinued after day 13. Future studies using more specific inhibitors will provide a preliminary biochemical characterization of the 5-alpha-reductase isozyme in the cloacal gland. (poster presentation)

THE USE OF RADIO-TELEMETRY EQUIPMENT TO MONITOR THE BEHAVIOR OF A MIDLAND PAINTED TURTLE (*CHRYSEMYS PICTA MARGINATA*).

P. Szarowicz and A.Terninko, Environmental Conservation Department, Finger Lakes Community College, Canandaigua, NY 14424.

The purpose of this study was to monitor the behavior of a female Midland painted turtle (*Chrysemys picta marginata*) introduced into Wellington Pond on Warren Cutler Scout Reservation in Naples, New York. A radio-transmitter was attached to the carapace of the turtle so that she could be located and observed. The turtle was tracked approximately every two to three days from June to August 1998. Information recorded at each observation included water temperature; air temperature; wind speed and direction; cloud cover; water depth; water clarity; date of last rainfall and approximate amount of rainfall; turtle location; and level of human activity. There was no apparent relationship between turtle location and atmospheric or water conditions. There was, however, a direct relationship between turtle location and human activity. During times of heavy human activity, the turtle chose locations with poor water clarity in which she was the least visible. During times of low human activity, the turtle chose sites with increased water clarity. (oral presentation)

THE EFFECTS OF A LOW HEAD DAM ON THE TEMPERATURE REGIME OF WISCOY CREEK.

David Van Horn, CPO 1821, Houghton College, Houghton, NY 14744.

Wiscoy Creek, a fourth order stream in Western New York, was impounded in the late 1940's to provide a source of hydroelectric power to the surrounding area. While changes in temperature regimes created by large dams have been studied extensively, the effects of low-head dams on water temperature are not well researched. This study researched how the low-head dam on Wiscoy Creek affected the water temperature below the reservoir.

To determine whether the small reservoir created by the dam affects the temperature regime of the stream, data loggers were used to record water temperatures, every eight minutes from the second week in September through the fourth week in October, 1998. These devices were placed in the two streams flowing into the impoundment, and in the dam's hypolimnotic and epilimnotic outflow structures.

Preliminary analysis of partial data for the four data collection sites showed means, in degrees Celsius, of 13.84 and 14.03 for the creeks flowing into the reservoir, 15.30 for the epilimnotic release, and 13.75 for the hypolimnotic release. The hypolimnotic release also lacked many of the daily fluctuations of the streams above the reservoir. Future time-series analyses are planned. (poster presentation)

VEGETATIONAL EFFECTS ON POPULATION DYNAMICS OF SMALL MAMMALS IN AN OLD FIELD AND HAWTHORN ENVIRONMENT.

Aaron Wells, CPO Box # 1855, Houghton College, Houghton, NY 14744.

The effects of vegetation can be quite drastic in relation to small mammal community dynamics. As a senior honors project four separate sites, two in old-field environments (30mX30m) and two in hawthorn environments (60mX60m), were set up. Small mammals (e.g. meadow voles, deer mice, short tail shrews) were trapped in Sherman live traps. Each individual was given an ear tag, shrews were toe clipped, and released. Traps were set ten meters apart in the hawthorn and five meters apart in the old-field. Trapping was conducted a total of nine times in each hawthorn and seventeen times in each field.

Vegetation surveys were conducted at each site. This included meter plot areas at each flag and time meander surveys. Vegetation was identified and placed into different height categories. Common vegetation to all plots included goldenrod and grasses. Biomass was collected at 5 random plots at all sites in order to determine the differences in biomass between the sites.

Preliminary results show that deer mice, chipmunks, and white-footed mice prefer the hawthorn environment. Meadow voles, meadow jumping mice, and shrews prefer the field environment. It has also been observed that greater vegetational richness at a site leads to greater richness of small mammals. (poster presentation)

SPATIAL DATA COLLECTION IN BEHAVIORAL STUDIES: PROS AND CONS OF GPS.

B. Welker, Department of Anthropology, 13 Sturges, SUNY College at Geneseo, 1 College Circle, Geneseo, NY 14454.

Global positioning systems (GPS) have become accessible and indispensable in a very short time. Their utility in field studies would appear to be boundless. There are, however, accuracy and reception problems in certain environmental contexts, especially with reference to the scale of the intended data.

I have collected spatial data on howler monkey movements and food tree utilization and location for two consecutive dry seasons as part of my research on their intraspecific feeding selectivity. Data from the first season was collected using a GPS, the second season's data was collected manually. The pros and cons of both methods will be discussed. (oral presentation)

EXPRESSION OF THE GENE FOR AN ANTIBIOTIC OF *ERWINIA HERBICOLA* THAT INHIBITS THE FIRE BLIGHT PATHOGEN, *ERWINIA AMYLOVORA*.

Jennifer Wilen, Jodi Corideo and Richard Wodzinski, Biology Department, Ithaca College, Ithaca, NY 14850.

Erwinia herbicola (Eh) is a potential biological control agent for fire blight, a disease of apple and pear trees caused by the bacterium *Erwinia amylovora* (Ea). One way Eh inhibits Ea is by production of antibiotics. The most common and effective antibiotic produced is difficult to study because it is probably unstable and there is no good assay for it. A ß-glucuronidase reporter gene (*gus*) was inserted into the antibiotic gene of Eh. The expression of the antibiotic gene can be studied by measuring GUS activity. When Eh grew on a minimal medium, GUS was produced constitutively; however, on complex nutrient medium GUS was detected only at high cell populations and at relatively low levels. Highest levels of GUS occurred when Eh was grown on pear juice with no additions. (oral presentation)

A COMPARISON OF THE LIMNOLOGY OF SIX HARDWATER LAKES IN MICHIGAN AND NEW YORK.

James Wolfe, Biology Department, Houghton College, Houghton, NY 14744

Six hardwater (63-250 μS cm^{-2})glacial kettle lakes in the headwaters of the Manistee River (Michigan) and Genesee River (New York) watersheds were studied from 1984 to 1996. The lakes varied in size and density of shoreline human habitation. The five Michigan lakes showed the presence of summer metalimnetic oxygen maxima, correlated with chlorophyll maxima (4 -31 μg/L) at the bottom of the metalimnion in these clear (Secchi depth = 5 - 7 m) lakes. Metalimnetic oxygen maxima were also correlated with maxima in alkalinity and pH.

Spring Lake in New York showed no metalimnetic oxygen maximum and a smaller Secchi depth. Phytoplankton samples from the water column showed the presence of blue-green algae and dinoflagellates in low concentrations in the five Michigan lakes and high concentrations of blue-green algae in Spring Lake (New York).

Total phosphorus levels in the water column for the five Michigan lakes were also low, ranging from 7.5 to 12 ppb, whereas for Spring Lake concentrations were 10X greater in the hypolimnion during summer. The five Michigan lakes were characterized as oligotrophic-mesotrophic (indicated by Secchi depth, chlorophyll levels, and phosphorus concentrations) despite nutrient loading from lakefront cottages, whereas Spring Lake in New York was classified as eutrophic despite lack of current nutrient loading. This trophic status for two of the Michigan lakes was maintained over a nine year period. Epilimnetic decalcification with subsequent calcium carbonate precipitation and nutrient lockup may play a significant role in the maintenance of the trophic status for the Michigan lakes. Spring Lake in New York may have had past nutrient loading which negated this possible mechanism for maintaining trophic status found in some hardwater lakes. (oral presentation)

UNIQUE NORTH AMERICAN RECORD OF MIDDLE WISCONSIN GLACIAL EVENTS IN THE GENESEE VALLEY BETWEEN 35,000 AND 46,000 YEARS BP.

Richard A. Young, Geological Sciences, SUNY College at Geneseo, Geneseo, NY 14454.

The last Late Wisconsin ice sheet covered New York State between 23,000 and 11,000 years ago, but it accounts for most of the existing glacial deposits. The southern boundary of Middle Wisconsin glaciation in North America is poorly documented. Canadian researchers claim that Middle Wisconsin ice did not extend south of Toronto. Polar ice cores and deep sea sediment records have only recently established a precise chronology for the entire Wisconsin Stage of the Pleistocene Epoch, approximately the last 120,000 years. These records have been matched to U -Th sea level chronology for the major Stades (cold) and Interstades (warm) of continental ice sheet advance and retreat. The southernmost limit of Middle Wisconsin ice has important implications for climate models, which correlate global sea level changes with ice sheet volume, using radiometric and oxygen isotope records.

A site in northern Livingston County contains a stratigraphic record of three ice advances, including organic horizons with Middle Wisconsin radiocarbon ages that cluster near 35,000 and 46,000 years BP. The site contains well-preserved remains of trees, saplings, peat, leaves, seeds, insect parts, and mammoth bones, teeth and tusks. The site also records the existence of three large proglacial lakes. The best dated glacial advance (35,000 years BP) preserves a record of the actual ice margin at the latitude of Caledonia, NY, 80 km south of previous Canadian estimates. These data correlate well with global oxygen isotope Stage 3 events and with ice sheet oscillations between internationally established Interstadials 8 and 12. The Genesee Valley ice advance dated at 35,000 BP also matches the known age of a major iceberg discharge event recorded in North Atlantic sediment cores, known as Heinrich event, H4.

Pollen analyses confirm a tundra-like environment with willow, rose, and herb species during the earliest recorded ice advance. The mammoth skeleton remains appear to be the oldest dated Wisconsin evidence of these animals in North America. Studies in progress will attempt to refine and expand the preliminary radiometric chronology at the site to improve the North American data base for global climate models.

An enigmatic question raised by the location of this shallow, buried site concerns the survival of such old deposits within the Late Wisconsin Finger Lakes glacial province, a region often cited as the prime example of the capability of continental ice sheets to erode bedrock valleys far below sea level. (oral presentation)

TOWARD A CULTURAL APPROACH IN THE LINEAGE STUDIES.

Zhiming Zhao. Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

This paper presents an analytical framework for the ethnographic data from my ten-month field research on the Tangs of Lung Yeuk Tau, a localized lineage in the New Territories, Hong Kong that once dominated the region but was eclipsed under the British rule at the turn of the century. In the recent decades, however, it has staged a comeback to become a dynamic part of modern society in Hong Kong. Not only is this lineage actively engaged in the market economy, but it has reclaimed its dominance of local politics as well.

The data from Lung Yeuk Tau pose serious problems for the functionalist model that is built on structural determinism, emphasizing utilitarian rationality. Implicit in the functionalist analyses of the lineage is the belief that meaning is secondary to function. If there is a decline in the traditional functions of the lineage, there must be a loss of meaning in its norms, values, and beliefs. It leads functionalists to be pessimistic about the survival of the lineage into modern society as a dynamic institution. Such pessimism, however, is largely assumed, for little effort has been made in the anthropological literature to investigate the mechanisms of problem-solving developed by the lineage.

An analysis of the adaptive strategies adopted by the Tang lineage of Lung Yeuk Tau reveals that its fundamental norms, values, and beliefs are very much alive. The analysis is conducted within the framework of a cultural approach under which there is a symbolic system and a normative system. The symbolic system defines the fundamental ideology of the Chinese lineage, which, in turn, sanctions the rules of behavior provided by its normative system. The primary functions of the normative system are to cope with the problems of meaning, to offer a meaningful life and social order, and to adapt. There is, however, no one-to-one correspondence between the symbolic system and the nominative system, where an array of alternatives is available. The vitality of a Chinese lineage is closely associated with its efforts to explore these viable alternatives in the face of challenges from modem society. (oral presentation)

TWENTY-SIXTH ANNUAL SCIENTIFIC PAPER SESSION

FINGER LAKES COMMUNITY COLLEGE
CANANDAIGUA, NY
November 6, 1999

LARRY J. KING MEMORIAL LECTURE

Conservation in the Montezuma Wetlands Complex: An Ecosystem Management Approach

Paul Hess, U.S. Fish and Wildlife Service
Sheila Sleggs, Ducks Unlimited

ABSTRACTS OF PAPERS

Abstracts are listed alphabetically by first author. Abstracts have been included with minimal editing exactly as submitted. Whether a submission was a poster or oral presentation is indicated at the end of each abstract.

A DEMOGRAPHIC AND TEMPORAL COMPARISON OF TWO FORESTS.

Henry Adams, 1947 Powell Campus Ctr., Alfred University, Alfred, NY 14802.

A current debate in applied forestry is that of the sustainability of logging technique. In this study, basal area is used as a measure of the economic value of a forest and diversity indices are used as a measure of the ecological effect of logging technique. In 1971 two forest communities in Allegany County were sampled by Rogers Baker, for his masters thesis at Alfred University. One of these communities is a stand of *Pinus strobus* (white pine) planted in 1950 in The Phillips Creek State Forest. The other site is located on private property, is composed of *Acer rubrum* (red maple) among other hardwoods, and has never been logged intensively. It was hypothesized that the pine site would show a greater increase in basal area than the hardwood site while the hardwood site would have a higher species richness. These field sites were sampled again in 1999. Slight decreases in basal area were found at both sites. Species richness was found to be greater at the pine site. At the pine site species richness has increased since 1971 while species richness at the hardwood site has decreased. The Shannon-Weaver diversity index is greater at the pine site and has increased significantly there. (oral presentation)

TECHNOLOGY AND COLLABORATIVE LEARNING: PRACTICING "DEVELOPMENT ANTHROPOLOGY" IN THE CLASSROOM.

Adele Anderson, 5010 Butler Road, Canandaigua, NY 14424.

The development literature in anthropology and sister disciplines recognizes a need for increased technological dialogue, hybrid adaptations, and redefinition of the terms of technology from the worldview, perspectives and knowledge of local users. In this connection, reflective practice and participative and collaborative learning figure prominently as recommended modes

of ensuring optimum outcomes, in the adoption of technological and social innovations by organizations and localities.

These principles can also be applied fruitfully when teaching with and introducing students to the use of rapidly evolving information technologies in college classrooms. My own applications are taking place in "Technology and Society," an interdisciplinary capstone seminar that I teach to third and fourth year students of SUNY Brockport's Delta College. In this interdisciplinary liberal arts endeavor, I employ collaboration projects and cooperative learning that includes the "bootstrapping" of increased technological competency among a class of students comprised of many different majors and widely differing technological preparations and competencies.

As a class, members of Technology and Society collaborate in improving our collective understanding and use of Web-driven communications, by identifying, using, and teaching each other to use an expanding variety of campus facilities and resources. We employ Web and other media (textbooks, movies, videotapes, audiotapes and live presentations) to interrogate American and global histories, interpretations, and social impacts of technology. The student learning outcomes aim to enhance students' employable professional skills (communication, information management) and to integrate and reinforce their critical thinking abilities and their liberal studies knowledge base across the social science disciplines. (oral presentation)

LONG-TERM IMPACT OF ZEBRA MUSSELS (*DREISSENA POLYMORPHA*) IN CANANDAIGUA LAKE.

Jay Bailey and Bruce Gilman, Department of Environmental Conservation/Outdoor Recreation, Finger Lakes Community College, 4355 Lakeshore Drive, Canandaigua, New York 14424-8395.

A proactive sampling and monitoring program has been in place on Canandaigua Lake for several years in an effort to gather base-line information on the oligotrophic condition of the water. Coincidently over the same time span, zebra mussels were introduced to the lake. Data on lake clarity (Secchi disk readings) and estimates of algal abundance (chlorophyll a) have changed dramatically over the last four years, an effect that may be linked to the growing population of zebra mussels. The future condition of lake water is uncertain as native aquatic organisms adjust to the impacts of zebra mussels and other invasive species. (oral presentation)

THE SENSITIVITY OF *ERWINIA AMYLOVORA* TO ANTIBIOTICS INVOLVED IN CHEMICAL AND BIOLOGICAL CONTROL OF FIRE BLIGHT DISEASE.

Jennifer Barbre, Nathan Ross, and Richard Wodzinski, Biology Department Biology, Department Ithaca College, Ithaca, NY 14850.

Fire Blight is a bacterial disease of apple and pear trees that is controlled by streptomycin. There is interest in biological control using *E. herbicola* which produces an antibiotic that inhibits the pathogen *E. amylovora*. The sensitivity of *E. amylovora* and *E. herbicola* to streptomycin was about equal. *E. amylovora* was about as sensitive to *E. herbicola* antibiotic as it was to streptomycin on a ppm basis. However, on a molar basis *E. amylovora* was more sensitive to streptomycin than to the *E. herbicola* antibiotic. *E. amylovora* developed resistance to streptomycin and the *E. herbicola* antibiotic at approximately the same rate. (oral presentation)

PHOSPHORUS AND CHLOROPHYLL LEVELS IN SPRING LAKE, ALLEGANY COUNTY, NY.

Rebecca D. Barton, Department of Biology, Houghton College, Houghton, NY 14744.

Spring Lake, a small, shallow kettle lake in Hume, NY, was studied for phosphorus and chlorophyll levels during the fall turnover. This hardwater lake is home to a flock of Canada geese and is ringed by livestock pastures and mature forests. Prior to the fall turnover the average secchi depth was 1.3 meters and the pycnocline was found to be at 4 meters. The greatest levels of chlorophyll were at a depth of 5 meters, in anoxic conditions. This seems to point to the phytoplankton being dominated by cyanobacteria, which can grow at low light and oxygen levels. At the turnover, the bloom had dissipated and chlorophyll levels were low at all depths. The levels of phosphorus in relation to chlorophyll are being investigated. (poster presentation)

A TEMPERATURE MICROCLIMATE STUDY AT HOUGHTON AND FILLMORE, NY.

Mark L. Biermann, Department of Physics and Earth Science, Houghton College, Houghton, NY 14744.

A temperature, microclimate study was conducted in and around Houghton and Fillmore, NY from September 1998 to April 1999. Recording thermometers were used at study sites to determine the daily temperature extremes throughout the period of the study. A notable aspect of this study is that both undergraduate and elementary students were involved. Students in the 3rd grade at Fillmore Central Schools worked with undergraduate students at Houghton College in recording the temperature data. Data was recorded at four sites, two in Houghton and two in Fillmore.

Interesting results were found both scientifically and educationally. The average high and low temperatures were found to be approximately 5 degrees Fahrenheit higher in Houghton than in Fillmore. Planning for a study to determine the mechanism for this striking difference in average temperatures over only 4 miles is now underway. Variations in average temperature within Houghton due to elevation effects were also observed. Finally, an obvious solar heating effect was seen in the results at Fillmore.

The 3rd grade students benefited from the project, while contributing to it. They were able to gain an appreciation for scientific research by taking part in actual data collection. An analysis of the various results provided an opportunity to teach the students about various weather and climate effects. The educational aspect of the project was particularly successful due to the enthusiastic participation of the 3rd grade teacher. This project could serve as a model for projects which provide K-12 science education while producing valid scientific results. (oral presentation)

THE NEW YORK STATE INTEGRATED PEST MANAGEMENT PROGRAM.

Lynn Braband, Cornell Community IPM Program, NYSAES, Geneva, NY 14456-0462.

The New York State Integrated Pest Management (IPM) Program - created in 1985 as a partnership program of the New York State Department of Agriculture and Markets, Cornell University, and Cornell Cooperative Extension - works with producers of 25 major crops in New York to reduce their reliance on pesticides while maintaining high-quality, affordable products. In this poster presentation, basic tenets of IPM are described. Information on the increasing interest in implementing IPM concepts in non-agricultural settings, especially schools, is also given. (poster presentation)

AN OVERVIEW OF THE HIPPARCOS MISSION.

James J. Carr, 14 Tall Meadow, Painted Post, NY 14870.

The Hipparcos mission was the first space-based experiment specifically for astrometry, the measurement of star positions. Launched in August, 1989 by the European Space Agency (ESA), the Hipparcos satellite spent four years in orbit collecting measurements until 1993. It took another three years to fully reduce, refine, analyze and finally catalogue the data. Results were made public when project scientist Michael Perryman (and colleagues) released the official catalogues of data in June, 1997.

A very clever acronym, derived from High Precision Parallax Collecting Satellite, Hipparcos is named for the Greek astronomer of antiquity, Hipparcos of Nicea. Its companion measurement system, Tycho, is named in honor of Tycho Brahe, the Danish observer considered the last great naked-eye astronomer. The Hipparcos and Tycho catalogues comprise 17 volumes containing the positions, distances, movements and other properties of more than 100,000 stars. The project was recommended to the ESA in 1980, taking nearly 20 years to complete from conception until the present time. (oral presentation)

STUDIES OF SEDIMENTARY STRUCTURES AT THE CONTACT OF WILLIAMSVILLE-A WITH WILLIAMSVILLE-B, SILURIAN, EURYPTERID-BEARING, BERTIE GROUP, ONTARIO, CANADA.

Samuel J. Ciurca, Jr., 54 Appleton Street, Rochester, NY 14611, and Joseph LaRussa, 198 Maria Street, Rochester, NY 14610.

Since 1992, quarrying operations (Ridgemount Quarry South, south of Bridge Street, Fort Erie) enlarged an area of the quarry floor revealing intriguing, perhaps unique sedimentary structures. The structures have been observed in a dolomite sequence of strata within the Late Silurian Bertie Group (Ciurca, 1994, New York State Geological Association Fieldtrip Guidebook, Fredonia, New York).

At the contact of formational Williamsville-A with Williamsville-B, numerous sedimentary structures have been observed and studied. The structures were preserved on the quarry floor, on a surface that almost appeared glacially polished (that's how smooth the quarry floor appeared, with no excavation of the surface). For some little-understood reason, one area of this large quarry was blasted down to this contact zone, rather than to the usual Fiddlers Green/Scajaquada contact exposed in most of the quarry.

The most problematic structures were the "boomerangs" (named by Ciurca, 1994, NYSGA Fieldtrip Guidebook). Boomerangs are relatively large sedimentary structures (definitely not ichnofossils as Ciurca, upon seeing them for the first time, thought), depressions on a bedding plane, generally at the contact of Williamsville A & B members, that are interpreted to be relatively high energy, boomerang-shaped, current structures.

During the period 1995-1997, a map of the quarry floor was begun by Ciurca. Emphasis was on the distribution of the boomerangs and ripplemarks, but a number of other interesting structures were found. During the 1999 field season, Joseph LaRussa joined in a continuing effort to study all of the current indicators (structures) that still remain exposed on the quarry floor. We have already lost most of the boomerangs due to quarry operation and vigorous fossil collecting (not a criticism).

The area that Ciurca mapped previously (in 25 m squares), recorded the distribution of the boomerangs and provided the primary evidence of current flow in this a really (thus regionally insignificant) small area of temporary exposures of the Bertie Group. (Ciurca collected data on over 50 boomerang structures, data soon to be published). All evidence indicates strong (storm) currents from the southwest. The largest percentage of exposed ripplemarks show a SW to NE current. The exception is a small area of the floor (NE quadrant) that shows current flow from the east. While it is a small area, we have to realize that the entire quarry area is insignificant compared to the regional distribution of the formation. Analysis can only tell us what happened in this minute area of exposure, at the A-B contact. This is better than nothing, and there is always the hope other sites will provide additional data in the future.

Joseph LaRussa and I are currently assembling data on the current-controlled distribution of eurypterid remains and other animals. In addition, data have been assembled on a variety of other preserved structures, both fossil and physical. A report is currently in preparation. (oral presentation)

HARRIS HILL MEMBER OF THE LATE SILURIAN VERNON FORMATION, PENFIELD, NEW YORK: TYPE SECTION AGAIN REVEALS STRATIGRAPHIC SECTION, EURYPTERIDS AND SEDIMENTARY STRUCTURES.

Samuel J. Ciurca, Jr., 54 Appleton Street, Rochester NY 14611

The Harris Hill Bed (now member) was described previously (Ciurca, RAS Abstracts) from a surprise occurrence of the Vernon Formation north of previously mapped localities (see NYS Geologic Map, State Museum Publication, Albany, NY). The Vernon Formation contains a *Hughmilleria*-bearing unit, lithologically distinct from overlying and underlying lithologies of the Vernon Formation of the region and was given a distinctive name, the "Harris Hill Bed" after the glacial hill just to the north of the type locality.

During the summer of 1999, new excavations immediately south of the original site revealed the stratigraphic sequence again. The new exposures are in the north-south creekbed (Harris Hill Creek) immediately to the SW of the Wegmans Superstore. Due to the nature of the excavations (to allow southward drainage during rainstorms) the new site should remain visible and accessible as a type locality for the unit.

Studies during this interval revealed only the presence of *Hughmilleria socialis* and ostracods. Eight carapaces were collected over the interval mentioned above. Notable was the pervasive occurrence of mudcracks, denoting exposure of the sediments to the drying conditions of the sun. They are very evident in the eurypterid bed (i.e., Harris Hill Member), in some of the dolomitic rocks, and, of course, in the overlying syncretic redbeds.

Of significance to future studies, as was the case in 1989, is the position of the Lockport/Vernon boundary. How far below the Harris Hill Member is the contact? Is the Harris Hill Member older than the other horizons in the Pittsford area (Pittsford Member, Monroeav Member and Barge Canal Member)?

Hughmilleria generally occurs in sandstones and shales, while *Eurypterus* generally occurs in the dolomitic rocks and shales. Is *Hughmilleria* riverine? And *Eurypterus* more typically marine (i.e., the "algal zone" behind stromatoporoid biostromes and bioherms)? One thing is certain, *Hughmilleria* and *Eurypterus* are found in sediments that were deposited during conditions of high salinity.

I have proposed, in previous papers, that this high salinity began before Vernon Time, indicating that there was evidence in the upper Lockport Formation rocks (Allens Creek beds) of salt hoppers forming during deposition of these dolomitic sediments (apparently a part of *Eurypterus pittsfordensis* Zone).

Areas just to the east and north of the new exposure appear to have thick glacial deposits. The area all around the intersection of NY 441 and NY 250 is composed mostly of sandy deposits, at least to a depth of 15-25 feet (Hess Gas Station excavations). Just to the east, on the north side of NY 441, near Watson Road, exposures of red shale were noted in 1989.

It is unfortunate, but it could take another 100 years to be able to interpret the stratigraphic sequence of the region to the extent that we understand the distribution of the many eurypterid-bearing horizons of (just) our region. Are there even more? Little is understood, presumably because of lack of exposures, of the thorough (cyclic) intercalations of the Vernon Formation sediments, as the Lockport seas retreated northward (toward Hudson Bay), and westward (toward the midcontinent). (oral presentation)

OUT OF THE UNDERWORLD: A RECONSIDERATION OF FELINE ICONOGRAPHY IN MESOAMERICA.

R.M. Collins, Dept. of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

The feline iconography of Mesoamerica may be more complex than first believed. Typically, any feline character is assumed to be a jaguar, despite many differences in the representations of such an animal. It is my belief that not only jaguars, but also pumas, and possibly smaller cats, such as ocelots, jaguarundis and margays may also be found in the iconography. The focus of this paper is a comparison between the jaguar and the puma, and so our discussion will be limited to these animals. As there has been little research conducted on the topic of feline iconography in the New World, a critical analysis of archaeological remains and ethno-ecological attitudes was employed on the Olmec, the Maya, and the Aztecan cultures. Folk tales and artistic representations of feline distinguish the difference between the puma and jaguar, leading to the conclusion that a significant portion of the iconography has been incorrectly associated with jaguars when it should be more properly affiliated with other felines, like the puma. (oral presentation)

PRODUCTION OF DIEPOXYBUTANE MUTATIONS OF THE ASTEROID GENE OF *DROSOPHILA MELANOGASTER*.

Rebecca Dudek and Michael A. Kotarski, Department of Biology, Niagara University, NY 14109.

The asteroid gene of *Drosophila melanogaster* functions in embryonic and eye development. The gene is hypothesized to have a role in the epidermal growth factor receptor (Egfr) signaling pathway. In order to confirm this function of asteroid, it is useful to produce a null mutation of the gene for further experiment. Flies were fed the chemical alkylating agent diepoxybutane in a sucrose solution to produce deletion mutations. Putative mutations of asteroid were identified by a jumbled eye phenotype in adult flies. To date, 57,023 flies have been screened and 10 interesting asteroid mutants have been recovered. (poster presentation)

EVERYONE'S AN EXPERT: CONFLICTING ROLES IN KEEPING CONTRACT ARCHAEOLOGY SCIENTIFIC.

John O. Floyd, Anthropology Department, SUNY Buffalo, 380 Fillmore, Buffalo, NY 14261-0005.

Among the most visible people in archaeology are those doing Cultural Resource Management (CRM), or archaeology done under contract in an area subject to development or other disturbance to comply with preservation laws. These archaeologists may not make the most

spectacular discoveries but they do make the local news and when people encounter archaeologists it is generally through CRM.

Scientific research designs based on sampling strategies form the basis of all well-planned archaeological investigations including CRM projects. In CRM the archaeologist is providing a service under contract to the developer and that developer's input must play a role in designing the study. In accommodating the needs of the client the archaeologist may encounter an effort to compromise scientific research design.

CRM archaeology is very public archaeology. It is performed along roadsides and in neighborhoods - wherever there is construction or development. Because CRM archaeologists are often not local to the area where they are working, they are dependent upon an informed public (in addition to their client) to make them aware of local archaeological sites, artifact collections, and preserved historical documents. Therefore, the need exists to educate the public about the project and solicit information from them but this must be done without fueling the interest of relic hunters or of development protesters, both of whom can interfere with the implementation of a scientific research design. (oral presentation)

STREAM MACROINVERTEBRATE ANALYSIS WHEN A GOOD RIFFLE CANNOT BE FOUND.

William Hallahan, Nazareth College, Biology Department, 4245 East Avenue, Rochester, NY 14618.

The analysis of stream water quality traditionally involves the sampling and analysis of the macroinvertebrate community living in the riffles. This report illustrates the results of a preliminary analysis of Buttonwood Creek in the town of Parma where the drop in elevation produces very low velocities. In addition, the sandy substrate provides little opportunity for macroinvertebrate colonization and virtually no riffles. Macroinvertebrates were collected in a 500-micron net from an area of 18" by 18" on the stream substrate. Using the Izaak Walton classification of three tolerance ranges, all macroinvertebrates were counted. Pie graphs of the populations illustrate that the stream quality is substantially more dominated by pollution tolerant organisms after the stream receives a tributary from an inactive landfill. (poster presentation)

VERTEBRAL OSTEOPHYTOSIS AND MECHANICAL STRESS IN APES.

Kristi J. Krumrine, Dept. of Sociology/Interdisciplinary Anthropology, University of Akron, Akron, OH 44325-1905.

Vertebral osteophytosis is a degenerative arthritic condition of the vertebral bodies common in human populations. It is generally distributed in areas of the spine receiving high amounts of stress, especially the lumbar region and at points of maximum curvature. Much research has focused on its prevalence among archaic human populations, specifically looking at the comparative distribution of osteophytes within the vertebral column between groups. These studies have attempted to link the distribution of osteophytosis to specific patterns of behavior based upon the way in which the patterns of distribution deviate from that expected of bipedal locomotion. Much of this work has been inconclusive. This study analyzes the distribution of vertebral osteophytosis in apes in order to compare the way in which osteophytosis is expressed in quadrupedal versus bipedal locomotion and, consequently, to better understand the potential causal factors associated with its development. A sample of 88 gorillas, 46 chimpanzees, 13 orangutans, and 40 gibbons were examined for evidence of vertebral osteophytosis. With the exception of the gibbons, which were negative for osteophytosis, the severity of the osteophytes in all groups was greatest in the lumbar region. In gorillas and orangutans, the cervical region had the second most severe osteophytes, while in chimpanzees the thoracic showed the second most severe osteophytes. The gorilla and orangutan patterns are similar to that seen in some human archaic groups, specifically archaic Eastern Woodland groups. The chimpanzee pattern is consistent with the expected pattern for bipeds. Evidence of similar distributions of osteophytosis in humans and apes suggests that locomotion and activity patterns may not be the only causal mechanisms for the development of vertebral osteophytosis. (poster presentation)

ELECTROPHILIC AROMATIC SUBSTITUTION USING HALOACIDS AND DMSO.

Pankaj Kulshrestha, James J. Worman, Department of Chemistry, Rochester Institute of Technology, 86 Lomb Memorial Drive, Rochester, NY 14623.

Present methods for aromatic halogenation involve the use of reagents and catalysts under experimental conditions which present a safety hazard when performed in the undergraduate teaching laboratory. In addition, the disposal of wastes are costly and definitely not benign to the environment.

A simple, safe, and cost effective experiment to demonstrate electrophilic aromatic substitution can be accomplished by placing one drop of N,N-dimethylaniline into an NMR tube containing the appropriate level of hexadeutero DMSO. After observation of the expanded proton NMR region, two drops of 48% aqueous HBr is added and the NMR spectrum recorded after one half hour. Observation of an AA' B,B' pattern in the aromatic region is direct evidence for halogenation on the para position. A mechanism for the reaction along with other examples will be presented. Application of the reaction for the halogenation of complex biomolecules is plausible because the room temperature experimental conditions should prevent structural degradation of sensitive molecules. (poster presentation)

INQUIRY IN THE SCIENCE CLASSROOM.

Douglas Llewellyn, Director of Science, Rochester City Schools, 131 West Broad Street, Rochester, NY 14614.

Inquiry can be defined as the scientific process of active exploration by which we use critical, logical and creative thinking skills to raise and engage in questions of personal interests. Driven by our curiosity and wonder of observed phenomena, inquiry investigations usually involve:

- stating a question to investigate,
- choosing a course of action,
- carrying out the procedures of the investigation, and
- gathering and recording the data through observation and instrumentation.

As we propose and debate our explanations to communicate and evaluate our results, inquiry helps us to 1) connect our prior understanding to new experiences, 2) modify and accommodate our previously held beliefs and conceptual models, and 3) construct new knowledge. In constructing new formed knowledge, students develop additional questions and discrepancies to investigate.

Although the term scientific inquiry itself can conjure up an image of scientists working in laboratories, inquiry does not necessarily mean following the sequential steps of the scientific method. Comparing inquiry to the scientific method is much like comparing intuitive to analytical thinking. The process of intuitive thinking tends to complement problem solving. It generally requires a higher level of self confidence on the part of the investigator. Analytical thinking, on the other hand, usually involves an explicit set of step-by-step procedures.

If we were to enter an inquiry-centered classroom what would we expect to see? We would probably observe students acting as researchers and investigators. Students would be asking a lot of "What if..." and "I wonder..." questions as they worked cooperatively in groups making predictions and testing their hypotheses. We would observe students making observations, sharing ideas and becoming responsible for their own learning. When students do inquiry in science, they are encouraged to raise questions and pursue their own course of action to make meaning of their personally held scientific models and theories.

Looking towards the teacher, we would see her posing questions and exploring the students' interests. She would be acting as a facilitator and creating an environment conducive to learning. Her daily lessons would make learning meaningful and focus on student-initiated problems. During the lesson the teacher might utilize instructional techniques that integrate science with mathematics, language arts, social studies, technology and other subject areas.

The classroom environment would be active and learner centered. Students' questions and work would be displayed on the walls and desks would probably be arranged in groups for cooperative learning activities. We would see, feel and hear an atmosphere where students were encouraged to pursue their questions and think creatively. We might also expect to observe an attitude of self reliance and self confidence radiating from the students' faces.

Finally, learning through inquiry empowers students with the skills and knowledge to become independent thinkers and life-long learners. As teachers, we can encourage students to use the communication, manipulation and problem-solving skills to increase their awareness and interest in science and set them on their way to becoming scientifically literate citizens. (oral presentation)

AN INTRODUCTION TO THE MAPS (MONITORING AVIAN PRODUCTIVITY AND SURVIVORSHIP) BIRD BANDING PROTOCOL.

C. Marchenese and J. Van Niel, Environmental Conservation Department, Finger Lakes Community College, 4355 Lakeshore Drive, Canandaigua, NY 14424.

Monitoring Avian Productivity and Survivorship (MAPS) is a continent-wide effort to provide long-term data on the productivity, survivorship and population sizes of landbird species through constant effort mist netting, banding and point counts through the breeding season. By monitoring areas consistently over time, MAPS can provide long-term landbird data trend information that is critically needed. Data will be presented from a single field season at Montezuma National Wildlife Refuge. (oral presentation)

CONSTRUCTION OF A *STREPTOMYCES-E. COLI* SHUTTLE VECTOR CONTAINING THE GREEN FLUORESCENT PROTEIN GENE.

Heather Lynch and Mark Gallo, Department of Biology, DePaul Hall, Niagara University, NY 14109.

The green fluorescent protein has become one of the leading biomarkers, and has been used in a large number of organisms to follow cellular processes. To date, this system has not been demonstrated in the *Streptomyces*. *Streptomyces* are Gram-positive, filamentous bacteria that are responsible for production of a majority of pharmacologically-active natural compounds. In addition to their chemical prowess, they undergo a complex differentiation which is at present poorly understood. The investigators have constructed a promoterless shuttle plasmid, pGFPSL, to investigate regulation and control of differentiation and secondary metabolite production in these organisms. (poster presentation)

STRUCTURE OF THE OLD GROWTH FOREST AT HALE'S WOODS, WEBSTER, NEW YORK.

Amy McNamara and Bruce Gilman, Department of Environmental Conservation/Outdoor Recreation, Finger Lakes Community College, 4355 Lakeshore Drive, Canandaigua, New York 14424-8395.

Remnants of primeval forest are in rare in western New York. While many sites have been investigated, only 29 locations have been documented as old growth based on structural attributes of the forest. The most recent discovery of ancient forest is the Hale's Woods site along the southern shore of Lake Ontario. The forest is characterized by the presence of tree species that are long-lived and large in size. American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), eastern hemlock (*Tsuga canadensis*) and black birch (*Betula lenta*) dominate the canopy layer. Stand structure is all-aged with a high proportion of mature trees of old age as determined by dendrochronology. Dead standing snags, large fallen logs, canopy gaps and a pit and mound microtopography are prevalent throughout the forest. Land ownership has passed through successive generations of the same family, and their environmental ethic may help explain the lack of human disturbance at Hale's Woods. (oral presentation)

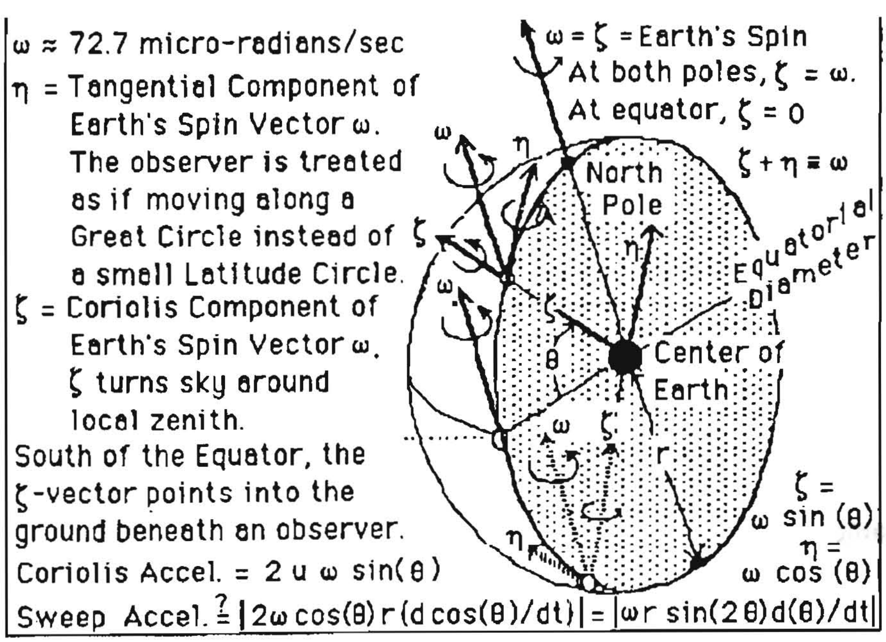
CORIOLIS IS NOT ENOUGH.

Frank Mooney, 6135 Dugway Road, Canandaigua, NY 14424.

A thrown ball eludes long arms on a carousel. Because you are turning, coriolis pseudo-arcing of the ball is the problem. Likewise, we see wind falsely turn around lows and highs. Note that centrifuged equatorial air orbits Earth at over 1000 mph, so enough speed is available. Earth turns around local zenith under rapidly diffusing air (wind), but not at the equator where zodiac constellations parade but do not turn in the sky.

Coriolis Acceleration = 2 ω v sin θ:

Ω = 2 π / 24 hrs, v = speed of ball, θ = latitude, r = Earth's radius.



Mid-latitude air arcs around local zenith while it also seems to move along a great-circle that reaches highest latitude locally. When this air changes latitude, it takes its momentum. Tropical tradewinds bring too little of it from higher to lower latitude, so they have too little speed and blow west-to-east. Latitude-sweep of tradewinds blowing south (or blowing north for westerlies) adds to coriolis-arcing and needs its own formula.

$$\text{Sweep Acceleration} =?= 2\ \omega\ r \sin (2\ \theta)\ d\ \theta\ /dt.$$

Only wind that changes latitude ($rd\ \theta\ /dt$) swerves, which extends the vast oceanic anticyclones east-west for thousands of miles. These highs end where weakened cross-latitude airflow lets coriolis-arcing connect tradewinds and westerlies and close the circulation. The $\sin(2\ \theta)$ of sweep acceleration is 0.00 at the equator and at both poles; it is 1.00 at 45° and is 0.866 at 30°, where coriolis accelerations are 0.707 and 0.5 respectively. (oral presentation)

EXPRESSION OF AN ANTIBIOTIC GENE IN *ERWINIA HERBICOLA*, A POTENTIAL BIOLOGICAL CONTROL AGENT FOR FIRE BLIGHT DISEASE.

Jennifer Morawiak, Richard Wodzinski, Biology Department, Ithaca College, Ithaca, NY 14850.

Fire Blight is a disease that affects apple and pear trees and is caused by the bacterium *Erwinia amylovora*. *Erwinia herbicola*, a harmless epiphyte, has been show to inhibit *E. amylovora* by means of an antibiotic. The antibiotic is difficult to measure because it is unstable. To alleviate some of the problems associated in studying the expression of the antibiotic, the *gus* reporter gene was inserted into the antibiotic gene. Measuring the expression of the inserted *gus* reporter gene is equivalent to measuring the expression of the antibiotic gene of *E. herbicola*. The expression of the antibiotic gene, through measuring the *gus* gene, was determined in apple juice. It was found that when the cells grow exponentially, the expression of the antibiotic is minimal, but when the cells begin to stop growing exponentially, the expression of the antibiotic increases. Thus the antibiotic is produced as a typical secondary metabolite. Expression of the antibiotic gene in pear is being studied. (oral presentation)

A COMPARISON OF THREE SOFTWATER LAKES IN EASTERN CONNECTICUT.

Daniel E. Mund, James M.Wolfe, Department of Biology, Houghton College, Houghton, NY 14744.

Bashan Lake, Pataganset Lake, and Amos Lake, all located in the eastern uplands geological formation of Connecticut (East Haddam, CT, East Lyme, CT, and Preston, CT respectively), were studied during the summer and fall of 1999. The lakes, with maximum depths of 15.3 m (Basham), 10.2 m (Pataganset), and 14.5 m (Amos), were stratified from May to August. Bashan Lake had a mean conductivity reading of 64 μS/cm, mean alkalinity of 5 mg/L, mean hardness of 15 mg/L, and a mean Secchi depth of 6.2 m. Pataganset Lake had a mean conductivity reading of 74 μS/cm, mean alkalinity of 11 mg/L, mean hardness of 16 mg/L, and a mean Secchi depth of 2.9 m. Amos Lake had a mean conductivity reading of 128 μS/cm, mean alkalinity of 25 m/L, mean hardness of 27 mg/L, and a mean Secchi depth of 2.1 m. Aquatic plants were dense in Amos and Pataganset Lakes, with white water lily dominating in both cases, while Bashan Lake had limited areas with dense plant cover, mostly consisting of milfoil. These findings support the hypothesis that Bashan Lake is oligotrophic, Pataganset Lake is late mesotrophic, and Amos Lake is eutrophic. Preliminary findings support the hypothesis that the late mesotrophic status of Pataganset Lake and eutrophic status of Amos Lake may be due to cultural eutrophication. (poster presentation)

TIME, AGENCY, AND UTOPIA: FUN IN AMERICAN CULTURE.

Robert Myers, Anthropology & Public Health, Division of Social Sciences, Alfred University, Alfred, NY 14802.

This paper, based on ethnographic study of contemporary cultural practices in the United States, examines linguistic, commercial, and behavioral roles of "fun." At century's end, conceptions of fun permeate the American cultural system, shaping ways people speak, patterns of consumption and labor, social relations, and a wide range of other behaviors. Ideas about funs' positive meanings to individuals as well as the frequent linkage of fun with consumer products tie Americans to a thoroughly commodified existence. Obtaining fun exists as a desired, often obligatory goal of the commodity-shaped value system while references to fun provide linkages both to the past and to an idealized and anticipated future. Fun thus provides a positive linear framework in which Americans are anchored. At the same time individuals frequently express disappointment at the difficulty and frustration of being unable to obtain the fun experiences they remember from the past or seek in the future. They complain about the rigidity and political correctness of the restrained atmosphere of the present. In the midst of this climate, efforts to experience spontaneous fun serve as individual rebellions against the routine structure of pervasive order. Unplanned individual decision-making to "have fun" represents a struggle for autonomy in the presence of larger social forces emphasizing order and self-control. Spontaneous fun provides an individually-created and sought-after opportunity, more likely to be successful than the idealized memories of past fun times and the unattainable utopian sentiments of future fun. (oral presentation)

CHOOSING OPTICS FOR THE GERIATRIC SET.

Ray Newell, AS-RAS, 386 Watson Road, Fairport, NY 14450.

As we age our eyes change in ways that should influence our selection of binoculars and telescopes.

The senior eyeball has lost most of its ability to adjust focus from a distant object to a nearby object. This effect is realized by most people as they enter their 50's. Less well recognized, perhaps, is the fact that the range of eye pupil size, which helps our ability to adapt to darkened environments, becomes significantly reduced as we age.

This paper discusses these effects and their implications as we select and use optical devices. (oral presentation)

AN ASSESSMENT OF THE CURRENT DIRECTION OF HOPEWELLIAN RESEARCH AT THE MILLENIUM.

Paul J. Pacheco, Anthropology Department, SUNY College at Geneseo, 1 College Circle, Geneseo, NY 14454.

Approximately 2000 years ago native peoples of the Eastern Woodlands periodically constructed earthen mounds, in many cases to house the dead. These mounds, and the associated earthworks and residential sites form a well-defined, but regionally diverse archaeological complex referred to as Hopewell. The first 130+ years of Hopewellian research directed all of its energy towards mound excavations, creating an archaeological construct based on mortuary contexts. During the last half century research on the associated earthworks and residential sites has shifted some, but not all, of the attention away from mound studies. Some areas, like western New York, have not yet moved beyond a concept of Hopewell as mound. Here, residential populations of mound users are archaeologically invisible, just as they once were in places like

Ohio. Only two studies have attempted to estimate regional population density and both rely on mound data. Conversely, currently existing studies of residential sites have not gone beyond a concept of mound or earthwork as central places. As of yet, there have been no successful attempts to create an integrated understanding (i.e., one that links the results of mound, earthwork, and residential studies) of the Hopewellian cultural-historical landscape. A case is made for the direction of research in the new millennium to shift towards a paradigm that integrates both mound and non-mound research by studying the variability and evolution of regional Middle Woodland populations. (oral presentation)

THE PEDAGOGICAL APPLICATIONS OF THE DEBATE OVER MARGARET MEAD'S SAMOAN DATA.

John Rhoades, Department of Anthropology, St. John Fisher College, Rochester, NY 14618

Margaret Mead's study of adolescence in 1920's American Samoa, published as *Coming of Age in Samoa*, attained the status of a classic, both in and out of anthropology. It was a staple text for anthropology courses as well as a popular choice for a large reading public interested in an exotic look at sexual behavior or in a lesson on how human society could be improved. In the 1980's, however, its validity was challenged by the Australian anthropologist Derek Freeman in what became a discipline-wide controversy. The purpose of this paper is to explain how this (still on-going) controversy can be a very useful pedagogical tool in courses on theory, ethnographic method, and the scientific basis of anthropology. The areas to be covered are: 1) The history of the relationship between ethnological theory and ethnographic research; 2) The manner in which ethnography is conducted, especially the requirement of using an appropriate research design, how personal characteristics affect data, and the relationship between language and elicitation; and 3) The scientific nature of anthropology, in particular the question of "proof" and the role of restudies. (oral presentation)

ST. JOHN FISHER COLLEGE/ THOMAS JEFFERSON MIDDLE SCHOOL SCIENCE TECHNOLOGY CLUB - A PARTNERSHIP FOR THE FUTURE.

Sheila Brady Root, Department of Mathematics, Science and Technology Education, St. John Fisher College, 3690 East Ave., Rochester, NY 14618 and David J. Adams, St. John Fisher College Alumnus, Class of '91, 7 Elliott Lane, Marlboro, NY 12542.

The "Science Technology Club" is part of a *working partnership* between St. John Fisher College and Thomas Jefferson Middle School. The Science Technology Club, in its 10th year of collaborative partnership, provides enrichment in the sciences on a college campus for approximately 150 seventh and eighth grade students. The focus of the program is "middle-ground" student - students who show the capability to succeed in high school and moving up to the next goal, college. One objective is to provide a change of environment for students to learn in and challenge them to ask the question "why?" through hands-on experience. Another Club objective is to captivate the inquisitive minds of these students in an effort to keep them in high school and work towards a college education in the sciences. Along the way, many of these students develop key holistic qualities, including personal identity, self worth, ownership of original ideas, problem solving, and the use of constructive criticism. Students who take part in the Science Technology Club and maintain high averages may become eligible to receive a Scholarship/Grant to attend St. John Fisher College.

Small groups of 24-30 students arrive on campus and then divide into two teams for integrative study. One team of students experiences a physical and or natural science program.

This is a supplement and enrichment to the science curriculum used by the middle school teachers. The other team works in the library with one of their English teachers or in the computer laboratories with a science computer teacher. After seventy-five minutes, the teams flip-flop. The integration of science, a social science/history or language arts components, and use of the College Library or computer laboratories is engaging for the students. Mentoring by Fisher students, team teaching by Fisher and Jefferson educators, lunch in a resident hall with Fisher students, and recreation in Student Life Center are all part of a full day's activities. Special field trips, including visits to the Toronto Science Museum, a whale watch in Cape Cod and tour of historic Boston, tour of a modern nuclear power plant, and visits to the Rochester Museum and Science Center, are sometimes added experiences. (oral presentation)

MOLECULAR TYPING OF ASPERGILLI USING CLONED REPETITIVE DNA OF *ASPERGILLUS FLAVUS*.

Anthony D. Saleh, John Kupinski, Department of Biology, St. Bonaventure University, St. Bonaventure, NY 14778.

Aspergillus flavus is an important plant and animal pathogen, but identification of new *Aspergillus* isolates as *A. flavus*, and differentiating among different *A. flavus* isolates is problematic. In this study we cloned repetitive DNA sequences from *Aspergillus flavus* and then used them as molecular probes for differentiating among strains of *A. flavus*, and for distinguishing *A. flavus* from other closely related *Aspergillus* species. Genomic libraries of *A. flavus* were created by ligating restriction fragments of whole genomic DNA into the lambda cloning vector EMBL 4. Phage libraries were screened for repetitive DNA sequences by using labeled genomic DNA of *A. flavus* as the probe in plaque hybridizations. Plaques containing repetitive sequences stain more intensely than plaques containing unique sequences. Two clones containing repetitive DNA were selected for use in DNA fingerprinting experiments of *Aspergillus* DNAs. Probes were prepared by excision of the cloned DNA from the lambda vector, purification by agarose gel electrophoresis and labeling with digoxigenin (DIG). Southern blots of restriction enzyme digested *Aspergillus* DNAs were hybridized to the probes and the patterns developed with alkaline phosphates tagged anti-DIG antibodies and a chemiluminescent substrate. Preliminary results indicate that repetitive DNA probes may be useful for identifying species-specific as well as strain-specific DNA markers of aspergilli. (poster presentation)

A HUBBLE SPACE TELESCOPE SEARCH FOR WATER IN ASTEROIDS.

H. Schenk, J. Secosky, 2330 S.11th St., Sheboygan, WI 53081; 23 South Ave., Manchester, NY 14504.

Introduction: The existence of volatiles on asteroids, especially water, would be of great significance to future miners of the asteroid belt and to people traveling about the solar system. Volatiles could supply water, fuel, and oxygen for missions (O'Leary, 1977). Scientists suspect that some asteroids were once comets. A comet loses part of its mass with each passage around the sun. Eventually some may lose all of their volatiles, or perhaps cover them under a blanket of dust after repeated passages around the sun. Such an object might then have an asteroid appearance.

Researchers have compiled lists of asteroids have may be extinct or dormant comets. So far, searches for volatiles outgassing from these asteroids have shown negative results (Cochran and Barker, 1984; Degewij and Van Houten, 1979; Degewij, 1980; Chamberlin et al., 1996). However, being mostly ground-based, nearly all of this work was limited to CN and C3 emissions. One space-based study with the International Ultraviolet Explorer (IUE) looking for OH was also negative (Schulz et al., 1993).

Observations: Under the amateur observing program for the Hubble Space Telescope (HST), we examined 5 asteroids with the HST's Faint Object Spectrograph for the 3085 Å emission of OH. The amber detector was used in the accumulation mode with spectral element G270H which covers wavelengths 2222-3277 Å. During 1993 we examined 182 Elsa, 224 Oceana, 899 Jokaste, 944 Hidalgo, and 2201 Oljato.

In addition to spectroscopic observations with HST, a search for a visible light coma was conducted by 80 amateur astronomers in 24 states and 22 different countries. While HST gathered data on OH, the amateurs conducted their study visually, photographically, with VHS, and CCD equipment.

Results: None of the asteroids showed signs of the OH emission that might be expected from a weakly active cometary nucleus. All of the visual observations also were negative.

Discussion: Due to the complexities of scheduling HST and the great demand for time on HST, most of the asteroids were studied at suboptimal time. Comets generally emit OH only when near the sun; out past 2 AU from the sun, their OH emission falls off dramatically. Hidalgo was at a distance of 5.3 AU while Oljato was 2.36 AU from the sun during their observing runs. Since their perihelions are 1.99 and 1.4 AU's respectively, much better viewing geometries are possible. We recommend that observing programs be planned each year for any asteroids that may be discovered in comet-like orbits. The studies should be done when the body is both close to the sun and close to the earth.

Acknowledgments: This research was based on observations with the NASA/ESA Hubble Space Telescope, obtained at the Space Telescope Science Institute, which is operated by the Association of Universities for Research in Astronomy, Inc., under NASA Contract NAS-26555. We are grateful for the help of all the staff at the Space Telescope Science Institute: Alex Storrs, Max Mutchler, and James Scott.

References: Chamberlin, A. et al. 1996. Icarus. 119. 406; Cochran, A and E. Barker 1984. Icarus. 59. 296; Degewij, J. and C. Van Houten. 1979. In Comets (T. Gehrels, ed.). 665. Univ. of Az Press. Tucson; Degewij, J. 1980. Astron. J. 85. 1403; O'Leary, B. 1977. Science. 197. 393; Schulz, R. et al. 1993. In Abstracts for Asteroids, Comets, Meteors 1993. Belgirate, Italy. (oral presentation)

EARTH BASED VISUAL OBSERVATIONS OF THE LUNAR SOUTH POLE.

Matthew P. Sinacola, President, Rochester Academy of Science, 19 Benedict Drive, Rochester NY 14624.

After the close of the Apollo manned space program, lunar studies were mostly limited to Earth based observations. Recent spacecraft dedicated to lunar science and surface mapping have renewed interest in selenology. Specifically, the discovery of possible water sources at the Moon's poles, by the Clementine spacecraft, has renewed future feasibility plans for sending humans back to the Moon. Assuming that the presence of water is confirmed, the lunar poles, and especially the south pole, will become the likely basing locations for future human exploration.

By employing a modest portable telescope I have conducted visual line of sight measurements on notable surface features in the south lunar polar region. Because of the ever changing Earth/Moon geometry and lunar libration the occurrence of favorable observation times of this region is surprisingly infrequent. I have quantified the frequency by which these features are visible from the Earth and seen directly how this condition will need to be considered in future planning. Due to the high magnification necessary to resolve the features observed, I chose to record my observations by hand sketching the images while at the telescope, rather than by photographic or charge couple device data collection systems. Images of my sketches as well as historical and recent lunar mapping results will be presented and compared. (oral presentation)

USE OF ION-EXCHANGE HIGH-PERFORMANCE LIQUID CHROMATOGRAPHY TO MEASURE CONCENTRATIONS OF ADENINE NUCLEOTIDES AND PHOSPHOCREATINE.

K.M. Sixt, J.H. Benington, St. Bonaventure University, P.O. Box 1965, St. Bonaventure, NY 14778

Energy metabolism occurs in all living things. The energy state of an organism can be measured by the ATP/ADP ratio. It is also beneficial to determine concentrations of AMP and phosphocreatine (Pcr) due to their importance in energy phosphate-group transfer. In this report we describe a method for measuring adenine nucleotide and Pcr concentration using ion-exchange high-performance liquid chromatography. We use this method to measure energy state in germinating *Aspergillus nidulans* spores and rat brain samples. In subsequent experiments, we will use these recipes to measure the effects on energy metabolism of sleep deprivation in rat brains and the regulation of germination in *A. nidulans* spores. (poster presentation)

ALTERNATE SYNTHESIS AND ANTICANCER ACTIVITY OF 5'-DEOXY-5'-FLUOROTHYMIDINE.

Jessica M. Sligar, Shawn P. Terkhorn, Irene M. Evans, and John P. Neenan, Departments of Chemistry and Biology, Rochester Institute of Technology, Rochester, NY 14623.

Langen and Kowollik (*Eur. J. Biochem.*, 1968, 6, 344) synthesized 5'-deoxy-5'-fluorothymidine (compound **1**) in 15% yield by reaction of 5'-O-tosylthymidine (2) with KF in MeOH in a sealed tube at 150°. They found that **1** inhibits the enzyme thymidylate kinase as well as the multiplication of Ehrlich ascites mouse carcinoma cells. Later, Kowollik et al. (*Carbohydr. Res.*, 1970, 12, 301) synthesized **1** in 24.6% yield by reaction of **2** with tetrabutylammonium fluoride in DMF at 50°.

We were unable to reproduce the synthesis of **1** by either method. However, we were able to synthesize **1** in 3% yield by reacting 3'-O-acetyl-5'-O-mesylthymidine with KF in ethylene glycol at 130° under Ar followed by deacetylation with NH_3 in MeOH to give, after flash chromatography and prep TLC, crystals from MeOH, mp 204-206°. The melting point, elemental analysis (C,H,N and F), and optical rotation, as well as UV and NMR spectra of our preparation of **1** matched the data in the literature. We are currently attempting to prepare **1** more efficiently by the reaction of commercially available 3'-O-acetylthymidine with diethylaminosulfur trifluoride (DAST). We found that **1** reduced Sarcoma 180 cancer cell viability by 60% at 10 μM and showed a synergistic effect in combination with fluorouracil, which, along with methotrexate, is used in the adjuvant chemotherapy of human breast cancer. We are currently testing **1** in combination with methotrexate. The biochemical rationale and latest results of our studies will be presented. (oral presentation)

AN OPTICAL MODEL OF A COMET, 1986 HALLEY'S COMET AS EXAMPLE.

Charles Spoelhof, 5 Mullett Drive, Pittsford, NY 14534

The change in brightness and appearance of a comet as it approaches the sun can be predicted from basic physical relationships involving the surface temperature balance and the sublimation rate of its icy nucleus being warmed by the sun. An analysis made prior to the 1986 apparition of Halley's Comet is compared to what was observed from earth and from the Giotto space probe. (oral presentation)

THE EFFECTS OF AGE AND GENDER ON ANTICIPATION TIME

Laura Van Niel, Jolene Herman, and Brienne Tuck, Finger Lakes Technical and Career Center, 3501 County Road 20, Stanley, NY 14561.

Background. The purpose of this study was to determine the relationship between age and gender on anticipatory reaction time. This investigation studied volunteers ranging in age from 5 to 89 years (mean = 26.4).

Methodology. The subjects' anticipation time was measured using a Bassin Timer. The runaway speed was set at 10 mph and the warning time at 1.0 second. Each subject (n = 405, female = 221, male = 184) was provided with standard directions and then given 3 trials.

Results. A One-way Analysis of Variance rejected the age null hypothesis. At the 5% significance level, there is sufficient evidence that at least one of the age groups' reaction time had a significantly different mean.

Analysis of Variance:

Source	DF	SS	MS	F	P
Factor	8	1.0983	0.1373	7.13	0.000
Error	397	7.6253	0.0193		
Total	405	8.7236			

The results of a Two Sample T-Test supported the null hypothesis, gender did not affect the anticipatory reaction time of our subjects (female x = .117, male x =.116).

Two Sample T-Test and Confidence Interval:

	N	Mean	Std Dev	SE Mean	
Female	221	0.117	0.133	0.0089	
Male	184	0.116	0.163	0.012	
	T = 0.06	P = 0.95	DF = 352		

Conclusion. Within the limitations and findings of this study, the following conclusions seem warranted: Age has a diminishing effect on anticipatory reaction time. Specifically within the 1-9 y/o and the 70-89 y/o. However, gender does not have an effect on anticipatory reaction time. (poster presentation)

ANALYSIS OF A P TRANSPOSABLE ELEMENT MUTANT OF STAR IN *DROSOPHILA MELANOGASTER*.

Stephen P. Voght, Stacey A. Sedore, Deborah A. Leonard and Michael A. Kotarski, Department of Biology, Niagara University, NY 14109.

The Star gene functions in the Egfr signaling pathway in *Drosophila* development. The insertion of transposable P elements near the Star gene region produced mutations which were recovered and analyzed for levels of mRNA. One of these mutations, 218-2, displayed four traits: an abnormal embryonic cuticle phenotype, a jumbled eye eye phenotype, lethality in combination with Starl, and a three-fold increase in Star mRNA. Genomic clones containing the P element from the 218-2 strain were recovered in the X2001 phage vector. These clones were restriction mapped, and fragments containing the P element were subcloned and sequenced to determine the position and orientation of the element. These data provide the basis for determining how the element influences the Star gene. Revertants have been made and will be analyzed in order to determine that the P element insertion is the cause of these phenotypes. (poster presentation)

FACTORS AFFECTING HOWLER MONKEY CHOICE OF SLEEPING AND RESTING SITES.

B.J. Welker, G.V. Hunt, Dept. of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

Howler monkeys spend a large proportion of their time resting. They are, for the most part, inactive at night and can spend upwards of 70% of daytime hours resting. It was hypothesized that monkeys may use different decision rules when choosing daytime versus nighttime sleeping sites because of differing environmental pressures.

Data for this study were collected while observing one group of free-ranging howler monkeys in Sector Santa Rosa, Area de Conservación Guanacaste, Costa Rica. The study took place in dry tropical forest during the dry season in early 1999. At this time of year, days are typically sunny and hot and daytime temperatures may exceed 35°C. Most trees in the study area lose many or all of their leaves during this period.

We hypothesized that shade is likely the most important variable affecting daytime choice of sleeping sites at this time of year, especially as trees become defoliated. Since there are no potential diurnal aerial predators present at the study site, daytime predation risk was assumed to be low relative to night conditions. At night, we proposed that the monkeys are more concerned with predator avoidance. There are many potential nocturnal predators in the study area.

Data were collected using resting animals during their long afternoon rest period and again when they retired for the night. The following variables were measured: (1) tree species, architecture, size, and percent foliage (2) monkey height, distance from the trunk, distance to nearest neighbor, and whether the individual was positioned under foliage, and (3) substrate characteristics.

There were significant differences between diurnal and nocturnal sites that support our propositions. The diurnal pattern was as follows: (1) trees had more foliage and a more closed canopy and (2) monkeys were more often clustered together and positioned closer to the trunk, under foliage, and on larger substrates. Conversely, the nocturnal pattern was as follows: trees were taller and had less foliage and a more open canopy and (2) monkeys positioned themselves higher, farther away from the trunk and each other, and on smaller terminal branches.

These results were interpreted as convincing evidence that monkeys position themselves well under the densest portion of the tree canopy by day to avoid the sun and heat. At night, they spread out onto smaller terminal branches in open canopy trees. We believe that a reasonable assertion is that smaller branches will more readily notify a sleeping animal of any approaching animal. Likewise, by moving a moderate distance away from other group members, a sleeping individual will not be confused by movements of other group members.

An understanding of the environmental and selective forces that shape primate behavior and cognition is essential to physical anthropology. In addition, it is important to continue to learn as much as possible about extant species of primates from an anthropological as well as a conservationist perspective. (oral presentation)

ACTINORHIZAL PHYLOGENY BASED ON ATPB AND 18S DNA SEQUENCES.

Heather M. Welsh, Ithaca College, Garden Apartment 29-4-1, 953 Danby Rd., Ithaca, NY 14850

Phenetic classifications of actinorhizal plants, a group of angiosperms that maintain a symbiotic relationship with nitrogen-fixing *Frankia* bacteria, reflect more distant ancestry than is real. Evolutionary relationships may be established through cladistic analysis in which monophyletic groups are formed on the basis of unique shared, derived characteristics. *rbc*L was previously sequenced for a select group of actinorhizal and non-actinorhizal taxa, and cladistic analyses of DNA sequences were used to produce an evolutionary hypothesis. Four distinct actinorhizal clades were evident, and the phylogeny supported multiple origins of the nitrogen-fixing symbioses. In order to compare the utility of chloroplast and nuclear genes in establishing the evolution of actinorhizal clades, the *atp*B and 18S genes were sequenced for 10 new taxa, and these sequences were added to a larger data set for each gene. Single gene analyses resulted in the resolution of some actinorhizal clades, but the ancestry of the clades was unresolved. The combined analysis of the *atp*B and 18S genes gave the most resolved phylogenetic hypotheses that inferred the ancestral relationships of the clades, resolved the same four clades established in the *rbc*L analysis, and supported the theory of multiple symbiotic origins among actinorhizal taxa. (oral presentation)

THE INCIDENCE OF DARK FEATHERS AND FEATHER SUBSTITUTES IN TREE SWALLOW (*TACHYCINETA BICOLOR*) NESTS.

A. Young, J. Van Niel, and A. Tenninko, Environmental Conservation Department, Finger Lakes Community College, Canandaigua, NY 14424.

The nesting behavior of Tree Swallows (*Tachycineta bicolor*) includes the lining of the nest with feathers. This practice may benefit the eggs and chicks by providing camouflage, insulation, and barriers to ectoparasites. White feathers are preferred, although dark feathers are utilized as well. In 1998, during an ongoing study at Warren Cutler Scout Reservation, it was noted that Tree Swallows will also make use of feather substitutes to line their nests. At the end of the 1999 nesting season, Tree Swallow nests were collected and the incidence of dark feathers and feather substitutes was recorded. Substitutes included toilet paper, a faded bandage wrapper, deer hair, insulation, and plastic. A total of 43 nests were inventoried. The average number of feathers in nests was 40, but totals ranged from 2 to 108. The average number of white feathers was 25, and the average number of dark feathers was 14. Fourteen percent of the boxes in the study contained feather substitutes. No significant relationship appears to exist between the total number of feathers or the total number of white feathers and the presence of feather substitutes. It is likely that the use of feather substitutes is a result of opportunistic behavior, where the birds are utilizing a source of lining that exists in close proximity to their nesting box. (oral presentation)

MODERNIZATION AND THE MANAGEMENT OF LINGEAGE PROPERTY AT LUNG YEUK TAU.

Zhiming Zhao, Department of Anthropology, SUNY College at Geneseo, 1 College Circle, Geneseo, NY 14454.

The divine ownership of Chinese lineage property (*tso* and *tong*) sets the rules for its management: collective holding, corporation sole, and land inalienability, all of which are justified in the name of ancestor worship. Modernization, however, has been challenging the ideological foundation of Chinese lineage property. In response, the Tang lineage of Lung Yeuk Tau in the New Territories of Hong Kong has alternated containment and engagement tactically. At the heart of their adaptive efforts is the reform of property management by reinventing tradition. Not only did this reform shape the strategies that brought them where they are today, but it also has ideological, social, and political ramifications. (oral presentation)

TWENTY-SEVENTH ANNUAL SCIENTIFIC PAPER SESSION

ROBERTS WESLEYAN COLLEGE
ROCHESTER, NY
November 4, 2000

LARRY J. KING MEMORIAL LECTURE

The Museum of Earth for New York State
Dr. Warren Allmon, Director
Paleontological Research Institution, Ithaca, NY

ABSTRACTS OF PAPERS

Abstracts are listed alphabetically by first author. Abstracts have been included with minimal editing exactly as submitted. Whether a submission was a poster or oral presentation is indicated at the end of each abstract.

IMPACTS OF ACADEMIC TOURISM: METHODS FOR REFLEXIVE ETHNOGRARHY IN A GROUP STUDY ABROAD.

Adele Anderson, SUNY Empire State College, 1475 Winton Road North, Rochester, NY 14609.

Anthropological and sociological literatures have described the many and often disquieting economic, ecological, and health impacts of tourism on Costa Rica, a hugely popular Central American destination of North American travelers, students, and researchers. Recent Costa Rican press items, comments heard while visiting and a recent research note in *Practicing Anthropology* all suggest that local impacts of foreign student visitors in particular deserve greater attention from sending institutions and supervising professors. The great variability in purposes and preparation for individual study abroad programs and the size of most study group tours pose a methodological challenge for assessing student visitors' impacts, as well as how and to what extent students grow in their cultural awareness, observation skills and critical inquiry. A small group study, scheduled for January 2001 at a San Jose language and cultural center, will afford opportunities to craft a structured, qualitative approach to these questions.

This paper focuses on the planned methodologies for guidance and analysis of directed ethnographic journaling and informal interviewing to be done by students in the field. Qualitative and reflexive exploration of the social impacts of academic tourism - on the visitors, on the Costa Rican home -stay families and on Tico and Tica student counterparts, who study English at our host language and culture center in San Jose - should result in a better understanding of past and present tourism experiences, and in improved observational and analytic skills for the US students. The extent of attainment of these objectives, however, will depend in good measure upon how "scientific" this short but intensive field immersion can be made to be. The author will comment on this last question and will open it for an exploratory discussion, in the context of anthropological inquiries in general. (oral presentation)

PATHOGENECITY TESTS OF GRAPES FOR DISEASE RESISTANCE TO *BOTRYTIS CINEREA* (Persoon).

Seth Arrow, Michael Brady and Ming-Mei Chang, Department of Biology, SUNY College at Geneseo, 1 College Circle, Geneseo, NY 14454.

Genetic engineering allows the insertions of genes from one plant species into the genome of another plant species to improve the agro-economically important traits of the recipient plants. Using this approach, scientists can produce crops that are more nutritious or more resistant to certain pathogens. Developing grapes that are resistant to fungal pathogens can help farmers reduce the cost for fungicide applications. In the past few years, we have transferred disease resistant response genes, such as glucanase and DRRG-206 from peas into Niagara grapes (*Vitis x lubruscana* cv. Niagara). Both genes were highly expressed in the pea during its disease resistant response to the bean pathogens (non-host resistance). Our study reports pathogenecity tests for the putative transgenic grapevines containing either gene. Leaves were cut into small strips and an agar plug containing fungal hyphae (*Botrytis cinerea* Persoon) was placed at one end on each strip. The distance of necrosis on each leaf strip was measured. The results show that there are variations in the disease resistance response among different putative transgenic plants. The significance of these results will be discussed in detail in this paper. (poster presentation)

HEALTH, MEDICAL ETHICS, AND RELIGION: PERCEPTIONS OF RUSSIAN AND AMERICAN MEDICAL PERSONNEL.

David S. Barnes, Ph.D., Department of Biology, Roberts Wesleyan College, 2301 Westside Drive, Rochester, NY 14624.

This study is designed to determine the perceptions of physicians, nurses, and nursing students in Novgorod, Russia and in Novgorod's sister city of Rochester, New York, regarding aspects of health, medical ethics, and religion. Novgorod, a city of 250,000 people, is located 300 miles north of Moscow.

Novgorod subjects included 25 physicians and 32 nurses and medical nurse practitioners from the Novgorod Regional Hospital and 144 nursing students from the Novgorod Medical College (NMC). Rochester subjects included 20 physicians from several hospitals, 31 nurses from Highland Hospital, 57 nursing students from Roberts Wesleyan College, and 73 nursing students from the Genesee Community College (GCC), Batavia (metropolitan Rochester), NY. Each completed a questionnaire.

Health: Novgorod medical personnel expressed more confidence in herbal medicine and more concern with the effects of both environmental pollution and cellular phone radiation on health and the possible contagious nature of cancer than their American counterparts. Seventy percent felt that birth control pills commonly result in severe maternal or fetal problems, and 70% felt that condoms essentially insure safe sex.

Medical ethics: Most Novgorod physicians felt that they should not explain to their patients a serious diagnosis such as a potentially fatal cancer, and only a third felt patients should be able to see their test results and medical documents; 80% of Novgorod medical personnel felt patients should have the right to refuse treatment; most believed that the state should provide free medical care for all people; and over 45% support the state encouragement of the euthanasia of the sick elderly and severely mentally handicapped. Their American counterparts were more insistent on patient autonomy, less supportive of socialized medicine, strongly opposed euthanasia, and less supportive of abortion.

Religion: Over 80% of Novgorod medical personnel described themselves as Russian Orthodox; 4% attend church weekly; 80% indicated a belief in God; 88% have a Bible or New Testament and 60% believe in life after death.

Novgorod nursing students appeared more religious than physicians or nurses. GCC and NMC nursing students were quite similar in their belief in God, life after death, origin of life, and in frequency of Bible reading. (poster presentation)

RNA ISOLATION FROM NIAGARA GRAPE LEAVES.

Michael Brady, Ming-Mei Chang, Department of Biology, SUNY College at Geneseo, 1 College Circle, Geneseo, NY 14454.

Transferring genes from one plant species to another to improve the genetic traits of the recipient species is a widely used application of plant biotechnology. Scientists use genetic engineering to insert specific genes into the genome of the target plants. Once the gene has been inserted, RNA isolation is needed to test the proper expression of the gene. RNA isolation in woody plants, such as grapes is often laborious. No reliable method of RNA isolation has been established. The focus of our research is to obtain a better understanding of RNA isolation techniques and find an effective method for RNA isolation from grape leaves. One method involved using commercially available RNA isolation kit- RNAeasy Plant Mini-prep (Qiagen). This method produced no or little RNAs with significant amount of degradation. The second method involved the use of insoluble PVP in isolation buffers modified from those for pea RNA isolation. The first experiment produced no or little RNAs. Consequently, the volume of isolation buffers was increased more than two folds and a subsequent step for the removal of protein contamination was performed. After these modifications, the insoluble PVP method resulted in good RNA yields with very little degradation. It was determined after repeated trials of the insoluble PVP method that the physiological condition of the plants played an important role in the success of RNA isolation from grape leaves. (poster presentation)

COMPETITION FOR POLLINATION AND THE EFFECT OF PLANT HEIGHT ON POLLINATOR VISITATION TO *LYTHRUM SALICARIA* (PURPLE LOOSESTRIFE) AND *LYTHRUM ALATUM* (WINGED LOOSESTRIFE).

Beverly J. Brown and Emily J. Andersen, Biology Department, Nazareth College of Rochester, 4245 East Ave., Rochester, NY 14618.

Previous research indicates that the showy invasive plant *L. salicaria* can attract pollinators away from the native *L. alatum* reducing pollination quantity. Some propose that flower height alone may impact pollinator visitation if pollinators do not vary their flight level. We tested the hypothesis that plant height has no effect on pollinator visitation to *L. salicaria* and *L. alatum* under field conditions. Linear arrays alternating plants of both species were erected in a grassy area adjacent to the Nazareth College Greenhouse. Plants were arranged with flowering branches at their natural heights (*L. salicaria* approx. 1.3 m, *L. alatum* 0.75 m), with heights reversed, and at approximately the same height. The ratio of *L. alatum*: *L. salicaria* approaches (the number of times a pollinator came to a plant, regardless of the number of flowers visited) was substantially higher when flowers of *L. alatum* were higher than the *L. salicaria*. The other treatments exhibited identical approach ratios. This indicates height may play a role in reduced visitation to *L. alatum* when *L. salicaria* is present. (poster presentation)

SPATIAL DATA ANALYSIS OF THE ROEMER ARBORETUM.

Jennifer A. Caito, 10 Avon Road, Geneseo, NY 14454.

The Roemer Arboretum is a 20-acre nature preserve owned by SUNY Geneseo. It serves as an outdoor classroom for research as well as for the public. Prior to the maps that I created, there were no large scale accurate maps of the Arboretum. Using the Pathfinder Pro–XRS Global Positioning System (GPS) data of the boundaries, trails, plant communities, structures, and trees (DBH > 25 cm) was collected. These data were uploaded into ArcView GIS. The Arboretum is going through old field succession, and is making a slow return to woodland. Further research was performed of the history of the Geneseo area to better understand community dynamics in the local region. These maps and history of the area serve as a baseline for further research in the area. (oral presentation)

THE CHALLENGE OF STIMULATING EARTH GRAVITY ON AN ORBITING SPACESTATION.

James J. Carr, 114-4 Deerhurst Lane, Webster, NY 14580.

Whenever a NASA representative appears in a public forum such as a television talk show, he or she is inevitably questioned by the host or call-in viewer about artificial gravity. Recently, Dan Goldin, NASA administrator - his official title - was asked by a C-SPAN viewer why the International Spacestation is not rotated to simulate on-board gravity. Goldin's terse response, in essence: it's too costly.

Of course it is impossible to reproduce gravity. But using the acceleration of uniform rotation, a gravitation-like effect can be generated. A Ferris wheel spacestation design, very much like that originally proposed by the late German physicist Wernher von Braun, under controlled rotation could achieve a centrifugal acceleration at the perimeter. The inertial respond to the centripetal (real) acceleration toward the center of the rotating spacestation arises as a perceived centrifugal (pseudo) force pressing objects to the far wall, the rim of the spacestation (wheel). The magnitude of the centrifugal acceleration equals the angular or rotational speed squared (w^2) times the distance or radius from the center of rotation (r). And the perceived force on an object equals mass (m) times acceleration (w^2r).

This paper briefly discusses the design requirements, and therefore challenge of stimulating Earth gravity on an orbiting spacestation by rotating the station. These requirements demand a station size and spin rate combination reproducing Earth's gravitational acceleration of 9.8 meters per second squared ($9.81 m/s^2$). (oral presentation)

AN ALTERNATIVE ROUTE TO THE KEY SYNTHETIC INTERMEDIATE, 6',7'-DIHYDROXY-2-AMINO-1-PHENYLETHANOL.

Thomas Carroll, Dr. Timm Knoerzer, Chemistry Department, Nazareth College Rochester NY 14618.

The goal of this project was to synthesize 6', 7'-dimethoxy-2-amino-1-phenylethanol (DAPE), a key intermediate in the total synthesis of 3',4'-dihydroxy-2-phenyl-2,3,4,5-tetrahydro[2,4]benzoxazepine (DPTB). The rationale for synthesizing DPTB relates to its promise as a dopamine receptor selective agonist, specifically the D_1 receptor subtype. DPTB's potential selectivity for the D_1 receptor is believed to be related to the incorporation of a number of structural features that have been shown to increase D_1 affinity in similar compounds.

The specific design strategy employed in this project centered around reactions that introduced both the oxygen and nitrogen functionalities in a single step, an improvement over a previous synthetic strategy. Initial attempts to synthesize DAPE included coupling of benzaldehyde and nitromethane via the Henry reaction. A number different catalysts were utilized including CTACl (cetyltriethylammonium chloride), Amberlyst A-21 (a weakly basic resin) and Amberlite IRA-410 (a strongly basic resin). In addition to the Henry reaction, current efforts have included attempts to achieving DAPE via the Sharpless inverse aminohydroxylation. It was found that CTACl was ineffective in catalyzing the Henry reaction. However, modest conversion of starting materials to the nitroalcohol product was accomplished using Amberlyst A-21 as indicated by TLC and NMR. Results from the Sharpless inverse aminohydroxylation indicate that little to no conversion was effected. (oral presentation)

DISCOVERY OF EURYPTERIDS AN *MEDUSAEGRAPTUS* SP. IN THE LATE SILURIAN SYRACUSE FORMATION (SALINA GROUP) ALONG OATKA CREEK AT GARBUTT, NEW YORK.

Samuel J. Ciurca, Jr., 54 Appleton Street, Rochester, NY 14611-2510.

For several years, I have been studying the rocks exposed along Oatka Creek at Garbutt, New York and nearby roadcuts and temporary excavations. The rocks in this region are part of the Syracuse Formation of dolomitic rocks and argillaceous dolostones of various textures and grain sizes. Being part of an evaporite sequence (the Salina Group), the region shows much evidence of salt in the form of halite pseudomorphs in the dolomitic strata exposed and in the occurrence of gypsum beds formerly mined in the vicinity.

These rocks yield few fossils, undoubtedly due to the hypersaline nature of deposition of the preserved sediments. Nevertheless, over many years, I have obtained enough scant fossil remains to indicate the fauna and flora of this little-known interval of geologic time in this region. The occurrence of stromatolites (1-2 feet in diameter) easily allies this sequence with the type Syracuse Formation in central New York where stromatolites are relatively common.

Along the cliffs of Oatka Creek, west of Garbutt, I have obtained several specimens of *Medusaegraptus*, a slender algal plant known from similar rocks (lithologically) of the Williamsville Waterlime (Bertie Group) of western New York State and adjacent Ontario, Canada (Ridgemount Quarries).

Significant, also, was the observation of eurypterid remains - mostly of resistant parts like telsons-but also of a carapace indicating that this interval belongs to the Eurypterus zone of the Syracuse Formation. A single cephalopod and several pelecypods constitute the remainder of the fauna observed to date. All of the fossils found to date are believed to have been recovered from stratigraphically higher beds above the formerly mined gypsum beds.

The stratigraphy of the area is quite clear. Upstream are nearby roadcuts in the Camillus Formation. At Fort Hill, the lowest Bertie Group rocks are exposed along NY 19 (type section of the Fort Hill Waterlime), and farther upstream, at Buttermilk Falls, is an excellent section of much of the Bertie Group, including the Fort Hill Waterlime. Note: at the falls, Bertie units above the Fiddlers Green Formation are missing; the Devonian Onondaga Limestone unconforably overlies the exposed Late Silurian strata.

Occasionally, eurypterid fragments were observed in Salina Group strata exposed along the Oatka Trail. The occurrences appear to be stratigraphically higher than at Garbutt but details remain to be worked out.

I have traced the Syracuse Formation westward through the Batavia area to Interstate 90 at Buffalo, New York and farther westward into Ontario, Canada to the Welland Canal where I have previously reported the discovery of the eurypterid *Waeringopterus* in roadcuts adjacent to the canal. Thus far, *Waeringopterus* always occurs stratigraphically below the *Eurypterus* beds of the Syracuse Formation. The Canadian site also reveals the presence of stromatolite layers and a thin gypsum bed. These occurrences are part of a cyclic evaporite sequence bearing recurrent beds of gypsum, eurypterid and stromatolite horizons. I have no doubt that the stratigraphy intervals described, and the faunas mentioned above, will eventually be found even farther westward in Canada. (poster presentation)

"PREHISTORIC PITTSFORD" AND EURYPTERIDS, AN EDUCATIONAL PROJECT FOR THE WORLD WIDE WEB: HTTP://GEOCITIES.COM/PALEORESEARCH

Samuel J. Ciurca, Jr., 54 Appleton Street, Rochester, NY 14611-2510.

The exhibit, "Prehistoric Pittsford," was designed in 1999 and installed at the Pittsford Community Public Library in the village of Pittsford, New York in early 2000 in part to celebrate the 100th anniversary of the discovery of fossils (eurypterids) during the enlargement of the Erie Canal near the Pittsford-Brighton town line. In 1903, Clifton Sarle published an account of his discovery of a eurypterid fauna, a group of peculiar-looking extinct arthropods found in a layer of black shale (now the Pittsford Member of the Vernon Formation) encountered during reconstruction of the Erie Canal behind the Spring House on Monroe Avenue, just southeast of Rochester, New York.

The exhibit contains specimens of the two characteristic eurypterids reported by Sarle, *Eurypterus pittsfordensis* and *Hughmilleria socialis*, and text frames designed to inform viewers of the discovery and the nature of the fossils found. The exhibit also contains a representative of the living horseshoe crab, *Limulus*, one of the closest living relatives of the eurypterids.

The text presented in the exhibit, and illustrations of the reconstructed fossils, were utilized to create an educational exhibit on the World Wide Web. A website was constructed using Geocities.com free website service and their software for creating a website without the need for knowing html, the language that is used to generate websites.

The Prehistoric Pittsford website opened October 4, 2000, currently has three pages, and is being further developed using additional text frames and illustrations. Completion of the site is scheduled for November 30, 2000, although some minor modifications may be made from time to time.

Supplements are planned - a little history of the Erie Canal in the area, definition of terms, e.g., "What Is A Fossil?" and an explanation of genus and species in "What's In A Name?" which describes the origin of the names of the eurypterids described by Clifton Sarle.

The small exhibit I created as an education display for the Pittsford area, "Prehistoric Pittsford," and the recent development of a small website to compliment the exhibit, are types of projects that any interested parties - schools, libraries, clubs and perhaps, especially, nature organizations - could easily (and cheaply) develop for their communities. Across western New York, there are many towns, parks, and places of interest that could benefit by at least a small display of some characteristic feature of their regions.

Note: The "Prehistoric Pittsford" exhibit in Pittsford was facilitated by several persons whom I acknowledge here: Steve Hamm, Joseph LaRussa, Tod Clements and Steve Jarose. All having contributed to some aspect of the display. Thank you. (oral presentation)

INVESTIGATION OF HILLEBRANDIA SANDWICHENSIS: EVOLUTIONARY PLACEMENT IN THE FAMILY BEGONIACEAE.

Wendy Clement, (Susan Swensen), Ithaca College, Ithaca, NY 14850.

The family Begoniaceae is composed of three genera, *Begonia, Symbegonia,* and *Hillebrandia*. *Begonia* comprises over 1000 species that are divided among 64 sections, *Symbegonia* has 14 species endemic to New Guinea, and *Hillebrandia* is a monotypic genus whose sole member is *Hillebrandia sandwichensis*. Although *Hillebrandia* shares many similar characters with other members of Begoniaceae allowing it to be recognized as a part of the family, it also possesses unique characters that warrant classification in its own genus. To gain a better understanding of the evolutionary relationships among Begoniaceae, we are using cladistic analysis of ITS, *rbc*L, and 18S genes from members of all three genera of Begoniaceae. Preliminary cladistic analyses have indicated that *Hillebrandia sandwichensis* is ancestral within Begoniaceae. However, *Hillebrandia* is endemic to Hawaii, a relatively young island chain with present day islands being about 15 million years old. This poses an important evolutionary question: how did an ancestral species of Begonia come to exist on a relatively recent island chain? Based on existing data we propose that *Hillebrandia* is relictual, having jumped from island to island within the Hawaiian archipelago. Estimates of divergence time based on *rbc*L gene sequences may provide an approximation of the age of *Hillebrandia*, and biogeography might give insight as to the origin of *Hillebrandia*.(oral presentation)

EXOTIC WOODY PLANTS WITHIN THE WESTERN NEW YORK REGION.

Aimee B. Cousoulis, John C. Hunter, Department of Biological Sciences, 350 New Campus Drive, SUNY College at Brockport, Brockport, NY 14420.

According to the *Revised Checklist for New York State Plants* (Mitchell and Tucker 1997) there are 224 woody exotics existing without cultivation within the state. A list of species for Western New York has been developed by utilizing plant specimens in six herbaria in New York. Out of the 224 woody exotic species that occur in New York, 119 species have been collected in the Western New York region. The 119 woody species were investigated at the six herbaria and approximately 1500 specimen collections were recorded. The range of collection records per species is 1 to 78. If species occurring less than ten times (a total of 78 species) are excluded, the median number of records per species is 26 and the mean is 30. Additionally, by using the specimens' label information (locality, date and habitat of collection) and data from published floras, it can be concluded that *Robinia pseudoacacia* L., *Rhamnus cathartica* L., *Berberis vulgaris* L., *Acer negundo* L. and *Lonicera tatarica* L. are naturalized in the Western New York region. Although many other species are represented in the herbarium records, there is not substantial data to draw similar conclusions. (oral presentation)

SURVEYING BELIEFS ABOUT THE PRESENCE OF CHARISMATIC WILDLIFE IN NEW YORK STATE.

Andrew Donato, Krista Owens, Karin Wittmann, and John VanNiel, Natural Resources Conservation Department, Finger Lakes Community College, 4355 Lakeshore Drive Canandaigua, NY 14424-8395. Biology Department, SUNY College at Geneseo, Geneseo, NY 14454.

A number of sightings of rare or extirpated species (i.e., mountain lion and wolves) have been reported to the media, the Conservation Department at Finger Lakes Community College and the NY Department of Conservation. In addition, the authors have observed misconceptions among the general public regarding the status of many species of wildlife in New York. In this study we compare the public's perceptions of animal populations and their management histories with historical information. A random sample (n = 244) of participants of a hunting and fishing exposition (Hunting and Fishing Days 2000, Avon, NY) filled out surveys with questions about natural histories of wildlife and general demographics of respondents. We found significant discrepancies between survey respondents' beliefs and actual animal populations and management histories. Management implications are discussed. (oral presentation)

WHAT CAN AN EXTRA ELECTRON DO TO A MOLECULE IN A HUNDRED TRILLIONTH OF A SECOND? FIND OUT USING YOUR DESKTOP PC.

Dr. Michael Falcetta, Dr. K. D. Jordan, Division of Natural Science and Mathematics, Roberts Wesleyan College, 2301 Westside Drive, Rochester, NY 14624, Department of Chemistry and Center for Molecular and Materials Simulations University of Pittsburgh, Pittsburgh, PA 15260

Surprisingly, electrons with the appropriate kinetic energy to be temporarily captured into an empty molecular orbital can accomplish quite a lot in the few femtoseconds they reside in the molecular region. Such electron-molecule complexes are called temporary negative ions or TNI's. In addition to exciting rotational, vibrational, and electronic degrees of freedom of the molecule, TNI's can initiate chemical reactions. Knowledge of the probabilities of each of these possible outcomes is vital to our basic understanding of these systems as well as to design and optimization of applications based on this technology (such as the N_2/CO_2 laser system). The present study uses the Green's Function method as contained in the Gaussian 98 program to calculate some of the essential features of TNI's for several molecules. In particular, we calculate the lifetime and energy of the TNI's as a function of molecular geometry, comparing to other published results. In addition, we address future possible directions for this work including several important, "unsolved puzzles". Whereas most methods for treating such systems require specialized computer software and substantial computational resources, the present methods can be applied on PC using the user-friendly and inexpensive graphical user interface of Gaussian 98W. (poster presentation)

THE ROLE OF SEDIMENT IN THE PHOSPHORUS DYNAMICS OF HONEOYE LAKE, NEW YORK.

Bruce Gilman, John Foust, Department of Environmental Conservation, Finger Lakes Community College, 4355 Lakeshore Drive, Canandaigua, NY 14424-8395.

Lake eutrophication has historically been linked to human activities in the watershed and along the shoreline that contribute phosphorus to a lake basin. Because these nutrient sources originate outside the lake basin, they are considered external loading factors. However, in shallow lakes that experience seasonal benthic anoxia, phosphorus is known to be released from sediment, appropriately named an internal loading factor. When lake restoration efforts consist of the use of best management practices in the watershed, the question arises - will reductions in external phosphorus loading make a difference in lakes that regularly experience internal loading? Quantification of actual and potential release of phosphorus from lake sediment is required.

Thirty-four sediment cores were extracted with a piston sampler from the deepest zone of Honeoye Lake during August 2000. Each core was subdivided into a top, middle and lower section, then each section was analyzed for percent moisture, percent organic matter content, pH, available phosphorus and total phosphorus.

Historic differences were revealed among the modern (top section), middle-aged, and old (bottom section) sediment for some properties. The significance of phosphorus release from lake sediment will be discussed relative to historic models that exist in the scientific literature for

Honeoye Lake, and in comparison to recent stream monitoring data collected during storm events over the last year. (oral presentation)

STREAM ECOLOGY AND THE URBAN-RURAL GRADIENT.

W. L. Hallahan, Nazareth College, 4245 East Avenue, Rochester, NY 14618

Pollution in urban streams is often from nonpoint sources but is a contributing factor in the deteriorating health of these habitats. When standard chemical tests fail to indicate an unhealthy condition, the loss of the riparian zone appears to be a main cause of habitat deterioration. This study compares the chemistry, habitats and macroinvertebrates of an urban stream watershed with a rural stream. Abiotic data include pH, TDS, oxygen, nitrate and phosphate concentrations. Biotic indices include a number of taxa, family biotic index, EPT, PMA, and dominant taxa abundance based on protocols from the US EPA and NYS DEC. Implications for the analysis of urban ecology will be discussed. (oral presentation)

NON-NATIVE WOODY SPECIES IN NEW YORK'S FOREST REMNANTS: SUCCESSFUL INVADERS OR OCCASSIONAL WAIFS?

John C. Hunter, Department of Biological Sciences, SUNY College, at Brockport, Brockport, NY 14420.

During the last 61 years, non-native (exotic) species of woody plants have become substantially more numerous in the forests of Monroe County, New York. In 1938, the County's forests were inventoried, and in 1999 I re-inventoried 31 of these forest remnants near Brockport. In 1938, 10 species of woody exotics occurred in at least one of these forests, and on average forests contained 1.6 species of them. In 1999, there were 17 species of woody exotics, and forests contained 4.4 species on average. While the local distribution of exotics increased, so far this may not have caused substantial changes in the ecology of the forests because of the limited abundance of the exotics. Seven species either had declined in abundance since 1938 or were only found as a few individuals along the edge of < 10 % of the forests, while only four species either covered > 5 % of a forest or dominated a 0.1 ha patch within any forest. However, the exotics may not remain uncommon. Several of the locally abundant species are problematic invasive species of similar habitats and may be increasing in abundance, which would cause substantial changes in these forests in the near future. (oral presentation)

COMPARISON OF *HAE* III RESTRICTION DIGESTS OF A HUMAN MITOCHONDRIAL DNA GENE, CYTOCHROME *C* OXIDASE SUBUNIT 2 (COII): A *HAE* III RESTRICTION FRAGMENT POLYMORPHISM.

Marianne R. Jahnke, Andrea M. Sassano, and C. Martin Storm, Division of Natural Sciences, Keuka College, Keuka Park, NY 14478.

Various students isolated their own DNA (using proteinase K, followed by phenol: chloroform: isoamyl alcohol extractions) as part of a class project. We used the polymerase chain reaction (PCR) to amplify the cytochrome c oxidase subunit 2 gene (the COII gene) from mitochondria. All individuals produced an 811 base pair PCR product, comparable to the anticipated length of the gene plus primers. The amplified DNA was treated with the restriction enzyme *Hae*III, which cleaves all double-stranded DNA with the sequence (- G G G C C C -). An amplified DNA sample was identified which demonstrated an unusual *Hae*III restriction pattern of DNA fragments, as analyzed by agarose gel electrophoresis. This unusual *Hae*III restriction pattern was confirmed, and DNA was sequenced from 2 separate amplification reactions from this individual. The sequence was compared to DNA sequence obtained from an individual who showed the usual pattern of *Hae*III restriction fragments. Both sequences from the unusual DNA showed that base #8251 (mitochondrial consensus numbering system) had been altered from a G to an A (bases #8249-8253 are GGACCC), while the control DNA showed the published consensus sequence (bases #8249-8254 are GGGCCC, a perfect *Hae*III restriction site). Research of the GenBank human genome database using NCBI's BLAST software revealed that this alternative DNA sequence was uncommon, but had already been reported. Data about the occurrence of this alternative DNA sequences in humans and in primates, and the consequences to the function of the COII gene, will be reported. (poster presentation)

MORPHOLOGICAL CHANGES IN HUMAN UMBILICAL VEIN ENDOTHELIAL CELLS TREATED WITH GRAPE SEED EXTRACT.

Katherine Kaproth, Ming-Mei Chang, Department of Biology, SUNY College at Geneseo, Geneseo, NY 14454.

Atherosclerosis leading to heart attacks, strokes and peripheral vascular disease is the number one cause of death in the United States. Recent studies have shown that grape seed extract prevents atherosclerosis. Proanthocyanidin, the active component of grape seed extract is the focus of our study. Significant morphological changes occurred in human umbilical vein endothelial cells grown in media containing different concentrations of this chemical. Changes were viewed using both the light microscope and the transmission electron microscope. Cells treated with grape seed extract containing proanthocyandin at concentrations of 10^{-5} M and 10^{-6} M produced large number of vesicles. Lower concentrations did not stimulate vesicle productions. The contents in the vesicles and their possible role will be discussed in this paper. (poster presentation)

CHANGES IN PROTEIN LEVELS OF CHRONIC WOUNDS FOLLOWING TREATMENT WITH HYPERBARIC OXYGEN AND ELECTRICAL STIMULATION.

Joelle E. Karch, Kristen Baird, Kristin Fries, C. David Jaynes, Michael Brogan, Laura Edsberg, Daemen College, 4380 Main Street, Amherst, NY 14226.

Chronic wounds are an immense burden to the healthcare system due to the increasing costs of treatments, which reaches an average of 7 billion dollars annually. In addition, the necessary care required to treat these wounds is overwhelming because a variety of deficiencies compromise the repair process. Factors contributing to these wounds include sustained pressure on soft tissue, shearing forces, skin breakdown from too much dryness or moisture, inadequate nutrition, and dehydration. It has been shown that protein levels differ in normal versus chronic wounds. To better understand which proteins may be responsible for improving or impairing wound health, we analyzed protein samples from chronic wounds.

Many techniques have been attempted to expedite the healing process in chronic wounds. Electrical stimulation appears to assist in wound healing by initiating vasodilation and increasing vessel permeability. Through a different mechanism, hyperbaric oxygen also enhances the healing process. Oxygen applied at a pressure greater than one atmosphere takes on a pharmaceutical property rather than its normal metabolic function. It promotes the development of new capillaries and collagen fibers in wound tissue while enabling oxygen tension to attain normal levels. Adequate oxygen tension is necessary for a collagen matrix to form.

In our current study, fluid samples were obtained from wounds of patients undergoing topical hyperbaric oxygen and electrical stimulation. Changes in proteins present in wound fluid following both treatments were assessed by gel electrophoresis. Interestingly, initial studies do indicate a correlation between the concentration of specific proteins and wound closure. Specifically, two molecules increased in concentration while one protein decreased in concentration. This is an important step towards identifying proteins which may serve, as indicators of wound healing. It is also possible that these proteins have been upregulated to promote the healing process. (poster presentation)

DEVELOPMENTAL EXPRESSION OF PHENOLIC COMPOUNDS IN *PLANTAGO MAJOR*.

Maryann E. Keene, Margaret G. Flowers and Linda S. Schwab, Wells College, Aurora, NY 13026.

Plantago major has been used in wound healing among various cultures worldwide. Several factors can affect the production of secondary metabolites involved in the medicinal action of *Plantago* spp.; the purpose of this study was to determine whether secondary metabolite expression is related to the age of the plant and differs among the species *P. major*, *P. lanceolata*, and *P. rugelii*. The results of Chromatographic analysis showed that the distribution of phenolic compounds in *P. major* is age-dependent and that there is a significant difference between secondary metabolite production among the three species. In addition tissue culture was attempted on *P. major* to see if a callus could be obtained for analysis of secondary metabolite production. A callus was obtained from *P. major*, but its growth was extremely slow. (poster presentation)

MAYA GARDENS: CONSTRAINTS AND POSSIBILITIES FOR SMALL-SCALE INTENSIVE AGRICULTURAL PRODUCTION.

E. R. Kintz, SUNY College at Geneseo, Geneseo, NY 14454

Although the Yucatec Maya have responded to forces of "globalization" since the intrusion of the Spanish on to the peninsula in the early 1500s, they have retained classic adaptive strategies to the tropical ecosystem, including cultivation of small-scale intensive kitchen gardens. With increasing pressures for modernization and decreasing productivity from milpa agriculture, kitchen gardens present a familiar alternative production mode, utilizing crops that are high in vitamins and fats, contributing to the overall well-being of household members. Recent work in Coba, Quintana Roo, Mexico, has consulted with Maya women to determine in detail the constraints and possibilities for expanding kitchen garden production. (oral presentation)

A GENERAL APPROACH TO SUPERPOSITIONING GEOMETRIC SHAPE DATA USING NUMERICAL METHODS, WITH APPLICATIONS TO THE STUDY OF BIOLOGICAL FORM.

David Liebner, H. David Sheets, Department of Physics, Canisius College, 2001 Main St., Buffalo, NY 14208.

Comparisons of shape are common in biological studies of form. The first step in any such comparison is the placement of all objects being studied into a common framework or registration; this is accomplished using superposition techniques. In general, superpositions involve the mathematical rescaling, rotation, and translation of objects so that all objects differ from one another as little as possible. In Procrustes superpositions, goodness of fit is measured using an error function that incorporates the distances between each landmark of an object and the respective mean position for that landmark. Traditionally, the error function selected is the sum of the squares of all Procrustes distances. Although the minimization of this function is optimal for many superpositions, it can be demonstrated that other error functions, such as the sum of the absolute values of Procrustes distances, are more statistically robust and resistant to changes induced by outlying objects and data points. However, minimizations of these functions are often resistant to simple mathematical solutions. Simplex routines, which numerically seek out the minima of multivariate functions, offer a convenient method for optimizing a superposition based on such an error function. We show how to use the method of the downhill simplex to obtain optimizations with a degree of accuracy of one part in 10^6. Software developed using this approach will be shown and made available. (poster presentation)

BRAIN CIRCUITRY ABNORMALITIES IN TEMPORAL LOBE EPILEPSY.

Eileen Lynd-Balta, Ph.D., Shirley A. Joseph, Ph.D., Biology Department, Saint John Fisher College, 3690 East Avenue, Rochester NY 14618; Department of Neurosurgery, University of Rochester School of Medicine, Rochester NY 14620

Epilepsy affects 1-2% of the population, and specifically temporal lobe epilepsy afflicts 50% of all adults with seizures. Temporal lobe epilepsy is characterized by complex partial seizures with epileptic foci originating in temporal lobe structures such as the hippocampus. Glutamate is the most ubiquitous excitatory neurotransmitter in the mammalian nervous system and exerts its effects via several families of glutamate receptors in the hippocampus.

Patients with intractable temporal lobe epilepsy undergo extensive evaluation to determine if removal of temporal lobe structures will alleviate the symptoms of the disease. The tissue specimens collected at surgery are then examined with histologic and immunocytochemical techniques to evaluate the integrity of the hippocampus. These data can be correlated to clinical information including patient histories, imaging studies and electrocortographic recordings.

In the present study, we examined the relationship between cell death, glutamatergic neurotransmission, and synaptic plasticity. Specimens procured from surgery were cut into serial sections and then processed for 1) cresyl violet stain to determine cell loss; 2) glutamate receptor immunocytochemistry to map the distribution of individual subunits; and 3) Timm staining to visualize the important mossy fiber pathway in hippocampal circuitry.

Our results demonstrate an alteration in glutamatergic receptor subunit immunocytochemical profiles that can be correlated to patterns of cell loss and mossy fiber sprouting. These findings provide further evidence that aberrant glutamatergic neurotransmission is causal in the genesis and maintenance of temporal lobe epilepsy. (poster presentation)

DIFFERENTIAL NATAL DISPERSAL IN MALE AND FEMALE EASTERN RED-TAILED HAWKS (*BUTEO JAMAICENSIS*).

J. Newhouse, A. Terninko and J. Hewlett, Environmental Conservation and Science Departments, Finger Lakes Community College, Canandaigua, NY 14424.

Natal dispersal in raptors has been widely studied, with the notable exception of Red-tailed Hawks (*Buteo jamaicensis*). Differential dispersal has been documented between the sexes in some hatch year birds, and in many adult raptors in migration. Determining if differential dispersal exists in Red-tailed Hawks is difficult as there is currently no simple method to sex these birds in the field.

The purpose of this study is two-fold. The first objective is to develop a field method for sexing Eastern Red-tailed Hawks, by correlating field measurements to sex. The birds are captured at the Braddock Bay Raptor Research banding blind, near Hilton, New York, on the South shore of Lake Ontario during spring migration and natal dispersal in August. Each bird is fitted with a U.S. Fish & Wildlife Service aluminum leg band for identification purposes. Measurements including culmen, wing cord, hallux, neck feathers and weight are recorded for each bird. A blood sample is also collected from the basilic vein. The blood is analyzed at Finger Lakes Community College using Polymerase Chain Reaction (PCR). PCR targets sex-specific variations in an avian gene which provides a reliable method for the determination of sex. Comparing the field measurements to the sex of each bird should produce a matrix that will provide a method of sexing the birds in the field.

The second part of the study is focusing on timing of dispersal and variation in dispersal distance between sexes. Banding records will be examined to determine if differences exist in timing of dispersal. In the future, the study will incorporate the use of radio-transmitters to track fledglings of both sexes to determine if dispersal distances vary. To date, 50 blood samples have been collected and are being analyzed. (oral presentation)

EVALUATION OF THREE DIFFERENT TREATMENTS ON FATHEAD MINNOW (*PIMEPHALES PROMELAS*) LARVAL SURVIVAL.

Michelle Niescierenko, 4-8 Garden 26, Ithaca College, Ithaca, NY, 14850.

The degradation of freshwater ecosystems in the last century has led to a loss in fish species. This, in turn, has led to a pressing need to better understand the mechanisms by which environmental degradation affects aquatic life. The earliest stages in aquatic life are the most sensitive to these environmental changes. In the proposed research, three methods for increased survival in larval offspring of fathead minnows will be evaluated. The three techniques are formalin, hydrogen peroxide and tetracycline treatments. Testing the relative effectiveness of these treatments will demonstrate their relative abilities to reduce the extent of fungal infections, which are a main cause of larval mortality in aquatic research. (poster presentation)

THE EFFECTS OF THE *ERWINIA HERBICOLA* ANTIBIOTIC, THAT INHIBITS THE FIRE BLIGHT PATHOGEN OF APPLE AND PEAR TREES, AGAINST OTHER MICROORGANISMS.

Beth Peterson, Richard Wodzinski, Biology Department, Ithaca College, Ithaca, NY 14850.

The bacterium *Erwinia amylovora* infects both pear and apple trees via the blossoms to cause the disease fire blight, which has devastated entire orchards. Due to both the expense and the development of resistance to the antibiotic streptomycin, the current control agent, there is interest in a biological control. The closely related *Erwinia herbicola* has been shown to inhibit the growth of *Erwinia amylovora* in an experimental orchard. *Erwinia herbicola* produces an antibiotic, pantocin B, which is an important mechanism of inhibition of *Erwinia amylovora*. Pantocin B has been purified, and its chemical structure determined.

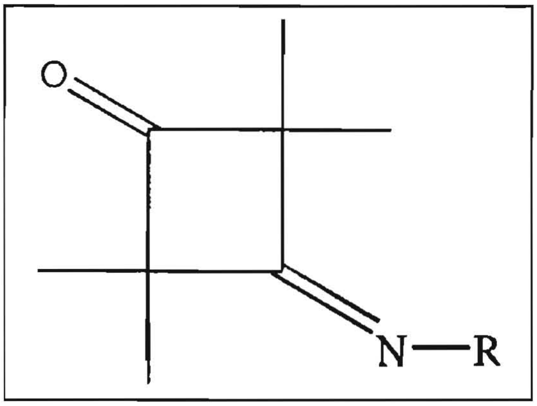
It is desirable to determine the spectrum of activity of pantocin B as it could potentially be used to control other plant or animal pathogens, in addition to the fire blight pathogen. This is difficult as pantocin B is ineffective in the presence of arginine, a component of most complex media. The enzyme arginine decarboxylase was used to try to eliminate arginine from complex media; however, this was ineffective. The effects of the antibiotic were tested on strains that grew on minimal medium. The spectrum of activity is relatively limited. Pantocin B was effective primarily against several strains of *Enterobacteriaceae*, in addition to *Erwinia amylovora*, such as *Shigella flexneri*, *Serratia marcescens*, and *Salmonella typhimurium*. (oral presentation)

THE EFFECT OF ORBITAL INTERACTIONS ON THE INVERSION OF GROUPS ATTACHED TO NITROGEN ON IMINOCYCLOBUTANONES.

Monica Phelps, Allan Chong, and James J. Worman, Department of Chemistry, Rochester Institute of Technology, 85 Lomb Memorial Drive, Rochester, NY, 14623.

Iminocyclobutanones of the type shown below undergo non-bonding orbital interactions through orbitals of proper symmetry on the carbon atoms of the ring skeleton. This interaction affects the inversion of groups through nitrogen of the imino chromophore.

R= cyclohexyl, phenyl, p-methoxyphenyl



When R=phenyl, the free energy of activation for inversion through nitrogen is 17.1 Kcal/mole. If orbital interactions affect the inversion energy, variable temperature NMR of specific derivatives should allow one to calculate a free energy of activation different from that observed for the phenyl group. The ?G* values will give insight into the magnitude of long range circumannular interactions. The synthesis and properties of derivatives of iminocyclobutanes will be presented. (poster presentation)

A PROPOSED DRAFT PURPLE LOOSESTRIFE MANAGEMENT PLAN FOR THE LOWER HUDSON RIVER VALLEY - AN OPPORTUNITY FOR UTILIZING COMMUNITY INVOLVED WATERSHED MANAGEMENT.

Roy Powers, D. Adams and B. Blossefy, NYSDEC, 21 S. Putt Corners Rd., New Paltz, NY 12561; NYSDEC, 108 Game Farm Rd., Delmar, NY 12054; Cornell University, Fernow Hall, Ithaca, NY 14853.

After decades of unsuccessful attempts to control purple loosestrife, *Lythrum salicaria*, using mechanical, physical and chemical means, the successful development of a biological control offers new opportunities to better manage this exotic invasive species. After approval by federal and state regulatory agencies, two leaf beetles, *Galerucella calmariensis* and *G. pusilla*, a root feeding weevil, *Hylobious transversovittatus*, and a flower feeding weevil, *Nanophyes marmoratus*, have been released in New York State. This draft management plan outlines goals, objectives and actions required to achieving long-term population reductions of purple loosestrife using a community focused, watershed management approach. The implementation of the Draft Purple Loosestrife Management Plan for the Lower Hudson River Valley will occur in three phases as outlined below.

Phase 1 (3-5 Year)
-Establish purple loosestrife biological control agents within each Town. Utilize partnerships whenever feasible.
-Continue long term on site monitoring to assess the efficiency of the bio-control agents.
-Assess the regional abundance and distribution of purple loosestrife utilizing remote sensing techniques.
-Develop and distribute educational materials targeting agencies, community organizations and private landowners.
-Draft documentation required to initiate legislative action prohibiting the sale and distribution of purple loosestrife.
Phase 2 (3-5 Year)
-Review the establishment, spread, and impact of single and multiple species (bio-control agents) in suppression of purple loosestrife within different habitat types.
-Develop an economical landscape model for bio-control agent distribution and establishment. (oral presentation)

THE INCIDENCE OF DARK FEATHERS AND FEATHER SUBSTITUTES IN TREE SWALLOW (*TACHYCINETA BICOLOR*) NESTS.

A. Rohnke, A. Terninko, J. Van Niel, Environmental Conservation Department, Finger Lakes Community College, Canandaigua, NY 14424.

The nesting behavior of Tree Swallows (*Tachycineta bicolor*) includes the lining of the nest with feathers. This practice may benefit the eggs and chicks by providing camouflage, insulation, and barriers to ectoparasites. White feathers are used more often, although dark feathers are utilized as well. In 1998, during an ongoing study at Warren Cutler Scout Reservation, it was noted that Tree Swallows will also make use of feather substitutes to line their nests. At the end of the 1999 and 2000 nesting seasons, Tree Swallow nests were collected and the incidence of dark feathers and feather substitutes was recorded. Substitutes included toilet paper, a faded bandage wrapper, deer hair, insulation, plastic and twine. A total of 83 nests were inventoried. Fourteen percent of the boxes in the study contained feather substitutes. The use of feather substitutes may be a result of opportunistic behavior, where birds are utilizing a source of lining that exists in close proximity to their nesting box. (poster presentation)

RECENT LIMNOLOGICAL SAMPLING AND MONITORING OF CANANDAIGUA LAKE, NEW YORK.

A. Rohnke, Bruce Gilman, Department of Environmental Conservation, Finger Lakes Community College, 4355 Lakeshore Drive, Canandaigua, NY 14424-8395.

Since 1996, Canandaigua Lake waters have been sampled and monitored monthly from April to November. Water quality parameters included Secchi disk clarity, algal abundance and vertical profiles of temperature, dissolved oxygen, conductivity and pH. This presentation will summarize the consistent limnological conditions over the five study years and also identify unidirectional changes in water quality that appear to be closely associated with the introduction of zebra mussels (*Dreissena polymorpha*) to the lake basin. Potential impacts of the latest lake invader, the fish hook water flea (*Cercopagis pengoi*) will be discussed. (oral presentation)

THE EFFICACY OF PANTOCIN B, AN ANTIBIOTIC OF *ERWINIA HERBICOLA*, A POTENTIAL BIOLOGICAL CONTROL AGENT OF FIRE BLIGHT DISEASE.

Nathan Ross, Richard Wodzinski, Biology Department, Ithaca College, Ithaca, NY 14850.

Currently *Erwinia amylovora*, which causes fire blight of apple and pear trees, is controlled chemically by streptomycin; however, the pathogen is developing resistance to this antibiotic. *Erwinia herbicola* is a potential biological control agent of fire blight. Antibiotic production is thought to be one of the mechanisms by which *Erwinia herbicola* inhibits *Erwinia amylovora* in the biological control of fire blight. One of the antibiotics produced by *Erwinia herbicola* is Pantocin B, it has been isolated and its structure has been determined. The ability of Pantocin B to control fire blight disease in immature pear fruit was greater than that of streptomycin on a part per million basis. Pantocin B was more effective then streptomycin at 100ppm, 50ppm and 20ppm. This was also true when the pears were supplemented with additional antiobiotic 24 hours after being inoculated with *Erwinia amylovora*. Supplementation at 24 hours after inoculation increased the protection provided by the antibiotics in all cases. (oral presentation)

CARDIAC MAST CELLS AND THEIR RESPONSES TO NEUROCHEMICALS: A STUDY IN MAST CELL HETEROGENEITY.

Kristen Sager, Jean Hardwick, Biology Department, Ithaca College, Ithaca, NY 14850.

Mast cells (MCs) are multifunctional effector cells of the immune system that are found in various anatomical locations. MCs are commonly located in close proximity to petidergic nerves and it has been suggested that MCs and nerves form a part of a homeostatic regulatory unit. Because of the close proximity of cardiac MCs to the sensory nerve fibers in the cardiac ganglia of the guinea pigs, we believe that the chemicals of the nervous system may stimulate cardiac MCs to release histamine. Four drugs were tested in this study; bradykinin (BK), capsaicin, substance P (SP), and pituitary adenylate cyclase activating polypeptide (PACAP). Each of these chemicals has been shown to induce histamine release from MCs found in other anatomical locations and/or in other species of animals. However, not all MCs respond to the same stimulants, and MC heterogeneity is a widely held theory. MCs are usually grouped into two categories - connective tissue and mucosal MCs. However, cardiac MCs have been proposed as a third category of MC. In this study, we found that cardiac MCs are unique from other MCs, in that they showed no significant increase in histamine release in response to any of the drugs that we tested. We feel that this adds evidence to support the theory of MC heterogeneity as well as supporting cardiac MCs as a third category of MC. (oral presentation)

IMPACT OF WHITE-TAILED DEER (*ODOCOILEUS VIRGINIANUS*) BROWSE ON FOREST REGENERATION AT THE WARREN CUTLER BOY SCOUT RESERVATION, NAPLES, NEW YORK.

Brien Schulik, Mark Pragle and Bruce Gilman, Department of Environmental Conservation, Finger Lakes Community College, 4355 Lakeshore Drive, Canandaigua, NY 14424-8395.

A fenced deer exclosure (5m by 5m) was erected in September 1997 within a mesic forested slope along the western base of Cleveland Hill. A control plot of the same dimensions was established immediately adjacent to the exclosure. All vegetative strata within both the control plot and experimental exclosure were inventoried for composition and percent cover of individual species. Twenty five randomly located red oak (*Quercus rubra*) seedlings were measured for overall height.

After three years, both the control and the exclosure were re-examined with the original methodology. Significant changes were detected, especially in oak seedling height. Species new to the plots (not observed in 1997) were infrequent but included forest tree seedlings regenerating within the exclosure. Comments on the role of white-tailed deer in controlling forest dynamics will be reviewed. (oral presentation)

A MACROINVERTEBRATE COMPARION OF TWO NATURAL AND TWO RESTORED WETLANDS IN THE MONTEZUMA WETLANDS COMPLEX.

R. J. Skipp, Nazareth College, 4245 East Avenue, Rochester, NY 14618.

The purpose of this experiment was to compare the water quality and habitat of two natural and two restored wetlands in the Montezuma Wetlands Complex. A variety of metrics were applied in this study to compare the water quality of restored emergent wetlands to natural emergent wetlands. The metrics used consisted of a diversity index, percent dominance, and a Hilsenhoff Biotic Index (HBI). The two restored sites that were sampled are the Malone impoundment and the Recckio impoundment; the natural sample sites were the Main Pool and the Vanderbilt impoundment of the Montezuma Wetlands Complex. In conclusion, the natural impoundments had a higher water quality that the restored impoundments. (poster presentation)

MEASURING THE DISTANCE OF A SUPERNOVA USING LIGHT ECHOES FROM SURROUNDING DUST CLOUDS.

Charles Spoelhof, Astronomy Section, RAS, 5 Mullett Dr., Pittsford, NY 14534.

The flare-up of a supernova forms a shell of light that continues to expand with time. Scattering of this light off interstellar dust clouds causes light echoes that can be used to determine the distance to the supernova. The measurement is based on the speed of light and is not subject to the uncertainties of parallax obtained from astrometry. Measuring the shell of light, however, involves several challenges and includes uncertainties of its own. (oral presentation)

THE STABILITY AND EFFICACY OF THE TWO PANTOCIN A-LIKE ANTIBIOTICS OF *ERWINIA HERBICOLA*, A POTENTIAL BIOLOGICAL CONTROL AGENT OF FIRE BLIGHT DISEASE.

Matthew Strodel, Nathan Ross, and Richard Wodzinski, Biology Department, Ithaca College, Ithaca, NY 14850.

Fire blight is a disease of apple and pear trees, and is caused by the bacterium *Erwinia amylovora*. The current means of controlling fire blight is with the chemical control streptomycin. However, *Erwinia amylovora* is developing resistance to streptomycin, and a new means of control is needed. Biological control using *Erwinia herbicola* may be effective against *Erwinia amylovora*. One mechanism of inhibition by which *Erwinia herbicola* inhibits *Erwinia amylovora* is antibiotic production. The most common antibiotics produced by *Erwinia herbicola* are two types of pantocin A-like antibiotics referred to as type 1 and type 2. Both antibiotics are non-toxic in the presence of histidine. The stability of the two types of *Erwinia herbicola* antibiotics was examined *in vitro* and the efficacy was examined *in vivo*. *In vitro* both type 1 and type 2 antibiotics were unstable. *In vivo*, type 1 and type 2 showed similar levels of inhibition of *Erwinia amylovora*. (oral presentation)

A PHYLOGENETIC ANALYSIS OF AMERICAN *BEGONIA* SECTIONS PRITZELIA AND GIREOUDIA.

Maggie Ward, 241 Coddington Rd. Ithaca, NY 14850.

A phylogenetic analysis was conducted using species from sections Pritzelia and Gireoudia of the genus *Begonia* from the family Begoniaceae. Previous studies on *Begonia* have been conducted based primarily on morphological characters, focusing on phenetics as opposed to phylogenetic analyses. In addition to morphological data, this project utilizes molecular systematics to investigate species of sections Pritzelia and Gireoudia using the Internal Transcribed Spacer region (ITS), which is a noncoding region of ribosomal DNA. Species from various African, Asian, and American sections were also included in the phylogenetic analysis. Geographic location as well as available morphological data of several Gireoudia species were mapped onto a phylogeny to investigate possible correlations between these data and ITS sequence data. The final results of these analyses suggest Pritzelia is not monophyletic, while Gireoudia is monophyletic with the inclusion of species from section Weilbachia. Some morphological characters support the pattern shown in the phylogeny, while other characters do not. The combination of the geographic range of Gireoudia species with ITS data shows a pattern where more ancestral species tend to have a more restricted geographic range. (oral presentation)

PRIMARY AND HIGHER EDUCATION COLLABORATIONS THAT FOSTER INTEREST IN SCIENCE.

Theresa D. Westbay, Ph.D., Department of Biology, St. John Fisher College, Department of Biology, 3690 East Avenue, Rochester, NY 14618.

Scientists in higher education have tremendous knowledge and experience that can be an invaluable resource to public schools. Their involvement in primary and secondary education affords the opportunity to introduce children to the excitement of science, problem-solving skills, and the importance of science in daily life. These educators are likely to find that, in return, they gain insights into teaching and science education that make them more effective teachers in their college classrooms and laboratories.

Sharing my expertise as a microbiologist with students at a local elementary school is one of the highlights of my professional life as a science educator. The activities I introduce complement existing units of study, while exposing children, even those in the lower primary grades, to the field of microbiology. For example, as part of a unit dealing with hand-washing and hygiene, I helped first-graders conduct an experiment to look for germs on their hands. The children became actively engaged in the scientific method, and discovered from firsthand experience that science is fun. Children were astounded by the number of bacteria and mold that grew from hands that appeared clean. This highly visual activity supplemented the exercises carried out by the classroom teachers and the school's nurse educator, and together these lessons drove home the importance of washing hands.

Professionally, my experiences with primary grade students and educators provide me with insights into teaching that surpass anything covered in a science education methodology course. The teaching strategies I continue to develop are inspired by the need, when working with primary school children, to approach lessons from the perspective of someone with little knowledge of science, in general, and microbiology, in particular. Such an approach forces me to be very deliberate in determining the concepts that are of key importance, and avoid entrenched terminology and the jargon of science "professionals". The greatest learning takes place when students are actively engaged, so structuring lessons to encourage discovery and critical thinking (rather than rote memorization) are successful, in part, because they draw upon and foster a child's inherent curiosity and love of learning. All of this is, of course, directly applicable to teaching at the college level, and the college students I interact with have undoubtedly benefited from what I have gained from my experiences with elementary school children. (poster presentation)

PHYLOGENETIC ANALYSIS OF SOUTH AMERICAN *BEGONIAS* USING CHLOROPLAST ATPB-RBCL SPACER REGION.

N. White, S. Swensen, Ithaca College, 953 Danby Rd., Ithaca, NY 14850.

Research has focused on the family Begoniaceae using the chloroplast atpB-rbcL Spacer Region. The goal of this research was to assess the utility of the region for phylogenetic analysis and to reconstruct the phylogeny of the South American *Begonias* using this gene. Morphological characteristics were also mapped onto the phylogenetic tree to investigate the correlation between the two types of data.

The atpB-rbcL spacer phylogenetic tree indicated that the section of South American *Begonias* were not monophyletic. The tree also showed Asian sections embedded within the South American sections. Some morphological characteristics of the male flower lend support for the phylogenetic tree while other characters did not.

The topology of the phylogenetic tree may be affected by the sequence data, which is indel rich. Also, poor species representation per section may have created artificial groupings. (oral presentation)

QUANTIFICATION OF WILD-TYPE AND DELETED MITOCHONDRIAL DNA USING THE FLUOROGENIC 5'-EXONUCLEASE (TAQMAN™ PCR) ASSAY.

Collynn Woeller, Wendy K. Pogozelski, Department of Chemistry, SUNY College at Geneseo, Geneseo, NY 14454.

Mitochondria, the cell organelles responsible for energy production, have DNA (mtDNA) that is distinct from nuclear DNA. Since each mitochondrion may bear multiple copies of this DNA and there may be several mitochondria per cell, mtDNA is fairly abundant. However, determination of the amount of mtDNA in a cellular extract is a challenging problem. Purification of mitochondria followed by DNA extraction is time-consuming and results in contamination. Also, various altered mtDNA molecules (point mutations, deletions, and insertions) can co-exist with normal mtDNA in a condition of heteroplasmy and are difficult to detect using current methodologies. We have investigated the use of the Fluorogenic 5'-Exonuclease PCR Assay, known as TaqMan™ PCR, to determine the amount of mtDNA in a cellular sample. We show results using a fibroblast cell line derived from an individual diagnosed with the mitochondrial disorder Pearson's Syndrome and we compare the findings with a plasmid clone used as a standard. We show the validity of the plasmid as a calibration standard by comparing its response to that of purified human mtDNA. Results compare favorably with mtDNA copy numbers obtained by other methods and reported in the literature. We also show quantification of mtDNA that bears the 4977-bp "common deletion", showing that this assay is useful for determining percentages of mtDNA aberrations in a cell. The assay is reproducible, amenable to multiplex analysis, easy to perform, and should prove useful to researchers and clinicians. (poster presentation)

TWENTY-EIGHTH ANNUAL SCIENTIFIC PAPER SESSION

NAZARETH COLLEGE
ROCHESTER, NY
November 3, 2001

LARRY J. KING MEMORIAL LECTURE

The Hiscock Site, 18 Years of Digging in the Ice Age
As Seen Through the Eyes of a Scientific Illustrator
William Parsons
Buffalo Museum of Science, Buffalo, NY

ABSTRACTS OF PAPERS

Abstracts are listed alphabetically by first author. Abstracts have been included with minimal editing exactly as submitted. Whether a submission was a poster or oral presentation is indicated at the end of each abstract.

CRACKING THE MAYA CODE: ALFRED MAUDSLAY AND THE *BIOLOGICA CENTRALI AMERICANA.*

S. Aldrich, Dept of Anthropology, SUNY College at Geneseo, Geneseo NY 14454.

This poster is an overview of Alfred Maudslay, his work, and his contributions to the decipherment of Mayan hieroglyphics. As one of the most detailed representations of Mayan architecture and epigraphy to reach Europe, Maudslay's contribution will be examined, as well as his shortcomings. An understanding of Maudslay and his work is essential when examining the history of Mayan decipherment. (poster presentation)

COMPARISON OF THE ANTIBIOTIC PRODUCED BY A CLONED GENE FROM *ERWINIA HERBICOLA* WITH OTHER ANTIBIOTICS PRODUCED BY *ERWINIA HERBICOLA.*

Kelly Barnes, Richard Wodzinski, Biology Department, Ithaca College, Ithaca, NY 14850.

Fire blight is a disease that infects apple and pear trees, and is caused by the bacterium *Erwinia amylovora.* This disease is being controlled chemically with streptomycin. However, *E. amylovora* is developing resistance to streptomycin and a new type of control is needed. *Envinia herbicola* is a potential biological control agent of fire blight disease. Antibiotic production is one of the mechanisms by which *E. herbicola* inhibits *E. amylovora.* Different strains of *E. herbicola* produce different antibiotics that seem to be in the same family as evidenced by the inhibition of their activities by various amino acids. The most common of these antibiotics are two types (type I and type II), both of which are not toxic in the presence of histidine. A gene for one antibiotic from *E. herbicola* that is not toxic in the presence of histidine was cloned into *Escherichia coli.* It was found that the cloned gene

produces a type I antibiotic as evidenced by its spectrum of activity, response to histidine concentration, and other properties. (oral presentation)

CELLULAR METABOLIC RESPONSES TO OXIDATIVE STRESS IN PRIMARY ASTROCYTE CULTURES.

Joel H. Benington, Christie J. Lysiak, Mary B. Sevigny*, Raymond A. Swanson*
Department of Biology, St. Bonaventure University, St. Bonaventure, NY 14778;
*Department of Neurology, Veterans Affairs Medical Center, San Francisco, CA 94121.

Loss of neurons in the brain associated with strokes is largely a consequence of oxidative stress as a result of metabolic deficits during ischemia. In collaboration with researchers at UCSF, we have measured levels of central metabolic intermediates following oxidative stress in primary astrocyte cell cultures, which are an established model system for events associated with brain ischemia in situ. Levels of ATP, ADP, AMP, NAD, and ADP-ribose were measured using ion exchange high-performance liquid chromatography (HPLC).

In agreement with previous studies, exposure of astrocyte cultures to 300 μM MNNG for one hour produced marked reductions in cellular ATP levels (> 90%). Furthermore, ADP, NAD, and ADP-ribose levels were reduced by comparable amounts, and AMP levels were reduced by more than 50%. In previous studies, treatment of astrocyte cultures with 5 mM glutamine for 3 hours after MNNG exposure substantially reduced cell death. We have found that, contrary to expectations, glutamine treatment does not reverse the effects of MNNG on levels of cellular metabolic intermediates. (oral presentation)

PARALLELIZING PHYLOGENETIC ALGORITHMS.

Jonathan Bona, Michael Kandefer, Konrad Malkowski, Department of Computer Science, Canisius College, 2001 Main St, Buffalo, NY, 14208.

Reproducing an evolutionary tree based on morphological data is an NP complete problem. As the number of specimens as well as the number of character traits considered increases, the complexity and amount of possible trees increases exponentially. This makes evaluation of large data sets practically unfeasible and computationally expensive. One way of addressing this problem is to disregard unlikely trees. This is called *maximum parsimony method*. This approach, however, may lead to the loss of one or more possible solutions. Another approach to solving this problem is to use a parallel computer to dramatically cut down on the computational time required to evaluate large data sets.

Through our research, we have worked on parallelizing *mix*, an application included in the *Phylip* software package, using our small Beowulf cluster at Canisius. Through our work with the parallel implementation of *mix* we have, thus far, managed to achieve a 16 times speed up in the computation. Currently, we are working on parallelizing a number of different algorithms for phylogenetic inference. (poster presentation)

BREAKING THE MAYA CODE: COPAN AND TIKAL TEOTIHUACANO RULERS.

Jen Bonamico, Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

Many Maya cities have been found to contain a Teotihuacano influence in their art, architecture, and writing. More specifically hieroglyphic inscriptions found at Copan and Tikal depict their rulers in the style of Teotihuacan. Through examination of such hieroglyphs found at these sites, I will take a deeper look into the political interaction Teotihuacan had with these cities. (poster presentation)

NEUTRON-DEUTERON SCATTERING AS A PROBE OF THE THREE-NUCLEON FORCE.

P. Brady, R. DeYoung, D. Kroening, S. Tuminaro, and M. Yuly, Department of Physics, Houghton College, One Willard Avenue, Houghton, NY 14744.

Previous experimental and theoretical studies are unclear regarding the existence and role of the three-nucleon force in nuclear interactions. An experiment is being performed at the Los Alamos Neutron Science Center (LANSCE) to measure the d(n, dn) cross-section for incident energies of 100 MeV to 700 MeV and deuteron angles of 24°, 30°, 36,°, 42°, 48°, and 54° to the incident beam. These results will eventually be compared to theoretical predictions for this reaction with and without inclusion of the three-nucleon force. (poster presentation)

COMPETITION FOR POLLINATION BETWEEN THE INVASIVE *LYTHRUM SALICARIA* AND A NATIVE SPCIES, *ECHINOCYSTIS LOBATA*.

Beverly J. Brown, Biology Department, Nazareth College, 4245 East Ave., Rochester, NY, 14618.

Lythrum salicaria (purple loosestrife) invades wetlands creating monotypic stands. Competition for pollination has only recently come to the attention of researchers as an area where showy invasive plant species might out compete native species. Reduction in visitation with reduced quantity or quality of pollination could result in reduced seed set, ultimately affecting survival of the native species. I investigated the possibility that *Lythrum salicaria* reduced pollinator visitation and seed set for the co-occurring native *Echinocystis lobata* and subsequently whether *E. lobata* impacted pollination of *L. salicaria*. Pollinator visitation observations occurred on three separate days over a two week period in August when both species were flowering. Treatments included pure *L. salicaria*, pure *E. lobata*, and a mixture of both species in relatively equal abundance. Observations were conducted at Ellison Park, Monroe County, New York. All observation sites were within a 36 m diameter circle. In early October ten fruit were randomly harvested from m^2 areas at each observation point. Pollinator visitation to *E. lobata* was not significantly affected by the presence of *L. salicaria*. However, *L. salicaria* suffered significantly reduced visitation where it co-occurred with *E. lobata*. There was no significant effect on seed set in either species. These preliminary data indicate that presence of the showy invasive may not impact native species and instead the native species may be reducing pollinator visitation to the invasive. However, due to the relatively close proximity of the observation sites, studies involving greater distances between treatment sites might show stronger effects on the native species. (poster presentation)

IDENTIFICATION OF REPETITIVE DNA SEQUENCES IN *ASPERGILLUS FLAVUS*.

Dennis A. Carbone, John Kupinski, Department of Biology, St. Bonaventure University, St. Bonaventure, NY 14778.

Aspergillusflavus is a fungal pathogen that infects animals, such as man, as well as economically important plants like corn, cotton and peanuts. As a food contaminant *A. flavus* can produce aflatoxins that are potent carcinogens and a serious health hazard to man. Because morphological differences among *Aspergillus* species are limited and often ambiguous, identification and classification of aspergilli is problematic. DNA fingerprinting is an alternative approach. In this study we characterized six recombinant lambda phage containing presumptive, repetitive DNA of *Aspergillusflavus*. Repetitive

DNA is an ideal target for DNA fingerprinting as it evolves rapidly and is therefore likely to be polymorphic. Nuclear DNA of *Aspergillus flavus* was cloned into lambda. Six clones were selected on the basis of their capacity to hybridize to large amounts of labeled *A. flavus* nuclear DNA. *BamHI* fragments of each clone were labeled with digoxigenin (DIG) and hybridized to the other five clones in Southern blot experiments to determine which of the *BamHI* fragments represented repetitive DNA. Two cloned DNA fragments were tentatively identified as repetitive DNA. These were used in preliminary DNA fingerprinting experiments to ascertain the degree of polymorphism in *A. flavus* and closer related species. (poster presentation)

POPULAR SCIENCE BOOKS AND THEIR BENEFIT TO THE READING PUBLIC.
James J. Carr, 114-4 Deerhurst Lane Webster, NY 14580.
On July 16, 2000 the television news series *Face the Nation* ended its Sunday morning program with the usual closing commentary by host Bob Schieffer. That week the topic was the *New York Times* Bestseller list. It seems that many bestsellers are never read by their purchasers. Schieffer himself confessed to buying a copy of Stephen Hawking's *A Brief History of Time* (100 weeks on the bestseller list), and though he read it, he couldn't understand it. This passing admission by Schieffer, an educated, worldly layman implies that the general reading public does not benefit much from recent science popularizations. In fact it confirms what many in science, particularly the physics community suspect: The difficulty of a science subject like physics makes much of it simply incomprehensible (even omitting the mathematics) without a formal background. A review of literature trends over the past century will be presented and suggestions for a future direction offered. (oral presentation)

TRENTON FALLS VISITORS: A STUDY OF NINETEENTH CENTURY TOURISM.
Ann C. Cavaluzzi, Department of Geography, SUNY College at Geneseo, 1 College Circle, Geneseo, NY 14454.
Trenton Falls was emblematic of America's infatuation with the picturesque and sublime settings in the opening decades of the nineteenth century. During the nineteenth century Trenton Falls was a prominent tourist attraction in New York State. Contemporary hotel registers reveal that recreational travel to Trenton Falls was prominent from the seaboard cities and nearby canal towns. Canal travelers in the early to mid-nineteenth century would break their journey at Trenton Falls before continuing on west toward Niagara Falls. Later in the nineteenth century during the railroad era, Trenton Falls saw a slight increase of visitors from the American interior. Using a distance decay model, the data show that as time progressed travel to Trenton Falls decreased as more transportation opportunities increased and more people traveled to other recreational settings. (oral presentation)

HUGH MILLER (BICENTENARY OF HIS BIRTH) AND "PREHISTORIC PITTSFORD AND THE ERIE CANAL."
Samuel J. Ciurca, Jr., 54 Appleton Street, Rochester, New York 14611-2510 (paleoresearch@yahoo.com).
Hugh Miller (1802-1856), a famous Scottish geologist, was mostly self-taught. His experiences were quite influenced by his religious upbringing, but he was still in search of the truth as revealed by his extensive field research and what the study of the rock record revealed

to him. His studies led to the publication of several books, now classics of early geological literature. Among these were:

1841 The Old Red Sandstone
1849 Footprints of the Creator
1857 The Testimony of the Rocks
1858 The Cruise of the Betsey

Many of his works were sold in the United States, also. About a hundred years after his death, I could be found in old bookstores in Rochester, New York, buying copies of his works. And these influenced my early education in geology.

Just before the publication of his last work, *The Testimony of the Rocks*, Hugh Miller committed suicide - shooting himself in the chest. Apparently, he had had a troubling problem with nightmares and could no longer deal with this condition.

2002 is the bicentenary of his birth, and there is currently a revived interest in Miller, his life and early contributions to geological observation. This includes "The Hugh Miller 2002 Web Site" at http://www.hughmiller.org.

"Prehistoric Pittsford" (http://www.geocities.com/paleoresearch) is a website devoted to the discovery of fossils (eurypterids) by Clifton Sarle (published in 1903). One of the new species discovered by Sarle was named in honor of Hugh Miller (near the centenary of his birth), viz. *Hughmilleria socialis* Sarle. A page on this website gives a brief description of Hugh Miller, including illustrations and links to the 2002 bicentenary celebrations (see http://www.geocities.com/paleoresearch/FossilNames.html.

"Prehistoric Pittsford - The Exhibit" is a small display of fossils at the Pittsford Community Library in Pittsford, New York. The exhibit is educational and was built by the author and the Town of Pittsford. Specimens of fossils, like those discovered by Clifton Sarle, are on display and a description of the discovery is described in textframes mounted in the display case. Samples of the various lithologies above and below the eurypterid-bearing black shale are also exhibited. The eurypterid named after Hugh Miller, *Hughmilleria socialis* Sarle, is illustrated in drawings and actual specimens at the bottom of the case. In co-celebration of the bicentenary of the birth of Hugh Miller, a specimen from the Pittsford Black Shale is being sent to Scotland to be preserved in a Scottish museum.

Ironically, the Pittsford Black Shale was seen again in August 2001. Underlying a heavily constructed area of Pittsford, the shale was observed in shallow excavations for the new Wegman's Restaurant on Monroe Avenue. What little shale that was seen, yielded only the carapace *of Eurypterus pittsfordensis.* Future discoveries, in an area of no natural outcroppings of this unit, depend upon construction sites. There is much more to be learned about the Pittsford Member of the Vernon Formation, Salina Group, of this region and its relationship to the other eurypterid-bearing units of the lower Vernon Formation.

Thanks to Frieda and Martin Gostwick at hughmiller.org in Scotland and to Steve Pavelsky of St. Louis, Missouri (for images of Hugh Miller). (poster presentation)

DIGITALLY DOCUMENTING "PREHISTORIC PITTSFORD."

Samuel J. Ciurca, Jr., 54 Appleton Street, Rochester, NY 14611; Joseph LaRussa, 198 Marion Street, Rochester, NY 14610.

"Prehistoric Pittsford" started out as a series of articles published in the Fossiletter (Rochester Academy of Science-Fossil Section). Discoveries in recent years have drawn attention again to the prehistoric animals (eurypterids) discovered by Clifton Sarle (1903). And, since a hundred years have passed since the initial discoveries, a small exhibit, "Prehistoric Pittsford," was designed and installed in the Pittsford Community Library in 2000. The purpose of the exhibit was to share information about Pittsford's prehistoric past with local students and residents.

Later, "Prehistoric Pittsford--The Website" was initiated to share information with a wider audience. See (http://geocities.com/paleoresearch)

At the Rochester Academy of Science 28th Annual Fall Scientific Paper Session, we intend to demonstrate and promote some of the techniques currently being used to illustrate "Prehistoric Pittsford" as an educational endeavor. Included is a computer-generated slide show displaying the "Prehistoric Pittsford" website, offline. The use of actual field samples, digital cameras, scanners and other tools will be discussed. Suggestions on building an educational website are being provided to those showing interest. (poster presentation)

HABITAT SEGREGATION BY GOLDEN-WINGED WARBLERS AND BLUE WINGED WARBLERS.

John L. Confer, Bernhard Preussen, Biology Department, Ithaca College, 953 Danby Road, Ithaca, NY 14850.

Blue-winged Warblers and Golden-winged Warblers are closely related species of neotropical migrants. Golden-winged Warblers have been declining throughout much of their territory, while Blue-winged Warblers have been expanding their territory northward. When this northward expansion by the Blue-winged Warbler leads to secondary contact between the two species, the Golden-winged Warbler is extirpated within approximately 50 years. The only known location where Golden-winged and Blue-winged Warblers have coexisted for more than 50 years is Sterling Forest State Park (SFSP) in Southern New York State. One theory on why the two species coexist in SFSP is habitat segregation. This study was conducted from mid-May to early July 1998-2001 to determine if habitat segregation occurs in SFSP and which habitat is used by each species. This study found that 19 out of 22 nests found in wetlands belonged to Golden-winged Warblers, and 14 out 25 nests found in uplands belonged to Blue-winged Warblers. This indicates that habitat segregation does occur in SFSP, with Golden-winged Warblers occupying wetlands more than Blue-winged Warblers, and Blue-winged Warblers being found slightly more often in uplands than Golden-winged Warblers. (oral presentation)

DEFINING ROCHESTER'S ELITE 1920-1940: THE PIONEERS OF HIGH-STATUS SUBURBIA.

Charles Z. Constantine, Department of Geography, SUNY College at Geneseo, Geneseo, NY 14454.

A profile of Rochester's elite was assembled utilizing Rochester Blue Books from 1923, 1931, 1940 and contemporary membership directories for the exclusive Country Club of Rochester. This profile was also used to examine what defined the truly elite of Rochester. The Rochester Blue Books were a directory of social notables in the Rochester community. Members of the Country Club of Rochester were matched in the Blue Books. The memberships in other organizations were compiled. The home residences of listed members were also identified, with interest in the streetscapes they created and occupied. The memberships of the captains of industry, such as Eastman, the Lombs, the Bauschs, and the Strongs, were compared to fellow country club members, in an attempt to document who the truly elite were. By 1940 more than one quarter of the Country Club's members lived in Rochester's emergent automobile suburbs, and most of those lived at the Town of Brighton's 'best' addresses. The latter were a natural axial extension of Rochester's East Avenue mansion district. In turn post-war growth would continue the development of metropolitan Rochester's high status southeastern wedge. (oral presentation)

SYNTHESIS, GELATION ABILITY AND PHOTOPHYSICAL CHARACTERIZATION OF NOVEL BIPHENYL-CHOLESTEROL COMPOUNDS.

Charles Z. Constantine, Ryan Holland, H. Cristina Geiger, Department of Chemistry, SUNY College at Geneseo, Geneseo, N.Y. 14454.

Although gels have been known since the 1800's, the study of thermally reversible organogels, obtained from a series of organic liquids and low concentrations of relatively low molecular mass gelators, has been addressed with more enthusiasm only during the last 20 years. The understanding of the formation of gels at the microscopic level, the role of the solvent, the nature of the aggregate structure, etc. are the focus of recent investigations. We have synthesized a series of biphenyl fatty acids connected to a cholesterol moiety through an ester link. We want to investigate the influence of the tethered chain between the aromatic chromophore and the cholesterol moiety on the gelation ability. We attempt to determine which are the stronger forces during aggregation, are they aromatic-aromatic interactions or the stacking of the cholesterol units? Herein we report the synthesis of a series of novel biphenyl-cholesterol compounds, their gelation ability in different organic solvents, their phase transition temperatures, and the nature of the aggregates formed. (poster presentation)

LA SEMANA SANTA: CULTURAL CELEBRATION OF BLENDED TRADITION.

Karrie Denniston, 61 Main Street Geneseo, New York 14454.

This paper explores symbols and rituals performed throughout La Semana Santa (Holy Week) in Guatemala. La Semana Santa is an expression of the process of syncretism of cultural forms that occurred during colonization, specifically religion. I will illustrate elements of indigenous ritual and Catholicism by comparing the current Guatemalan celebration to traditional Holy Week celebrations. Data for this discussion was gathered while I was in Antigua, Guatemala during the 2001 celebration from Holy Thursday through Easter Sunday and the photographs that I was able to take document the celebration. (oral presentation)

USING THE (n,2p) REACTION TO SEARCH FOR A PREEXISTING NUCLEAR Δ^{++} COMPONENT.

R. DeYoung and M. Yuly, Department of Physics, Houghton College, One Willard Avenue, Houghton, NY 14744.

The ^{3}He(n,2p)2n and the ^{4}He(n,2p)3n cross-sections are being measured as a means to explore the Δ^{++} contribution to the nuclear wave function. The incident neutron beam ranged between 200 and 500 MeV. Scattered protons passed through magnetic spectrometers centered 45° to the right and left of the beam line. Each spectrometer consisted of a thin ΔE scintillator, a wire chamber, a permanent bending magnet, a wire chamber, and a detection barrier of three stacked scintillators. (poster presentation)

DOES FIELD MOWING AFFECT BUTTERFLY ABUNDANCE?

Michael Dlugos, Peter G. Weber, Department of Biology, SUNY College at Oswego, Oswego, NY 13126.

The effects of field mowing on butterfly counts were investigated using Pollard walks. We predicted that counts would decrease immediately after mowing but increase one year later.

Counts from three sampling sessions prior to mowing were compared to counts from three after mowing, as well as to counts on approximately the same three days the following year. Significance levels were computed through comparison of counts to the Poisson distribution. Most locations showed no significant changes in abundance both immediately, and one year after mowing. We conclude that in the short term mowing modestly decreases butterfly counts. (oral presentation)

A MEASUREMENT OF THE MUON MAGNETIC MOMENT USING COSMIC RAYS.
D. Ely, D. Kroening and M. Yuly, Department of Physics, Houghton College, One Willard Avenue, Houghton, NY 14744.

The muon magnetic moment is being measured via the decay of polarized cosmic-ray muons in a 44 G magnetic field. One thick $102 \times 20.6 \times 5.4$ cm plastic scintillator detector was placed between two $101.5 \times 20.6 \times 1.6$ cm detectors in the uniform magnetic field produced by a solenoid. A veto-scintillator eliminated events from regions of non-uniform magnetic field. The time difference between when the muon stopped in the center detector and the detection of the decay electron was recorded for several thousand events. The decay electron is emitted along the direction of the precessing muon spin axis. (poster presentation)

BREAKING THE MAYAN CODE: PACAL AND PALENQUE.
Katie Gage, Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454

Pacal was the ruler of the city Palenque and his sarcophagus along with other hieroglyphs show the dynastic history of the city. Through looking at hieroglyphs and carvings from the Temple of the Inscriptions I will trace this history and also look at other glyphs related to family life. Pacal had numerous glyphs associated with his name and I will trace their appearance throughout various carvings found in Palenque. (poster presentation)

PROBLEM MANAGEMENT OF CANADA GEESE IN A SUBURBAN TOWN.
Conan Guard, Finger Lakes Community College, Canandaigua, NY 14424; Jim Eckler, New York State Department of Environmental Conservation, 6274 East Avon-Lima Road, Avon, NY 14414.

The Town of Brighton (population 35,000) is a suburban township adjacent to the City of Rochester, in Monroe County, New York. Complaints by town residents of nuisance and damage from a burgeoning Canada goose population led to the creation of a citizen's task force in the fall of 2000. A comprehensive plan was written and action taken on 6 major tasks which were: site alteration, egg addling, the use of herding dogs, educational outreach, regular surveys and implementation of a no-feeding effort which included a no-feeding ordinance for town-owned properties.

In the first year of activity, successes have been measured in many ways. Few public complaints were lodged. One hundred and ninety eggs were addled. Daily visits by herding dogs were effective. A two-thirds reduction in goslings was realized at one problem spot. Media coverage was favorable. The no-feeding policy was generally accepted, and task force members and students volunteered precious hours. (oral presentation)

GENDER AND POWER: STERILIZATION IN MODERN MEXICO.
Laura Gustin, 102 Riverside Drive, Geneseo, NY 14454.
This paper looks at issues of power, class struggle, ethnic barriers, and gender relations in the fields of Reproduction and Public Health, in modern Mexico. The main focus is on Mexico's population policy from the late 60's through the turn of the century. Sources include scholarly research, data from leading international organizations, and a first hand account of a Mexican woman who was sterilized without her consent, and against her will in a public hospital. (oral presentation)

EVALUATION OF THE MICROSTRUCTURE AND PROTEINS IN HUMAN TEMPOROMANDIBULAR JOINT DISORDERS.
Kerri Hallene, Laura Edsberg, Kristin Fries, C. David Jaynes, Michael Brogen, George Upton, Natural and Health Science Research Center, Daemen College, 4380 Main Street, Amherst, NY, 14226 and Department of Oral Medicine/Pathology/Surgery, The University of Michigan School of Dentistry, Ann Arbor, Michigan 48109.
Temporomandibular joint (TMJ) disorders affect approximately one in five Americans, 80 percent of whom are women. The joint is characterized by the presence of a fibrocartilagenous disc. The disc can perforate or slip, leading to pain and functional changes, as well as microstructural changes seen in patients with TMJ disorders. Patients with TMJ disorders have limited options. Removal of the disc has not always proven to improve function. Aspirating the fluid surrounding the diseased disc can provide some temporary relief. The purpose of our study was to evaluate the microstructure of TMJ discs from patients with this disorder. In addition, proteins in the disc tissue were evaluated using antibodies and a diaminobenzidine stain. Ultimately, we are hoping to use this technique as a diagnostic tool for patients with TMJ disorders by correlating the microstructure of these discs with the levels of various proteins, such as collagenase, found in the disc tissue. In addition, these data will be correlated with the severity of the patient symptoms. (poster presentation)

BREAKING THE MAYA CODE: MAYAN GLYPHIC NAME-TAGGING.
Yamalis Hernandez, Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.
Decipherments made by David Stuart have led to the understanding not only of who the Classic Mayan scribes were, but also the role of material ownership within the Classic Mayan societies. David Stuart found that the Classic Mayan scribes signed their names after their works, and that they were part of the elite noble class. He also discovered that material possessions such as dishes and pots were name tagged. This practice of name tagging has allowed decipherers of today to have a much more profound view of the ancient Maya way of life. David Stuart's contribution has opened the doors to a whole new way of thinking in deciphering Mayan glyphs. This poster will present David Stuart's contributions and illustrate his findings. (poster presentation)

***AMERICASPIS AMERICANA* A FOSSIL OSTRACODERM FISH FROM PENNSYLVANIA.**
John R. Honan, 50 Bly Street, Rochester, NY 14620.
The CLASS AGNATHA or jawless vertebrates comprise four major Orders: The Heterostraci, Osteostraci, Thelodontida, and the Petro-Zontiformes or Lampreys. Also included

here are the Hagfishes. Apart from the Lampreys and Hagfishes, the other Orders are known collectively as the Ostracoderms or shell-skinned fish-like vertebrates.

Americaspis americana is a Heterostracan fish of the family known as the Cyathaspidoformes. Cyathaspids flourished in the Silurian Period, and died out at the end of the Devonian Period. The Heterostracans lacked cell spaces in the basal layer of the bony shell which differentiated them from the other Ostracoderms. *Americaspis* comes from upper Silurian sediments and is the oldest fossil fish from Eastern North America.

Americaspis was described in 1844 by Professor Claypole who named it *Palaeaspis*. Dr. William Bryant described *Palaeaspis* in 1926, and made a restoration of it. In 1940, Dr. Whitley renamed it as *Americaspis*.

In 1999 and 2001, I visited a locality containing *Americaspis* in Ander-Sonburg, Pennsylvania. The fish occur in a thin sandstone layer of the Bloomfield Formation. Over 100 specimens were recovered consisting of many individuals on slabs and single specimens. One Americaspid was found in three dimensions showing a torpedo shape for this fish.
Some anatomical features are listed below:
1) - Robust dentinal ridges on the outer surface of Americaspis' shield;
2) - Distinct ridges dorsally to the small lateral orbits;
3) - Impressions of the semicircular canals and primitive brain;
4) - Impressions of the primitive gill pouches;
5) - Loose scales which encased the primitive tail.
The Bloomfield Formatiom can be correlated with the Upper Ludlow Beds of Great Britain.

References.
The Cyathaspididae by Robert H. Denison, Fieldiana Geology, 1964; Paleozoic Fishes by Moy-Thomas and Roger Miles, 1971. (oral presentation)

BREAKING THE MAYA CODE: COMPONENTS OF ROYAL INSCRIPTIONS AT YAXCHILAN.

Steve Howard, Department of Anthropology, SUNY Geneseo, Geneseo, NY 14454.

This poster will help illustrate the structure of Mayan writing. Following the work of Tatiana Proskouriakoff, deciphered glyphs from Yaxchilan's royal inscriptions will be diagrammed to identify the isolated components. Phonetic and semantic qualities will be discussed, and syntax will be examined. (poster presentation)

THE NORTHEASTERN PERIPHERY OF ARENA AND HOPEWELL CULTURAL INFLUENCE.

Steve Howard, Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

This is a report on the first phase of a project to determine the extent of influence that the core Ohio mound-building traditions had on the peripheral region of the Upper Allegheny Valley and adjacent areas. Past records of known sites that are, or have previously been, considered to be of Adena or Hopewell origin will be analyzed with currently recognized criteria. Theories from past research will be considered, from the earliest records of the mid-1800's to the most current studies. A discussion of site types will include mounds, earthworks and habitations, as well as their distribution. A brief introduction to the second phase will follow, accompanied by a discussion of the problems associated with new research of such sites, and possible solutions. (oral presentation)

POSSIBLE ZEBRA MUSSEL (*DREISSENA POLYMORPHA*) INDUCED EFFECTS ON THE LIMNOLOGY OF CANANDAIGUA LAKE, NEW YORK.

Seth Jensen and Bruce Gilman, Finger Lakes Community College, Department of Environmental Conservation/Outdoor Recreation, 4355 Lakeshore Drive, Canandaigua, NY 14424-8395.

Water quality information has been gathered on Canandaigua Lake as part of a sampling and monitoring program since 1996. The program increases our baseline knowledge on the yearly variability of lake condition, improves our understanding of the ecological impact of exotic species like the zebra mussel, acquires comparative data allowing the assessment of the effectiveness of watershed management techniques, and assures that recent, accurate data are available for environmental decision makers. Trend analyses of the data reveal significant changes in lake clarity, algal abundance and algal composition over the last six years. For the first five years, clarity improved and algal abundance decreased as a result of the cumulative filter feeding of a growing population of zebra mussels. However, in 2001, lake conditions deteriorated. Lake clarity was reduced, algal abundance increased and the algal community became dominated by a cyanobacteria, *Microcystis aeruginosa*. Throughout August, September and October, gigantic streaks of foam regularly appeared on the lake surface when windy conditions prevailed. Our working hypothesis suggests that the zebra mussel population has crashed, and that the selective filtration of remaining mussels has promoted *Microcystis*. The surfactants causing the foam are most likely naturally occurring organic molecules, and may be related to decay of zebra mussels, dieback of cyanobacteria, or the increased activity of decomposers. (oral presentation)

A GHANAIAN RITE OF PASSAGE: "WELCOME HOME!"

Jacqueline Jones, 2001 Saratoga Terrace, Frasier Mail Box # 90, Geneseo, NY 14454

As Ghanaians continue to recover their memories of slavery there is an increased emphasis on the ways in which Africans can reconnected with the descendants of slaves in other countries. The "Welcome Home" ceremony is an incorporation rite of passage which initiates "outsiders" into their African family and could be interpreted as an attempt to connect the people of the African Diaspora to their African roots. This paper is based on my experience in the Upper Volta region of Ghana. (oral presentation)

BREAKING THE CODE: MAYA UNDERWORLD AND CERAMIC CODEX.

Mia Jorgensen, Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

Through the strange patterns that emerged as Michael D. Coe was unpacking boxes for the Grolier exhibit, he was able to formulate a connection between the twins that were appearing on his ceramic vases and the sacred book of the Maya entitled The Popol Vuh. He was then able to distinguish distinct references to Xibalbá or the Maya underworld from their sacred book on these vases, which led him to the conclusion that these objects had a distinct function. Being that the ceramic vases were placed in the tomb or grave of the honored dead where they would remain until discovered by a looter or archaeologists. Yet their significance in regard to the understanding of Mayan writings would remain a mystery until Coe handled them for display. It is very fortunate that he should have been able to discern the significance of the

"Primary" and "Secondary" texts on these vases, which further research would prove him correct in his hypothesis. (poster presentation)

A STUDY OF THE EFFECT OF AGRICULTURAL LANDS ON THE OTSQUAGO CREEK WATERSHED.

Stacy Keith, William Hallahan, Nazareth College of Rochester, 4245 East Avenue Rochester, NY 14618.

This investigation is an attempt to determine the effect of extensively cultivated agricultural lands on stream quality in a region of the Otsquago Creek watershed upstream from Fort Plain, NY. Sites were chosen adjacent to fields currently under cultivation. Stream quality was measured using benthic macroinvertebrate sampling, as well as chemical analysis (phosphates, nitrates, conductivity, and pH). Stream metrics will be compared with streamside buffer zones, amount of upstream tillage, and types of crops. Proximity to livestock will also be evaluated for environmental impact. (poster presentation)

WOMEN AND ECONOMIC CONTROL: MICROENTERPRISE AMONG THE YUCATEC MAYA.

Ellen R. Kintz, Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

Yucatec Maya women of southern Mexico engage in multiple microenterprise activities on the village level. These activities provide women with status as successful entrepreneurs. Women negotiate their position in the family acting as the head while their husbands are absent working wage labor jobs on the east coast. Women control household economic resources day-to-day, bring in cash with their small-scale entrepreneurial activities, and command a degree of power in the village as the representatives of their functioning household. Women command economic control over the products of their gardens, flocks of chickens, and the products of fruit trees inside their yards (solares). Small-scale investment makes large-scale differences in the welfare of the family. Strategies for household success are orchestrated by the female heads of the household. This study explores the emerging roles of women in a rural context as they respond successfully to the challenges of development, modernization, and economic transformation of their household economies. The case study may have implications for research focused on women in other traditional communities in Latin America, Africa and Asia. (poster presentation)

SEARCHING FOR BIOLOGICALLY RELEVANT COMPOUNDS VIA MOLECULAR DIVERSITY.

Timm A. Knoerzer, Department of Chemistry, Nazareth College, 4245 East Avenue, Rochester, NY 14618 and Benjamin L. Miller, Department of Chemistry, University of Rochester, Box 270216, Rochester, NY 14627-0216.

This presentation will describe a research project undertaken in collaboration with Dr. Benjamin Miller of the University of Rochester during the summer of 2001. This particular effort focuses on the solid-phase combinatorial synthesis of a diverse set of small molecules that can function as molecular probes for proteins of biological or medicinal significance. It is worthwhile to note that our intention is not to design molecules targeted at one specific system or protein. Instead, the idea is to create a library of compounds with enough diversity that can be used to effectively screen a wide variety of protein targets in the hope that we can eventually discover a functional match. Our specific synthetic constructs were envisioned as a series of modified peptides containing a key benzothiazine moiety that might serve as a critical scaffold for the development of the library. The synthetic chemistry and design will be elaborated as well as the requisite molecular analyses. In addition, the screening technique for active compounds will be described. (oral presentation)

BREAKING THE MAYA CODE: PROSKOURIAKOFF AND YAXCHILAN.

Jennifer Lapp, Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

Tatiana Proskouriakoff began her drawings during The Depression. She reconstructed the architecture of the buildings in Yaxchilan and Piedras Negras. Through her drawings, I am going to investigate how she influenced the decipherment of the Mayan Hieroglyphs. (poster presentation)

CHANGES IN BRAIN ATP, ADP, AND GLYCOGEN LEVELS FOLLOWING SLEEP DEPRIVATION IN MICE.

Christie J. Lysiak, Phung Gip*, H. Craig Heller*, Joel H. Benington, Department of Biology, St. Bonaventure University, St. Bonaventure, NY 14778; *Department of Biological Sciences, Stanford University, Stanford, CA 94305

We used high performance liquid chromatography (HPLC) to see whether brain ATP, ADP, and glycogen levels increased or decreased following sleep deprivation in mice. Collaborators at Stanford University performed six-hour sleep deprivations in 12.5 week-old C57 mice. High intensity microwave radiation was used to fix brain tissue, and samples were shipped on dry ice to St. Bonaventure University. We then measured ATP and ADP levels using anion-exchange HPLC.

With a 42 minute gradient between a buffer of 0.01 N H_3PO_4 and a buffer of 0.75 M KH_2PO_4, ADP eluted at 20 minutes and ATP at 29 minutes. These peaks were readily separated from all other peaks in the brain samples. Glycogen levels were measured at Stanford University using a coupled enzyme assay. We hypothesized that the amounts of ATP, ADP, and glycogen would be less in sleep-deprived mice than in control mice. However, ATP and ADP levels in cerebral cortex did not significantly decrease following sleep deprivation, and glycogen levels in cerebral cortex were approximately 40% higher in sleep-deprived mice ($p<0.05$, two-tailed t-test). (poster presentation)

OPTIMIZATION OF EXPRESSION AND PURIFICATION OF RECOMBINANT FACTOR VIII A1 SUBUNIT.

Alicia M. Monroe[1], Angela M. Amoia[1], Mary E. Koszelak[2], Philip J. Fay[2], and Lynn M. O'Brien[1]. Department of Chemistry, Nazareth College[1], 4245 East Avenue, Rochester, NY 14618. Department of Biochemistry and Biophysics, University of Rochester School of Medicine and Dentistry[2], 601 Elmwood Ave, Box 712, Rochester, New York 14642.

Factor VIII plays a critical role in the coagulation of blood in the human body, and when absent or defective, results in the severe bleeding disorder hemophilia A. The active form of the protein, factor VIIIa, functions as a cofactor for the serine protease, factor IXa. This enzyme complex catalyzes the conversion of factor X to factor Xa, an essential reaction in the blood coagulation cascade. Factor VIII is converted to its active form, factor VIIIa, upon proteolytic cleavage by thrombin. Factor VIIIa is a heterotrimer composed of A1, A2 and A3-C1-C2 subunits held together by non-covalent interactions. Factor VIII activity is regulated by activated protein C (APC). This anticoagulant effect results from inactivation of factor VIIIa following proteolytic cleavage at Arg 336 located near the C-terminal end of the A1 subunit and Arg 562 within the A2 subunit. The focus of this project is to localize the interactive site between activated protein C and the A1 subunit of factor VIIIa. Since factor VIII is present in blood plasma at very low concentrations (~ 0.1 μg/ml), we wished to use a bacterial expression system to produce large quantities of recombinant factor VIII A1 subunit. The goals of this study were to optimize expression of the recombinant A1 subunit, purify the A1 subunit from bacterial cell cultures, and establish that the recombinant protein is functional. (poster presentation)

CHARACTERISTICS OF THE THROAT PATCHES OF HATCH YEAR BANK SWALLOWS.

Michael Morgan, Department of Biological Sciences, SUNY College at Brockport, Brockport, NY 14420; John Van Niel, Finger Lakes Community College, 4355 Lakeshore Drive, Canandaigua, NY 14424; and Jessica Morgan, Montezuma National Wildlife Refuge, 3395 Route 5 and 20 East, Seneca Falls, NY 13148.

We captured 86 hatch year (HY) Bank Swallows (*Riparia riparia*) over a two-month period at Montezuma National Wildlife Refuge. We assessed the degree of spotting and coloration of the throat patch on each individual. Sixty nine percent (n=59) of the birds that we captured had spots on the throat that covered more than five percent of the total throat patch area. Only 4 % of the birds that we captured showed spotting covering more than 75 %. Published literature indicates that less than 50 % of HY Bank Swallows show spotting. Our results also showed that 30 % of the birds showed either no or a trace amount of the buff coloration on the throat. No significant changes in these results were found throughout the season. Although this characteristic is documented in the literature, no previous studies were found which quantified or qualified this trait. More widespread study may show whether our results describe a regional phenomenon or a reassessment of Bank Swallow characteristics in general. (oral presentation)

NATAL DISPERSAL IN EASTERN RED-TAILED HAWKS (*BUTEO JAMAICENSIS*).

J. Newhouse, A. Terninko and J. Hewlett, Environmental Conservation and Science Departments, Finger Lakes Community College, Canandaigua, New York, 14424.

Natal dispersal in raptors has been widely studied, with the notable exception of Red-tailed Hawks (*Buteo jamaicensis*). Differential dispersal has been documented between the sexes in some hatch year birds, and in many adult raptors in migration.This study will focus on documenting the timing of dispersal and variation in dispersal distance between sexes of hatch year Red-tailed Hawks. Banding records from Braddock Bay Raptor Research will be examined to determine if differences exist in timing of dispersal. In the future, the study will incorporate the use of radio-transmitters to track fledglings of both sexes to determine if dispersal distances vary. Determining if differential dispersal exists in Red-tailed Hawks is difficult as there is currently no simple method to sex these birds in the field.

An additional objective of this study is to develop a field method for sexing Eastern Red-tailed Hawks, by correlating field measurements to sex. The birds are captured at the Braddock Bay Raptor Research banding blind, near Hilton, New York, on the South shore of Lake Ontario during spring migration and natal dispersal in August. Each bird is fitted with a U.S. Fish & Wildlife Service aluminum leg band for identification purposes. Measurements including culmen, wing cord, hallux and weight are recorded for each bird. A blood sample is also collected from the basilic vein. The blood is analyzed at Finger Lakes Community College using Polymerase Chain Reaction (PCR). PCR targets sex-specific variations in an avian gene which provides a reliable method for the determination of sex. Comparing the field measurements to the sex of each bird should produce a matrix that will provide a method of sexing the birds in the field. (poster presentation)

THE EFFECTS OF HABITAT DEGRADATION AND WATER CONDUCTIVITY ON THE REPRODUCTION OF FATHEAD MINNOWS *(PIMEPHALES PROMELAS).*

M. Niescierenko, H. Burgess, Department of Biology, CNS 161, Ithaca College, Ithaca, NY 14850.

The type and quality of the environment in which fish live plays a major role in the success of these organisms. Two especially important aspects of a fish's environment are water quality and habitat. We examined the importance of habitat and water quality on the fathead minnow *(Pimephales promelas)* The fathead minnow was chosen for this study because it is representative of the ecologically important Cyprinidae family and has been used extensively in chronic life cycle and early life stage survival and development tests. The experiment recorded the number of clutches laid by 16 breeding pairs of mature fathead minnows. Eight of the pairs had 5X habitat, an amount sufficient for breeding. The remaining eight pairs had OX habitat, almost no habitat. Water quality including pH, temperature, alkalinity and conductivity was measured throughout the six-week experiment. Lack of habitat decreases clutch production by 50%. There was also a time dependent response by the fish. Those in OX habitat could not sustain egg production beyond Week 2 whereas fish in the 5X environment continued to produce eggs throughout the experiment. With regard to water chemistry variables, decreased egg production was associated with declining water conductivity. This response was also time dependent. Although both habitat and conductivity were time dependent fish with 5X habitats were able to sustain reproduction with low conductivity. This indicates that the cause for the decline in reproduction was decreased spawning substrate. Lack of habitat may stress the fish physiologically and directly or indirectly affect reproduction. (oral presentation)

ASPIRANT BRIDES AND URBAN PRIMACY: WEB-BASED MATCHMAKING IN THE DEVELOPING WORLD.

Darrell A. Norris, Department of Geography, SUNY College at Geneseo, 1 College Circle, Geneseo, NY 14454.

Since the mid-1990s, mail-order bride sites have been a fast-growing element of e-commerce. Such services have spread from diffusion hearths such as the Philippines to the rest of Asia, the former Soviet Union, Latin America and, more recently, Africa and the Middle East. Early sites were a moving and sometimes troubling window on constraints to opportunity for educated women in the Developing World. Refinements in some sites such as oneandonly.com now incorporate detailed within-country geographical origin data, allowing for scrutiny of aspirant bride and pen-pal origins. This feature is used to ask whether the familiar phenomenon of metropolitan primacy in Developing World settings extends to primate city concentration of matchmaking service awareness and participation among women in a broad selection of national settings. The primacy effect is mixed and apparently related to the societies' overall length of experience with e-commerce. (oral presentation)

UNDERGRADUATE RESEARCH: A CATALYST FOR CHANGE.

Lynn M. O'Brien and Timm A. Knoerzer, Department of Chemistry, Nazareth College, 4245 East Avenue, Rochester, NY 14618.

Nazareth College is a comprehensive, liberal arts college situated in Rochester, New York with an approximate undergraduate enrollment of 1600 students. In particular, the chemistry department provides courses for non-majors as well as ACS-certified degree programs in chemistry, biochemistry, and chemical education. Historically, the chemistry department has offered a traditional curriculum aimed at preparing students with the skills necessary to succeed in post-graduate studies or immediate employment. However, we have recently re-evaluated our program recognizing the unique skills that our students could gain by participating in undergraduate research and it has become an integral part of the mission of the chemistry department at Nazareth College. This change in focus has been catalyzed primarily by the vision of junior faculty members in the department as a result of their participation in Project Kaleidoscope and this poster will demonstrate the significance of undergraduate research as a mechanism for curricular change.

We will discuss the process by which departmental support was generated, the value of the experience was demonstrated to the administration, and specific research opportunities were initiated. In addition, we will explore the impact of undergraduate research on enrollment, facilities planning, visibility, and connections within the scientific community. Finally, we will describe the evolving role of undergraduate research as it pertains to the future of our program. (poster presentation)

ARCHAEOLOGY OF WADSWORTH CABIN.

Sarah O'Donnell, Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

This poster is about the archaeology of Wadsworth Cabin, which in 1791 was the first Euroamerican cabin built in the Genesee Valley. In 1797 the cabin served as a base of negotiations for the Treaty of Big Tree. After that date it was rented by the Wadsworth family as a tenement.

The site was investigated by students of the summer 2000 SUNY-Geneseo archaeological field school under the direction of Dr. P.J. Pacheco. Investigations at the site included test excavations and remote sensing. The goal of the investigations was to solidify identification of the site location and to assess the conditions of artifacts and site structure. Remote sensing investigations utilized two methodologies, a magnetometer and a metal mapper, both on loan from Geometrics, Inc. of San Jose, California.

During the school year 2000-2001, artifacts were cleaned, classified, and subjected to distributional analysis with the support of a Dean Johnston Research Assistantship. Important conclusions from the artifact analysis included demonstration of a consistent stratigraphic sequence for the window glass category, but the lack of such a sequence for the nails. Finally, the investigations successfully provided a detailed account of the site structure. (poster presentation)

NON-INVASIVE ARCHAEOLOGY: EXAMPLES FROM THE FIELD.

Paul J. Pacheco, Department of Anthropology, SUNY College at Geneseo, 1 College Circle, Geneseo, NY 14454.

Archaeology tends to be a destructive science. New techniques in remote sensing are beginning to provide the means to change this rule of thumb. This presentation examines the application of recent advances in remote sensing technology to archaeological field data. Discussion includes application of a new method of remote sensing, called a Metal Mapper, to archaeological contexts. This method allows the production of digital maps generated with classic metal detection data based on ferrous and non-ferrous conductivity. By coordinating the Metal Mapper with other techniques, such as the Cesium magnetometer, interpretation of subsurface anomalies is improved. Field examples were collected during the summer of 2000 field season. They include a Middle Woodland mound, an early historic cabin, an early twentieth century farmstead, and a large grassy field with the potential for prehistoric features. (oral presentation)

STUDENT SPEECH AND STUDENT CULTURE.

Kenneth S. Porter-Hutton, P.O. Box 92208, Rochester, NY 14692-0208.

This live research project using two student focus groups explored the experiences of students at Empire State College's Genesee Valley Center. Students were interviewed in two groups by three research team members. Interview questions were generated using ethnographic methods; the interview process was informed by established focus group methodologies. Audio tape recording and live keyboard transcription were used to collect the data, maximize accuracy of reporting and facilitate detailed analyses.

This project was begun with these hypotheses: (1) Students' use of Empire State College's specialized terminology (register) reflects their degree of acculturation to Empire State College; (2) Students at Empire State College do not feel they are members of a student body. The data were analyzed using grounded theory and content analysis. Research team members reviewed the audio and print transcripts to ensure inter-coder reliability.

Analysis shows that students use Empire State College's register inconsistently; there may be differences in how students and faculty perceive and conceptualize Empire State College. Analysis also reveals students unanimously do not feel they are members of a student body; most indicated student socialization and interaction are desired and potentially beneficial.

There is clearly a basis and need for further research into these and other issues raised by the data. Student experiences should be more fully investigated and the potential problems and opportunities for them should be thoroughly explored. (poster presentation)

BREAKING THE MAYA CODE: FRAY DIEGO DE LANDA.

Casey Romanick, Department of Anthropolgy, SUNY College at Geneseo, Geneseo, NY 14454.

The discovery of Fray Diego de Landa's manuscript *Relacion de las Cosas de Yucatan* ("Account of the Affairs of Yucatan), changed Maya scholarship forever. The sixteenth century manuscript includes the Landa's "alphabet" of Maya hieroglyphs. The Landa's "alphabet" is not a real alphabet but actually a syllabary of Maya characters. This poster display of Landa's code to decipherment is accompanied by the modern work of Knorosov who used his "alphabet"syllabary as the Maya hieroglyph "Rosetta Stone." Breaking the Maya hieroglyphic code, following Knorosov's work, represents one of the great intellectual breakthoughs of our time. The significant contributions of various Mayanists are reviewed. (poster presentation)

NEST SITE FIDELITY IN PAINTED TURTLES FROM BEAVER ISLAND, MI.

J. Rowe, K. Coval, Natural Science Department, Daemen College, 4380 Main St., Amherst, NY 14226.

Nest site fidelity was studied between 1995 - 2000 and nest predation was studied between 1997 - 2000 in a population of *Chrysemys picta marginata* at Miller's Marsh on Beaver Island, Michigan. On average, turtles nested 122.3 m from water in five discrete nesting areas. Many turtles showed nest site fidelity over the years in that they favored one or two nesting fields and had internest distances (ID) that were significantly less than IDs of randomly paired nests of different individuals. Nest predation was 17.4 % over all and was independent of nest location (distance from water, road vs. field nests, nesting field) but was dependent on the number of nights since deposition (highest during nights 1 - 2) and on the year of deposition. Annual nest predation rate (4.0 - 44.4 %) was lowest when the previous January and February temperatures were low indicating that cold winters may reduce predator numbers and enhance subsequent nest survival. (oral presentation)

AN ESTIMATION OF FISH WATCHING EFFORT DURING THE SPRING 2000 CONESUS LAKE SPAWNING RUNS.

Matthew Sanderson, NYS Department of Environmental Conservation, Region 8 Bureau of Fisheries, 6274 East Avon-Lima Road, Avon, New York 14414.

Each Spring, spawning runs of big northern pike and walleye draw impressive numbers of "fish watchers" to the Conesus Lake Wildlife Management Area in Livingston County New York. These fish utilize clear waters of artificially enhanced spawning marshes (northern pike) and riffle-run habitats of Conesus Lake Inlet and are often quite visible to stream bank observers. Parking lots and trails provided in the WMA facilitate public viewing opportunities. From March 25 thru April 15, 2000 (three weeks), Region 8 Bureau of Fisheries conducted a survey of the spawning run fish watching activity using student interns. We randomly selected four weekend days, alternate Saturday and Sunday, and three weekday days, one day per week, to survey. Counts were made at three hour intervals, three times a day. Cars were counted at four parking lots on the WMA. People were then counted along a route through the four areas. After counts were made, the survey agents interviewed as many people as possible as they were leaving the areas. Interviews gathered information regarding arrival and departure times, angler status and residence location. During the survey, the agents counted 359 people and interviewed 227 people. On average, people watched fish for about 40 minutes per trip. Using expansion calculations, we estimate that approximately 3,900 people came to the WMA to view the spawning runs. Most visitors were from the Livingston, Monroe, or Steuben County area, but one visitor came from as far away as Tioga County, Pennsylvania. The majority (89%) of the fish watchers were anglers, indicating that watching the fish's spawning activity was as important to them as angling. The impressive number of non-anglers that came to watch the spawning run indicates that these fish resources are used uniquely by a non-traditional group of people. Certain critical fish management efforts are necessary in order to ensure that fish spawning run watching will continue. (oral presentation)

THE INCIDENCE OF DARK FEATHERS AND FEATHER SUBSTITUTES IN TREE SWALLOW (*TACHYCINETA BICOLOR*) NESTS.

T. Schultz, A. Terninko and J. Van Niel, Environmental Conservation Department, Finger Lakes Community College, Canandaigua, NY 14424.

The nesting behavior of Tree Swallows (*Tachycineta bicolor*) includes the lining of the nest with feathers. This practice may benefit the eggs and chicks by providing camouflage, insulation, and barriers to ectoparasites. White feathers are preferred, although dark feathers are utilized as well. In 1998, during an ongoing study at Warren Cutler Scout Reservation, it was noted that Tree Swallows will also make use of feather substitutes to line their nests. At the end of the 1999, 2000 and 2001 nesting seasons, Tree Swallow nests were collected and the incidence of dark feathers and feather substitutes was recorded. Substitutes included toilet paper, a faded bandage wrapper, deer hair, insulation, plastic, white bread, a white plastic bag, white clothing labels and twine. A total of 120 nests were inventoried. Twelve percent of the boxes in the study contained feather substitutes. The use of feather substitutes may be a result of opportunistic behavior, where birds are utilizing a source of lining that exists in close proximity to their nesting box. (oral presentation)

BREAKING THE MAYA CODE: THE DRESDEN CODEX.

Ilana Segelin, Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

The Dresden Codex deals with both astronomical and calendrical content that, once it began being deciphered, enabled anthropologists to learn more about time and space as it applied to the Maya. One particular glyph, the Moon Goddess, appears in many forms throughout the Dresden. Using the Codex with Fray Diego de Landa's syllabary signs, advancement was made in its decipherment as well as the meaning behind it. Yuri Knorosov used such method of comparing the texts in the Codex to their pictures, specifically dealing with the Moon Goddess. This furthered the comprehension of the Maya hieroglyphs and the understanding of Maya culture. (poster presentation)

BREAKING THE MAYAN CODE: THE PARIS CODEX.

Brian Seguin, Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

Throughout the continuing decipherment of the Mayan hieroglyphs, discoveries made in one aspect of the code have often led to the understanding of another part. For example, through the uncovering of Landa's alphabet and the decoding of the Dresden Codex, we are now able to decipher much of the Paris Codex. In using both Landa's alphabet and the Dresden Codex, we now have a basis to look at the many glyphs associated with the ***katun*** gods, so prominent in the Paris Codex, along with ***tuns*** and *uinals*, which are also highly displayed. This gives anthropologists the means to understand the Mayan calendar along with the significant figures associated with the dates on the calendar. As one of the last surviving texts of the Maya, it is important to be able to figure out as much as we can from the Paris Codex and through the Dresden Codex and the Landa alphabet, this figuring is now possible. (poster presentation)

PITCH PINE (*PINUS* RIGIDA MILL.) RECOVERY FOLLOWING CATASTROPHIC FIRE.

F. K. Seischab[1] and J. M. Bernard[2]. Department of Biological Sciences, Rochester Institute of Technology[1], 85 Lomb Memorial Drive, Rochester, NY 14623 and Department of Biology, Ithaca College[2], Ithaca, NY 14850.

Recovery of pitch pine after a catastrophic fire on Long Island, NY in August 1995 was quantified over four growing seasons. Sampling site selection was based on fire intensity and on pre-fire community type. Seedling establishment and survival was measured in 300 m^2 plots located at 6 sampling sites. Basal sprouting of trees was measured in 30 10 x 10 m plots at the same 6 sites. Pre-fire pine density was based on the density of charred pine stems in the 10 m x 10 m plots.

Pre-fire density of pitch pine varied from 460 to 4280 stems/ha. There was a dramatic decline in the percent of sprouted trees from 1996 (40.0%) to 1997 (12.2%) followed by a slight increase to 1999 (15.7%). Sprouts accounted for 15 - 733 trees/ha by 1999, certainly insufficient to replace the original number of trees. Seedling densities were initially high (16067 seedlings/ha in 1996) but a high mortality rate decreased their number precipitously in 1997 to 9067/ha. Seedling density seems to have stabilized at 7500/ha. Together, sprouts and seedlings comprise the recruits that will eventually replace the pre-fire individuals. Recruit numbers have declined from a high of 16731/ha in 1996 to 7776/ha in 1999. At this point we can say that there are sufficient recruits to replace the original 1720 stems/ha. (poster presentation)

INFANT CARE-TAKING BEHAVIORS IN CAPTIVE COTTON-TOP TAMARINS.
Chihiro Shibata, Barbara Welker, Dept. of Anthropology, SUNY College at Geneseo, 1 College Circle, Geneseo, NY 14454.

This study concerns infant care-taking behaviors, by individuals other than the mother, in a group of captive cotton-top tamarins *(Saguinus oedipus).* Data were collected during summer 2001 at the Wildlife Conservation Society at the Bronx Zoo. The study group consisted of 6 individuals: one adult female, one adult male, one juvenile female, two twin juvenile males, and a female infant. Members of the family group were all recognizable as individuals.

Cotton-top tamarins are New World monkeys which belong to the subfamily Callitrichinae. They are small-bodied arboreal monkeys that inhabit forests of Colombia. Tamarins give birth to twins twice a year. Free-ranging groups often contain one to two adult males as well as subadult or adult offspring that remain in the group and act as helpers to the dominant/breeding female by taking care of the infant in various ways. Males are especially sensitive to the female's needs. They carry infants on their backs through most of their infancy. This is probably a reproductive strategy used to copulate with the dominant female by demonstrating their parenting skills. Without the aid of helpers, the twin infants have a decreased chance of survival.

Although the captive group was maintained in a monogamous family grouping, observed behaviors matched those observed in free-ranging groups. The adult male was observed carrying the infant, especially when she needed transportation or was in danger. The mother carried the infant less often and the twins only occasionally carried the infant. All members tolerated theft of food but the adult male was usually the recipient. The infant seldom took food from the feeder, more often relying on food that the male was eating. The mother received much less theft of food and the other offspring, even less so. As the infant matured, i.e. three to four months old, she was carried less frequently but theft of food was still tolerated, especially by the male.

The adult male and the juvenile males demonstrated behaviors, e.g., scanning, vocalizations, etc., that were interpreted as vigilance and were possibly aimed at group protection as well as protection of the infant. Stimuli that elicited these behaviors were, for example, birds flying over the cage, large reflective objects passing by the cage, etc.

In conclusion, infant-care taking behavior by the adult male corresponded well with that observed in various studies of free-ranging cotton-top tamarins. (oral presentation)

PRECONDYLAR TUBERCLES AND CRANIAL DEFORMATION AS POPULATION MARKERS.

Shannon Simmons, Barbara Welker, Department of Anthropology, SUNY College at Geneseo, 1 College Circle, Geneseo, NY 14454.

This study is based on a collection of human skeletal remains housed in the Anthropology Department at the State University of New York at Geneseo. The portion of the collection considered here is a group of ten skulls of questionable provenience. Three of the skulls exhibited signs of artificial cranial deformation. Two of these also exhibited the non-metric cranial trait of precondylar tubercles. Precondylar tubercles are the result of prenatal ossification on the occipital bone, anterior to the foramen magnum.

We compared the observed patterns of cranial deformation with published descriptions of Native American practices in combination with published geographic/population incidences of precondylar tubercles. It was determined that one of the skulls is likely of New Mexico origin and Hopi or Zuni affiliation. The other two skulls are likely from one site in the eastern region of the United States. (poster presentation)

ABSOLUTE ZERO G.

Charles Spoelhof, Astronomy Section, Rochester Academy of Science, 5 Mullett Dr., Pittsford, NY 14534.

Absolute zero g is, of course, a misnomer. Even in orbital space there is a strong gravitational field although it is compensated by the acceleration of falling and thereby orbiting the major gravitational source. It is instead an apparent zero gravity. It is this zero g in which some physical and biological experiments are conducted to eliminate the force field of gravity. Three common methods of achieving zero g are orbiting the earth, flying an aircraft in a parabolic arc, and falling in a drop tower. Although this third method is of very short duration, it is claimed to come closest to achieving very low levels of apparent gravity, in the micro g category. What stops any of these methods from being truly zero g? Residual gravitational effects will be discussed. (oral presentation)

BEHAVIORAL EVIDENCE THAT *ARRENURUS POLLICTU5* MITES USE SHORT-DISTANCE CHEMICAL CUES TO DETECT POTENTIAL HOSTS.

Nathan Sylvester, Bruce P. Smith, Department of Biology, CNS 161, Ithaca College, Ithaca, NY 14850.

Previous researchers have concluded that parasitic larval *Arrenurus* spp. mites find their hosts by direct contact, that they cannot detect putative hosts from a distance. In this study, we tested this assumption by determining whether *Arrenurus pollictus* water mites exhibited a change in behavior when larval *Lestes disjunctus disjunctus* damselflies are present. Newly hatched larval mites were videotaped and their behaviors recorded with and without a damselfly larva present. When potential hosts were present, larval mites swam faster and turned a greater angle between successive frames in comparison to when a potential host was not present. However, there was no evidence for a directed response, which suggests that the mites can detect when they are close to a potential host but that they cannot orient towards it. (oral presentation)

IN SEARCH OF A MODERN TOWN SQUARE: ETHNOGRAPHY OF A CAFÉ.
Phyllis Vincelli, 124 Strathmore Drive, Rochester, New York 14616.

The urbanization of the U.S. population has spread people farther and farther apart from each other. The decrease in available space has made it difficult for people to find a common ground to congregate, to share, to 'commune' with their neighbors. The purpose of this study was to determine if, in the 21^{st} century, there still existed a desire for community as well as if there were public venues available where people could meet.

This descriptive social science study details observations made in a bookstore café over an 8-week time period. The focus is on de-commoditized behavior (non-purchasing uses) of the café and determines that the café is being utilized as a public space. Aside from a wide and varied list of de-commoditized uses, there also emerge two sub-sets of people who frequent the café and who have their own identifying characteristics: the 'regular', who is seen frequently in the café, and the 'non-edibler', who spends time in the café without ever making a purchase.

This study finds that although the café is widely used for many reasons and could be typified as a community-related space, people do not mingle with anyone other than who they come in with. Very little social interaction is observed between groups. There are indications, however, that given the right circumstances, an impetus of sorts, the café could more resemble the cafés in Europe, known for their lively debates and discussions amongst local patrons.

A recommendation to encourage social interaction and a sense of community is to schedule 'salons' in the café. Since a large percentage of café patrons are there to read newspapers and magazines, they should be well-versed in current events. Scheduled sessions to discuss events, particularly on a local level, would provide an opportunity for patrons to interact with each other. Discussions on local issues could result in fostering a community spirit, where neighbors work together to effect change. (poster presentation)

EVIDENCE FOR INTRASPECIFIC FEEDING SELECTIVITY IN THREE LEAF SOURCE SPECIES BY MANTLED HOWLER MONKEYS *(ALOUATTA PALLIATA)*.
Barbara Welker, Department of Anthropology, SUNY College at Geneseo, 1 College Circle, Geneseo, NY 14454.

Feeding selectivity in herbivorous primates is not well understood. Many studies have examined interspecific selectivity but none have systematically examined within species selectivity. This paper presents preliminary data on differences in patterns of use for three focal tree species as part of a larger study focusing on proximate mechanisms affecting intraspecific folivorous feeding selectivity in mantled howler monkeys.

The study site is located in the Area de Conservacion, Guanacaste, Costa Rica. Observational data were collected from one group of mantled howler monkeys during two dry seasons in 1997 and 1998.

The patterns of use for each of the three tree species *(Astronium graveolens, Machaerium biovulatum,* and *Hymenaea courbaril)* differed. Many *Astronium graveolens* trees were fed from each year but there was almost no overlap between years in particular trees used. The pattern of use in *Machaerium biovulatum* differed in that there was a high degree of overlap between years but with no apparent preference for particular trees versus others. The third species, *Hymenaea courbaril,* was the most interesting in that the animals appeared to prefer leaves from particular individuals. The monkeys were repeatedly observed to pass through trees that possessed leaves at the preferred developmental stage to feed in neighboring conspecific trees. There was a moderate amount of overlap between years in trees used and not used.

These results are of interest in illuminating differences in patterns of use within and between species and as a first step in understanding the processes involved in feeding selectivity by focusing within species. (oral presentation)

ELECTRON IDENTIFICATION AT CLEO.

B. Winey, Department of Physics, Houghton College, One Willard Avenue, Houghton, NY 14744.

The objective of this research was the refinement of the University of Rochester electron identification code. To do this, five primary electron identification variables were analyzed with the hope of finding errors and their respective limits of application. The research continued with a study of conversions, which can be used to implement a different method of testing electron-finding algorithms. Overall, the goal was to increase the efficiency of the present Rochester electron identification code, making it more precise and, at the same time, faster. (poster presentation)

LATE WOODLAND ARCHAEOLOGY OF BOCKMIER POINT.

Allyson M. Wright, Department of Anthropology, SUNY College at Geneseo, Geneseo, NY 14454.

This poster is about the Late Woodland archaeology of the Bockmier Point Site. This site represents a buried subsurface component located in western New York in the town of Allegany, Cattaragus County. The site occupies a woodlot on a small neck of terrace land approximately 5 meters above and 20 meters distant from the Allegheny River. The site was located by local archaeologist Steven Howard during a reconnaissance survey of the region in 1998. Howard conducted limited test excavations at the site in 1999, which produced evidence for a buried cultural horizon that contained Late Woodland ceramics and lithic materials.

The site was subjected to further test excavations with the help of a Geneseo archaeological field school in late May, 2001 under the direction of Howard and Dr. P.J. Pacheco. These excavations were aimed at obtaining additional artifactual evidence in addition to information about the stratigraphic sequence of the site, and assessing the preservation of organic remains and features which would allow a better understanding of Site structure chronology and function.

Laboratory analysis of the artifacts during the fall semester, 2001 reveals solid evidence for the association of the site with late Woodland people occupying the Allegheny Valley around 1000 years ago. The stylistic properties of the ceramics and lithics suggest a complex relationship between the site occupants and emerging Iroquoian peoples of western New York. Evidence for corn agriculture and large sturdy wooden structures indicate a degree of sedentism new to the region which becomes a major element of later Iroquoian lifestyles. (poster presentation)

BREAKING THE MAYA CODE: KNOROSOV'S PHONETIC DECIPHERMENT.

Allyson M. Wright, Department of Anthropology, SUNY College at Geneseo, 19 North Street, Geneseo, NY 14454.

This poster is based on the extensive research of Maya hieroglyphs by Yuri Valentinovich Knorosov. Knorosov was a Russian scholar who spent his early career specializing in Egyptology, Chinese and ancient Indian writing systems, Japanese literature, and the Arabic language. Years later, after reading about discoveries made by scholars of the Maya culture, he became interested in it himself. For years, he studied Diego de Landa's phonetic Maya alphabet and also intensively looked at the Dresden Codex. From his research in these areas, Knorosov made the discovery that Landa's Maya alphabet was really composed of syllabic signs. This discovery led to the conclusion that along with logographic signs, the Maya hieroglyphs were also phonetic. (poster presentation)

MODERNIZATION AND LAND USE IN A CHINESE LINEAGE: A CRITIQUE OF DEVELOPMENT IN THE CONDITIONS OF MODERNITY AND POST-MODERNITY.

Zhiming Zhao, Department of Anthropology SUNY College at Geneseo, Geneseo, NY 14454.

Modernization uses a rhetoric that is grounded in the Western values. Central to the rhetoric of modernization is the assignment of moral superiority to a way of life that rejects indigenous rights and traditional values in the name of development and progress. This paper begins with a review of the three land policies crafted to encourage development in the New Territories, Hong Kong since the early 1960s: "The Electric Networks Ordinance," "The Town Planning Ordinance," and "The land Exemption Ordinance." An analysis is provided of the impact of these ordinances on the social structure and land resources of a time-honored local Chinese lineage - the Tangs. It is shown that by dictating the dominance of a Eurocentric approach to development, the "Project of Modernity" threatened to exact a price in the form of ethnocide and ecocide in the New Territories. In conclusion, this paper argues for the acceptance of a multilineal model of development within the framework of postmodernism.(oral presentation)

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Benarta Glickman
(d. Jan. 2001)
Karen L. Wolf (Acting, contact person after 1/01)

FOSSIL
John Honan

MINERAL
Tom A. Smith

ORNITHOLOGY
David Strong (Contact person)

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ANTHROPOLOGY
Karen L. Wolf (Co-chair, contact person);
Ellen Kintz (co-chair)

ASTRONOMY
David Bishop

BOTANY/ENTOMOLOGY
Karen L. Wolf (Acting, contact person)

FOSSIL
Kym Pocius

MINERAL
Tom A. Smith

ORNITHOLOGY
David Strong (Contact person)

RECENTLY ELECTED FELLOWS

BRIAN OYER
FELLOW
2000

Brian Oyer joined the Rochester Academy of Science in 1990 upon hearing that the Astronomy Section was constructing an observatory and intended to conduct educational programs at its new facility. At that time Brian had been teaching Earth science and astronomy to his students at the Greece Central School District. Brian began his teaching career in 1968 after graduating from the University of Rochester with a BA in geology and an MS in paleontology. Finding that the Earth sciences curriculum was not fully meeting the demands of his students, Brian reorganized and expanded on the course material to include more astronomy. This action required Brian to expand his student's class time to evening hours at his home and at numerous dark sky locations throughout the western New York area. To date Brian has devoted over 750 out-of-classroom hours to his students.

Brian has also been instrumental in organizing the annual Project Scope educational program, conducted by the Astronomy Section. Each fall for the past six years, approximately a dozen local educators have enrolled in this intensive week-long short course in astronomy. Brian has taught astronomy at the Strasenburgh Planetarium, at the Rochester Institute of Technology and has provided advice to other organizations on astronomy-related topics. He has served on the Strasenburgh Planetarium Advisory Council to BOCES, written questions for the Science Olympiad and has been nominated by his former students to Who's Who Among American Teachers four times.

It is for his dedication to the education of his students, to his fellow educators and to the community at large, that we are honored to bestow the title of Fellow of the Rochester Academy of Science to Brian Oyer.

PETER T. PERKINS, M.D.
FELLOW
2000

Dr. Peter Perkins has practiced internal medicine in New York State from 1956 until his retirement in 1995. He has taught medicine and conducted research at the University of Rochester Strong Memorial Hospital. Born in England, Peter obtained a BA in the natural sciences from Cambridge University in 1946, followed by degrees in medicine from Cambridge and St. George's Hospital in 1949. He served as Surgeon Lieutenant in the Royal Navy from 1950 to 1955. Peter worked as an intern at St. George's Hospital, Selly Oaks Hospital in Birmingham, the Royal Naval Hospital in Plymouth, and at the Albany Medical Center here in New York. Peter's distinguished career at Strong Memorial Hospital started in 1956 and lists many credits and appointments. Starting as an Assistant Resident, Peter went on as a Research Fellow in Cardiology, eventually taking the position of Clinical Professor of Medicine in 1993.

While at the University of Rochester Medical Center, he had been the Director of the Respiratory Care Unit, Co-Director of Pulmonary Clinic, as well as the Sr. Associate and Attending Physician.

Peter received the James M. Stewart, M.D., Award for Clinical Teaching, in 1989. In addition to his involvement with the Rochester Academy of Medicine and the Larry Kohn Journal Club, Peter served as the Rochester Academy of Science, Astronomy Section's Treasurer, from 1991 to 2000. During his time as Treasurer, the Astronomy Section received significant financial and material gifts. The infusion of money, equipment, furniture, books and even a boat, required careful financial oversight. Peter's management of these assets and his advice during the development of the Astronomy Section's observatory in West Bloomfield were critical for making these activities sound and successful.

In recognition of his service to the field of medicine, his patients and those who have had the pleasure of sharing his interest in observational astronomy, we bestow the title of Fellow of the Rochester Academy of Science to Peter T. Perkins, MD.

ALVIN L. URELES, M.D.
FELLOW
2001

Dr. Alvin L. Ureles has made the Rochester area his native environment for most of his life. Born here in 1921, he attributes his lifelong interest in the natural world to his grandfather. Encouraged from an early age to take notice and learn about all aspects of the natural world, Al involved himself with the Audubon Society at 14 and soon was introducing others to what he had discovered. Choosing to focus on medicine, Al graduated from the University of Michigan in 1942 and the University of Rochester School of Medicine and Dentistry in 1945. His postdoctoral training for the following six years took him to Beth Israel Hospital in Boston, Harvard Medical School and Tufts Medical School. After serving in Korea for two years, Al began his professional career here in Rochester. His accomplishments are numerous as a physician, researcher, teacher, consultant, administrator and author. Despite Al's seemingly unlimited energies devoted to his appointments and organization duties, in addition to raising three children with his wife, Frumel, he has contributed greatly to the RAS. Al can arguably be considered as the singular most important member regarding the acquisition and development of the Astronomy Section's observational facility, situated in the Town of West Bloomfield. His advice and diplomacy made it possible for the RAS to recognize opportunities and capitalize on them. Further, Al has provided much of the motivation which has led to successful educational programs conducted by the Astronomy Section.

In recognition of his service to the practice and improvement of the medical sciences, and of his contributions that have helped advance the RAS, we are pleased and honored to bestow the title of Fellow of the Rochester Academy of Science to Dr. Alvin L. Ureles.