SCIENTIFIC PROGRAM, SOCIETY FOR ECONOMIC BOTANY
ANNUAL MEETING
JUNE 2-7, 2012

FROSTBURG STATE UNIVERSITY, FROSTBURG, MD, USA
in conjunction with ALLEGANY COLLEGE OF MARYLAND, CUMBERLAND, MD, USA

ORAL PRESENTATIONS: SCHEDULE

Monday, JUNE 4, 2012

SYMPOSIUM 01: APPALACHIAN MOUNTAIN CULTURES, ARMAH
Alice R. Manicure Assembly Hall, 133, Lane Center, Frostburg State University
8:30-11:30 AM, 1:30-3:30 PM

8:30-9:00 AM, Welcome
BUSSMAN, RAINER, President, Society for Economic Botany
HOFFMAN, JOSEPH, Dean, College of Liberal Arts and Sciences, Frostburg State University
BAMBARA, CYNTHIA, President, Allegany College of Maryland

9:00-9:15 AM SY01001 EISENSTEIN, EDWARD
BROSI, SUNSHINE L., HERNANDEZ, MIMI
An Appalachian Consortium for the Sustainable Cultivation of Medicinal Plants

9:15-9:30 AM SY01002 MCINTOSH, MARLA S.
SCHLAG, ERIN M.
New Insights into the Genetic Diversity and Conservation of American Ginseng
(Panax quinquefolius L.)

9:30-9:45 AM SY01003 SOUTHER, SARA
MOONEY, EMILY H., MCGRAW, JAMES B.
Restoration of American ginseng: The effects of transplantation on population demography

9:45-10:00 AM SY01004 PUTTOCK, CHRISTOPHER F.
GELNER, TRACEY, TRUMBLE, ROBERT B., BARTOLOMEI, ROCHELLE P.
Wild Ginseng in Maryland - Vulnerable?

10:00-10:15 AM SY01005 CHAMBERLAIN, JAMES
 Unsustainable harvesting of Allium tricoccum, ramps or wild leeks

10:15 BREAK
MONDAY, JUNE 4, 2012, continued

10:30-11:30 AM  PANEL 1  LEOPOLD, SUSAN
CHAMBERLAIN, JAMES, KINDSCHER, KELLY,
DEANGELIS, PATRICIA, DENTALI, STEVEN

Conservation of Appalachian Medicinal Plants

11:30 AM  APPALSHOP FILM, ARMAH
12:00-1:00 PM  LUNCH, CHESAPEAKE

1:00-2:00 PM  PANEL 2  SNYDER, CHERIE
ROCKS, BILL, JILANIS, PAULA, ROHRBAUGH, STACEY, SMITH, RAE ANN

Plants, People, and Practice

2:00-2:15 PM  SY01006  JOHNSON, TERESA L.
Black Cohosh: Coming Full Circle?

2:15-2:30 PM  SY01007  BAUMFLEK, MICHELLE
Using Herbarium Specimens to Compare the Habitat Associations of Closely-
Related Medicinal Plant Species: An Example from the Genus Acorus

2:30-2:45 PM  SY01008  CUMMINGS, KATE
HALL, KAREN, CHEN, FENG
Using a traditional method of preparation to reduce the carcinogenic compound
safrole from sassafras tea

2:45-3:00 PM  SY01009  AMJAD, HASSAN
AMJAD, QUARTEL-Ayne
Franklinia alatamaha, An American Medicinal Tea Plant

3:00-3:15 PM  SY01010  FRITZ, GAYLE
Early Frontier Food: Feeding Spanish Soldiers at Fort San Juan, Western North
Carolina, A.D. 1567-1568

3:30-5:30 PM  POSTER SESSION  LANE CENTER, GREENHOUSE

6:30-8:30 PM  PHOTOGRAPHY OPENING  ROPER GALLERY

8:00-10:00 PM  STUDENT SOCIAL, sponsored by United Plant Savers  ARMAH
Symposium 02: The Future of Ethnobiology Education: 8:30-1:45, Lane Center, ARMAH

8:30 AM  Pre-evaluation
9:00-9:10 AM  SY02001  HARRISON, PAT, Botanical Research Institute of Texas
Welcome and Introduction to the Open Science Network

9:10-9:30 AM  SY02002  BURGESS, TONY, Texas Christian University
Ethnobiology: Seeding a revolution in education

9:35-9:55 AM  SY02003  BROSI, SUNSHINE, Frostburg State University
WAGNER, GAIL, University of South Carolina
Vision and Change for Ethnobiology: recommendation for core concepts and course objectives

10:00  BREAK

10:15-10:35 AM  SY02004  HALL, KAREN, Clemson University
Assessing Student Learning of Interdisciplinary Curricula

10:40-11:00 AM  SY02005  MCCLATCHEY, WILL, Botanical Research Institute of Texas
Implementation of Vision and Change Ethnobiology 1.0 Recommendations in a Field School Setting

11:05-11:30 AM  SY02006  VOUgioUKALOU, SONIA, HUISH, RYAN, SHIELS, LAURA,
An evaluation of educational trends in ethnobiology: teacher and student perspectives on pedagogy and accreditation

11:30 PM  APPALSHOP FILM, ARMAH
12:00-1:00 PM  Lunch Workshop, Chesapeake Dining Hall
Scholarship of Teaching & Learning, BROSI, SUNSHINE L.
Technology in the Classroom, BRIDGES, KIM

1:00-1:20 PM  SY02007  WAGNER, GAIL, FOWLER, CYNTHIA T.,
HALL, KAREN, HUISH, RYAN, QUAVE, CASSANDRA, WYNDHAM, FELICE
The Biocultural Diversity Project

1:25-1:45 PM  SY02008  LOEB, ROBERT, University of Pennsylvania
Developing an On-line General Education Ethnobotany Course

1:45-2:00 PM Break
Concurrent Workshops: The Future of Ethnobiology Education, *Compton Science Center*, 2:00-5:00 PM

2:00-5:00 PM W01, W02, W03, and W04

50 min workshops, repeat for each time period:

001: 2:00-2:50 PM
002: 3:00-3:50 PM
003: 4:00-4:50 PM

**W01: How to Replace Papers with Student-made YouTubes**  
*Compton 330*

WAGNER, GAIL  
University of South Carolina

**W02: A Fiber Runs Through It…hand papermaking across cultures and materials,**  
*Compton 316*

HALL, KAREN  
Clemson University

**W03: Ecology in the Garden**  
*Compton 2nd floor lobby*

SHIELS, LAURA  
University of Hawai`i Hilo

**W04: Lab Activities for the Classroom**  
*Compton 218*

QUAVE, CASSANDRA  
Emory University

5:00-5:15 PM Post Assessment, 2nd floor of Compton Science Center

5:30-6:30 PM Dinner, Chesapeake Dining Hall  
Dinner Presentation: *Ethnobiology Education: Walking the Talk*

6:45 PM Shuttle to Allegany College, meet at Chesapeake Circle

7:00-7:50 PM Light refreshments  
*Allegany College of Maryland*

*College Center Charlotte and Ivan Hall Special Functions Room*

8:00 PM Allegany College of Maryland  
ESHBAUGH, W. HARDY  
*Drum and Stethoscope: Medicine on the Far Side*, sponsored by Allegany College of MD
WEDNESDAY, JUNE 6, 2012

CONCURRENT:
SYMPOSIUM 03: ARMAH: 133, 8:30-11:30 AM, Lane Center 111, 1:30-5:00 PM  
SYMPOSIUM 04: ATKINSON: 232, 8:30-11:30 AM, 1:30-5:00 PM

SYMPOSIUM 03: CULTURES AROUND THE WORLD, ARMAH 8:30-11:30 AM

8:30-8:45 AM SY03001 RASHFORD, JOHN
The Baobab Culture of the Island of Tobago

8:45-9:00 AM SY03002 Lupton, Darach
AL HATMI, SAIF, AL JABRI, THURAIYA, AL HINAI, ABDULRAHMAN
Documenting and Conserving Ethnobotanical Knowledge in the Sultanate of Oman

9:00-9:15 AM SY03003 RAGOSTA, SUMMER
MERLIN, MARK, HARRIS, IVEYLYN
Diffusions of Knowledge and Plant Species between West Africa and Jamaica:  
Historical Biogeography of Jamaican Maroon Ethnoflora

9:15-9:30 AM SY03004 MARANZ, STEVEN
COULIBALY, MAMOUTOU
Out of Africa: tree divinities and the origins of Moses’ encounter with the burning bush

9:30-9:45 AM SY03005 MUSSELMAN, LYTTON JOHN
Plants of the Bible—a historical review and present work

9:45-10:00AM SY03006 AHMED, SELENA
STEPP, JOHN RICHARD, DAYUAN, XUE
Farmer Perceptions of Climate Effects on Tea Agro-Ecosystems in the Highlands of  
Southwest China

10:00-10:15 AM SY03007 KITAGAWA, JUNKO
HOSHINO, YASUHARU, YAMADA, KAZUYOSHI, YONENOBU, HITOSHI
How does pollen analysis detect poor rice harvest?

10:15 BREAK

10:30-10:45 AM SY03008 DE HAAN, STEF
JUAREZ, HENRY, PLASENCIA, FRANKLIN, HAREAU, GUY
How resilient is the on-farm conservation of cultivated potato genetic resources in  
the Peruvian Andes? Spatial, varietal and socioeconomic dimensions.
**WEDNESDAY, JUNE 6, 2012, continued**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenters</th>
<th>Title</th>
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<tbody>
<tr>
<td>10:45-11:00 AM</td>
<td>SY03009</td>
<td>MEYER, RACHEL LITT, AMY</td>
<td>An investigation of the molecular and chemical differences among Asian eggplant lineages in the context of their history of domestication and utilization</td>
</tr>
<tr>
<td>11:00-11:15 AM</td>
<td>SY03010</td>
<td>MANZALI DE SÁ, IVONE</td>
<td>Açai Samurai: The Commoditization of a Local Foodstuff</td>
</tr>
<tr>
<td>11:15-11:30 AM</td>
<td>SY03011</td>
<td>RAGONE, DIANE</td>
<td>Breadfruit: Conservation and Use of a Traditional Oceanic Crop</td>
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<td>11:30 PM</td>
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<td>APPALSHOP FILM, ARAMAH</td>
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<tr>
<td>12:00-1:00 PM</td>
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<td>LUNCH, CHESAPEAKE DINING HALL</td>
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**SYMPOSIUM 03: CULTURES AROUND THE WORLD, LANE CENTER 111, 1:30-5:00 PM**

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<tr>
<th>Time</th>
<th>Session</th>
<th>Presenters</th>
<th>Title</th>
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<tbody>
<tr>
<td>1:00-1:15 PM</td>
<td>SY03012</td>
<td>BUSSMANN, RAINER W. ZAMBRANA, NAREL YAROSLAVA PANIAGUA</td>
<td>&quot;Tujujinak se usa para el techo, pero ya casi no hay&quot; - implications of language on resource conservation in the Andes and the Amazon of Peru and Bolivia</td>
</tr>
<tr>
<td>1:15-1:30 PM</td>
<td>SY03013</td>
<td>GILMORE, MICHAEL P. ENDRESS, BRYAN A., HORN, CHRISTA M.</td>
<td>Biocultural Conservation in the Peruvian Amazon – A Case Study of the Maijuna</td>
</tr>
<tr>
<td>1:30-1:45 PM</td>
<td>SY03014</td>
<td>HORN, CHRISTA M. GILMORE, MICHAEL P., ENDRESS, BRYAN A.</td>
<td>Towards Ecologically and Economically Sustainable Management of Aguaje (<em>Mauritia flexuosa</em>): two indigenous communities in the Peruvian Amazon</td>
</tr>
<tr>
<td>1:45-2:00 PM</td>
<td>SY03015</td>
<td>ENDRESS, BRYAN A. HORN, CHRISTA M., GILMORE, MICHAEL P., VARGAS, VICTOR</td>
<td>Documenting regional patterns of <em>Mauritia flexuosa</em> extraction in the Peruvian Amazon: implications for conservation and sustainable management</td>
</tr>
<tr>
<td>2:00-2:15 PM</td>
<td>SY03016</td>
<td>LENTZ, DAVID THOMPSON, KIM</td>
<td>Of Palaces and Pet Kot: Agroforestry Studies of the Ancient Maya at Tikal</td>
</tr>
<tr>
<td>2:15-2:30 PM</td>
<td>SY03017</td>
<td>BERTSCH, CALLIE ORR, BLAIR</td>
<td>Economic and cultural significance of non-timber forest products for three cultural groups in the southwest Rhodope Mountain region of Bulgaria.</td>
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<tr>
<td>Time</td>
<td>Symposium Code</td>
<td>Name(s)</td>
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<td>2:30-2:45 PM</td>
<td>SY03018</td>
<td>VIRAPONGSE, ARIKA</td>
<td>Examining the link between NTFP value chains and livelihood strategies in Maranhão, Brazil</td>
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<td>2:45 PM</td>
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<td><strong>BREAK</strong></td>
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<tr>
<td>3:00-3:15 PM</td>
<td>SY03019</td>
<td>KNAPP, WESLEY M. WIEGAND, RICHARD H.</td>
<td>Orchid Decline in the Catoctin Mountains, Frederick Co., Maryland as Documented by a Long-term Dataset</td>
</tr>
<tr>
<td>3:15-3:30 PM</td>
<td>SY03020</td>
<td>LINARES, EDELMIRA BYE, ROBERT, GARCIA, FELICIANO</td>
<td>The “quelites” of the Florentine Codex - their botanical identification and contemporary importance</td>
</tr>
<tr>
<td>3:30-3:45 PM</td>
<td>SY03021</td>
<td>FRYE, CHRISTOPHER T.</td>
<td>Notes on the distribution and human-mediated ecology of Carex, section Phaestoglochin in Maryland</td>
</tr>
<tr>
<td>3:45-4:00 PM</td>
<td>SY03022</td>
<td>MCCUNE, LETITIA M.</td>
<td>Seed Conservation Policies to Increase Agricultural Biodiversity, IPR and Benefits Sharing</td>
</tr>
<tr>
<td>4:00-4:15 PM</td>
<td>SY03023</td>
<td>TICKTIN, TAMARA MANDLE, LISA, GANESAN, R., SETTY, SIDDAPPA</td>
<td>Disentangling the drivers of decline of culturally important plants</td>
</tr>
<tr>
<td>4:15-4:30 PM</td>
<td>SY03024</td>
<td>KONCHAR, KATIE SALICK, JAN, STAVER, BENJAMIN</td>
<td>Perceptions, Adaptations and Mitigations of Climate Change in Manang Village, Western Nepal</td>
</tr>
<tr>
<td>4:30-4:45 PM</td>
<td>SY03025</td>
<td>BYE, ROBERT EDELMIRA LINARES</td>
<td>Continuity of inter-regional trade of medicinal and edible plants of the Sierra Tarahumara, Chihuahua, Mexico</td>
</tr>
<tr>
<td>4:45-5:00 PM</td>
<td>SY03026</td>
<td>SIGSTEDT, SHAWN</td>
<td>World Park - a unified nature conservation strategy and educational initiative with beneficial biological consequences.</td>
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WEDNESDAY, JUNE 6, 2012, CONCURRENT SESSION

SYMPOSIUM 04: CULTURES AROUND THE WORLD, ATKINSON, 8:30-5:00 PM

8:30-8:45 AM SY04001 MOLLIK, ARIFUL HAQUE
Documentation of vegetable plants growing inside the Khulna division used by the Buno people of Bangladesh

8:45-9:00 AM SY04002 PAUDEL, BABU RAM
Ethno-Phytotherapy in the Lekhnath Municipality, Kaski, the Mid-Hills of Nepal

9:00-9:15 AM SY04003 SHRESTHA, SUSHMA
Gurung ethnobotany and baseline floristic survey for biodiversity conservation in Manaslu Conservation Area, Nepal

9:15-9:30 AM SY04004 SHRESTHA, NAWAL
SHRESTHA, KRISHNA KUMAR
Rare and Endangered Medicinal Plants of Rasuwa District, Nepal: Status and Utilization

9:30-9:45 AM SY04005 SATYAL, PRABODH
PAUDEL, PRAJWAL, SETZER, WILLIAM N.
Bioactivities and Chemical Composition of Himalayan Aromatic and Medicinal Plants

9:45-10:00 AM SY04006 DE BOER, HUGO
LAMXAY, VICHITH, BJORK, LARS
Steam sauna, hot beds and mother roasting: Medicinal plants and postpartum recovery among the Brou, Saek and Kry (Laos)

10:00-10:15 AM SY04007 BROWN, ADAM
CECH, NADJA
Can every plant improve antibiotic effectiveness? Studies on bacterial efflux pump inhibitors in land plants.

10:15 BREAK

10:30-10:45 AM SY04008 MUELLER, NATALIE G.
Mound Centers and Seed Security in Middle Woodland Illinois

10:45-11:00 AM SY04009 SPENGLER III, ROBERT N.
Agriculture during the Bronze and Iron Age Interface: the Mountain Foothills of Eastern Central Asia
11:00-11:15 AM SY04010 BOUTAIN, JEFFREY
XU, JIANCHU

On the Origin of Hops (Humulus, Cannabaceae)

11:15-11:30 AM SY04011 RUELLE, MORGAN L.
Farmers’ phenological knowledge and climate adaptation in the Ethiopian highlands

11:30 AM APPALSHOP FILM, ARMAH
12:00-1:00 PM LUNCH, CHESAPEAKE

1:00-1:15 PM SY04012 HOOPER, DAVID A.
The Ecology of Harvesting Beargrass (Xerophyllum tenax), and Prince’s Pine (Chimaphila menziesii) from Mount Rainier.

1:15-1:30 PM SY04013 DUTRA ELLIOTT, DANIELA
TICKTIN, TAMARA
Wild harvest patterns and trade of epiphytic orchid species in Oaxaca, Mexico

1:30-1:45 PM SY04014 WILLIAMS, SOPHIE
JONES, JULIA, CLUBBE, COLIN, GIBBONS, JAMES
Can cultivation reduce pressure on wild populations?

1:45-2:00 PM SY04015 LEHMAN, ASHLEY
LYON, LINDA, SIEBERT, STEVE
On the Brink of Change: assessing ethnobotanical knowledge and resource use of a littoral landscape in Southeast Madagascar

2:00-2:15 PM SY04016 GERSHANECK, SEAN
Ethnobotanical Traditions of the Island of Kumejima

2:15-2:30 PM SY04017 DUVAL, ASHLEY E.
NAGATA, TOSHIYUKI, CRANE, PETER R., KNOBLOCH, CARL W.
A Synthesis and Interpretation of Early Meiji Japanese Wood Collections with Plant Portraits

2:30-2:45 PM SY04018 OFFRINGA, LISA
Medicinal Plants of Northern Thailand Used by Traditional Doctors to Treat Mild Cognitive Impairment in the Elderly

2:45 PM BREAK
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<tr>
<th>Time</th>
<th>Session</th>
<th>Speaker(s)</th>
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<tbody>
<tr>
<td>3:00-3:15 PM</td>
<td>SY04019</td>
<td>SAUNDERS, MARY WU, JIANGCHONG, POSNER, JOSHUA, EMSHWILLER, EVE</td>
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<td>Unique cultural and ecological role of tartary buckwheat facilitates genetic resource conservation in Yunnan, China</td>
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<td>3:15-3:30 PM</td>
<td>SY04020</td>
<td>ROSS, NANCI HART, ROBBIE</td>
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<td>Seeing the meadow beyond the grazing yaks: grazing pressure, alpine plant distributions, and the role of Rhododendron shrubs as “grazing shields”</td>
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<td>3:30-3:45 PM</td>
<td>SY04021</td>
<td>TERRY, MARTIN TROUT, KEEPER, WILLIAMS, BENNIE, HERRERA, TEODOSO</td>
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<td>Cultivation of peyote by native Americans: Past, present and future</td>
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<td>3:45-4:00 PM</td>
<td>SY04022</td>
<td>MERLIN, MARK</td>
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<td>Ancient uses of hemp fiber and seed for fishing in Eurasia: Theoretical and archaeological considerations</td>
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<td>4:00-4:15 PM</td>
<td>SY04023</td>
<td>QUAVE, CASSANDRA L. PIERONI, ANDREA</td>
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<td>Medical Ethnobotany in the Balkans: A Comparative Analysis of Results from Field Studies in Albania, Kosovo, and Serbia</td>
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<td>4:15-4:30 PM</td>
<td>SY04024</td>
<td>BEUTLER, JOHN A.</td>
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<td>Englerins and Schweinfurthins, Plant-Derived Compounds with Cancer Drug Potential</td>
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<td>4:30-4:45 PM</td>
<td>SY04025</td>
<td>OTÁLORA, JUAN MANUEL DONAZZOLO, J., OLKOSKI, D., NODARI, R. O.</td>
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<td>Uso tradicional de goiabeira-serrana (<em>Acca sellowiana</em> Berg. Burret) no sul do Brasil Traditional use of feijoa (<em>Acca sellowiana</em> Berg. Burret) in Southern Brazil</td>
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<td>4:45-5:00 PM</td>
<td>SY04026</td>
<td>GAJUREL, P. R.</td>
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<td>Ethnobotany and market potentiality of two mostly preferred edible forest species from Eastern Himalaya of India</td>
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<td>5:00-6:30 PM</td>
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<td>Shoots and Roots Bitters Tasting</td>
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<td>Lane Center, 2nd floor lobby</td>
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<td>6:30-8:30 PM</td>
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<td>Distinguished Economic Botanists Banquet</td>
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<td>ARMAH</td>
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</tbody>
</table>
THURSDAY, JUNE 7, 2012

SYMPOSIUM 05: MODERN CULTURE IDENTITIES, ARMAH, 8:30-11:30 AM

8:30-8:45 AM SY05001
SPIERING, MARTIN J.
TEKLEHAIMANOT, KEBREAB, EISENSTEIN, EDWARD

*Actaea racemosa* TDC1 and TDC2 are L-tryptophan decarboxylases that catalyze a key step in serotonin production

8:45-9:00 AM SY05002
VICKERS, AMANDA
BROSI, SUNSHINE L., PUTHOFF, DAVID P., HOWELL, JAMES A., KUAR, BHAVENET, EISENSTEIN, EDWARD

Chemotypic variation and adulteration factors in *Actaea racemosa* L.

9:00-9:15 AM SY05003
PUTHOFF, DAVID

Salicylic Acid and Wounding Cause Increases in the Level of Actein and Deoxyactein in Black Cohosh (*Actaea racemosa* L.) Rhizomes

9:15-9:30 AM SY05004
FISCUS, DAN
MOESSINGER, SETH

Insect Pollinators of Black Cohosh (*Actaea racemosa*) in the Western Maryland Region

9:30-9:45 AM SY05005
PENGELLY, ANDREW
CLARE, BEVIN, MULHOLLEN, JOSEPH

Black cohosh - does the research validate traditional and contemporary clinical applications?

9:45-10:00 AM SY05006
KUKLINSKI, TERMEH
BONSALL, CHAD, STORM, CHRISTINE, MILLER, BRENT, MILLER, MELISSA

Appalachian health beliefs and disparities

10:00-10:15 AM SY05007
CLARE, BEVIN

Training of Contemporary Clinical Herbalists in Appalachia

10:15 BREAK

CONCURRENT SESSIONS: SYMPOSIUM 05, AMRAH, 10:30-11:30 AM

10:30-10:45 AM SY05008
ROSE, JANNA L.
QUAVE, CASSANDRA, ISLAM, GAZI

What “Giving Back” Means to Botanists: The Results of a Survey
THURSDAY, JUNE 7, 2012, continued

10:45-11:00 AM SY05009
CHOCK, AL KEALI’I
MCCLATCHEY, WILL C., TICKTIN, TAMARA
Using Community Resources to Supplement Introductory Ethnobotany Courses

11:00-11:15 AM SY05010
SCHULZ, KATJA
HAMMOCK, JENNIFER, PARR, CYNTHIA
The Encyclopedia of Life: A Vision for a Global Collaborative Project

11:15-11:30 AM SY05011
FADIMAN, MARIA
Reconnecting East Asian Mountain Children to Place and Plants

11:30-11:45 AM P3001
JASTRZEMBSKI, JOHN P.
Maryland and Appalachian Forest Economies

11:45 AM-12:00 PM P3002
HOLMGREN, CHRIS
Waste stream to mainstream; using urban and suburban timber

12:00-12:15 PM P3003
HOSSELRODE, BRANDON
The Economics of Maple Syrup Production

12:15-12:30 PM P3004
KAYS, JONATHAN
A Burning Economy: Wood energy, Economic Growth and Community Stability

12:30 PM APPALSHOP FILM, ARMAH
12:30-1:30 PM LUNCH

1:30 PM SEB Business Meeting. ARMAH

3:00 PM Finzel Swamp Trip
An Appalachian Consortium for the Sustainable Cultivation of Medicinal Plants

Introduction: The Appalachian region has a long history of using indigenous plants for healing purposes, and therefore sustainable medicinal plant cultivation is an opportunity for unique specialty crop production for many landowners. Objectives: An Appalachian Consortium for the Sustainable Cultivation of Medicinal Plants is being forged among regional stakeholders from academia, government and the private sector. Our mission is to address the technical, economic and social barriers to increased profitability of the sustainable cultivation of medicinal plants as specialty crops for rural Appalachia. Methods: We will integrate research in field and laboratory science to advance our understanding of medicinal plant ecology, habitat, cultivation and reproduction, as well as natural product biosynthesis, analysis and characterization to develop best practices that address the needs of our stakeholders for the production and marketing of reliable products with improved quality. Results: Actaea racemosa (syn. Cimicifuga racemosa (L.) Nutt.; black cohosh) is an important non-timber forest product in the Appalachian region and our initial model. Plant genomic DNA has been used in PCR to resolve species in the genus Actaea. Survey and sampling methods suggest an ideal habitat for black cohosh, and controlled outside environments indicate that plants grown under shade cloth and thrive. In the laboratory, efficient germination schemes were developed for the reproducible growth of certified plants; optimal soil, watering and fertilization cycles were developed for healthy growth; an artificial vernalization approach was implemented to facilitate plant growth throughout the year; callus culture conditions were explored and utilized for the development of shoot and root organogenesis; and a differentiable suspension cell culture system was developed to develop genomics-metabolomics correlations for the production of bioactive secondary metabolites. Conclusion: Integrating research and outreach among diverse stakeholders is increasing economic opportunity for the sustainable cultivation of Appalachian medicinal plants. Keywords: Appalachian, black cohosh, conservation, genomics
New Insights into the Genetic Diversity and Conservation of American Ginseng (Panax quinquefolius L.)

Introduction: American ginseng (Panax quinquefolius L.) is a medicinal herb valued for a wide array of beneficial health effects attributed to the differing bioactivities of major root ginsenosides. Variation between and within ginseng populations has been reported for ginsenoside composition and genetic profile. However, studies of the relationship of genotype and ginsenoside composition are needed to determine the influence of genotype on root ginsenoside concentrations. Objectives: Study the relationship between phytochemical and genetic diversity of American ginseng and assess the genetic basis for ginsenoside composition. Methods: Root ginsenoside concentrations and RAPD marker profiles were investigated for 44 plants from seven wild and two cultivated American ginseng populations. The roots were classified into three chemotypes and genetic distances were estimated. The correspondence between chemotype and genetic clusters was evaluated. Results: Clusters based on 38 polymorphic RAPD loci corresponded closely to the chemotype groupings. The close relationship between chemotype and RAPD haplotype is visualized using non-metric multidimensional scaling. Conclusion: These results provide the first DNA-based evidence for the genetic basis of chemotypic variation in ginseng. A small number of RAPD primers can provide a fast and efficient tool for ginseng species identification, wild population protection and conservation, breeding and selection of improved germplasm using a small amount of either leaf or root tissue. RAPD markers could be used to: study and monitor wild ginseng populations with minimal disturbance and no reduction in population size; serve as indicators of both genetic and phytochemical diversity; select plants with genes related to targeted ginsenoside composition; and provide an inexpensive and reliable method for quality control for trade and sale of ginseng. Keywords: ginsenosides, medicinal plants
transplanted to the high elevation site, and individuals from the high elevation site were excavated and replanted in their home-site. The transplanted populations, as well as an adjacent population at the high elevation site, were censused from 2005 to 2009. Data on growth, survival, and reproduction were analyzed to test for differences among the three transplantation treatment groups (no transplantation, transplantation within site, transplantation to novel site).

**Results:** From 2006 to 2007, relative growth rate of foliar material differed among transplantation treatments. Growth rate was lower for high elevation plants that had been transplanted, but did not differ between the high elevation control and low elevation populations. Survival was greatest for high elevation populations in their home site, with no differences between transplanted and non-transplanted populations. These differences disappeared between 2007 and 2008. Transplantation treatment did not affect reproduction. **Conclusion:** Overall, transplantation success was high; indicating that ecological restoration of ginseng using native seed stock can be performed effectively. However, such projects should be conducted cautiously (e.g. introduce individuals to sites devoid of natural ginseng populations; proceed with minimal disruption to native source populations) until more is understood regarding the role of genetic differentiation on the long-term success of restoration. **Keywords:** *Panax quinquefolius*, assisted migration, wild-simulated cultivation, American ginseng, transplantation, population

**SY01004, 9:45-10:00 AM**
PUTTOCK, CHRISTOPHER F., christopher.puttock@gmail.com, Smithsonian Institution
GELNER, TRACEY, Chesapeake Natives, Inc.
TRUMBLE, ROBERT B., Maryland Department of Agriculture
BARTOLOMEI, ROCHELLE P., Chesapeake Natives, Inc.

**Wild Ginseng in Maryland - Vulnerable?**

**Objectives:** To review the current status of ginseng as an S3 vulnerable plant in the State of Maryland and the impact wild harvesting is having on the natural populations. **Methods:** Examination of the Ginseng harvest data from Maryland Department of Agriculture certification records of wild ginseng certified and cultivated ginseng (wild-simulated, woods-grown, shade-canopy cultivated) annually from 1979 to 2010.

**SY01005, 10:00-10:15 AM**
CHAMBERLAIN, JAMES, jachambe@vt.edu, Virginia Tech University, Blacksburg, VA

**Unsustainable harvesting of Allium tricococum, ramps or wild leeks**

**Introduction:** *Allium tricococum* (ramps, wild leeks), an early spring ephemeral herb are native to the Appalachian hardwood forests of eastern United States. When Scot-Irish immigrants in the early 1700s travelled through this region, in the spring, they smelled a familiar plant. These settlers brought with them traditional ecological knowledge about *Allium ursinum* (bear garlic) that they had been collecting and eating for generations. The Scots-Irish immigrants settled in what is now western North Carolina, eastern Tennessee and southwest Virginia. Each spring, after a long winter without greens, they would forage onions from nearby forests. In the mid-1900s, civic groups started organizing festivals to celebrate ramps and the coming of spring. They would generate significant revenues from these annual ramp festivals to support community causes. **Objectives:** In the spring of 2000, the Southern Research Station of the Forest Service initiated a long-term study with the objectives of improving our understanding of the
impacts of ramp festivals on the plant and human communities in western North Carolina, eastern Tennessee and Southwest Virginia. The intention of the project was to provide information that would help sustain a way of life that has evolved around this important natural resource. **Methods:** Various methods, including interviews, harvesting with groups, and measuring plants, were used to collect information on the festivals and the plants. **Results:** The study found that thousands of pounds of this small onion are harvested to support the ramp festivals. This amounted to millions of plants. Plant parts were quantified, and correlations between above and below-ground biomass were estimated. Most ramp festivals only use the bulb and throw away more than 45 percent of the edible portion of the plant. Over the nine years that ramps were sampled from patches from which the groups would harvest, the size of plants decreased in size. A strong correlation was found between above and below-ground plant parts that will aid in efforts to inventory this natural resource. **Conclusion:** Over the last 10 years, commercial interest in ramps has increased tremendously. Fancy restaurants in distant big city now offer ramps from the study area. People can purchase these delicacies over the Internet and at natural food stores across the nation. This increased demand for the spring ephemeral is putting undue pressure on plant populations and will lead to the demise of the species if efforts are not made to manage the harvest. Current harvest levels are not sustainable and threaten a way of life that is steeped in tradition. **Keywords:** Non-Timber Forest Products, Sustainable Harvest, Forest Onions

**PANEL 1: 10:30-11:30 AM, ARMAH, 133, LANE CENTER**
LEOPOLD, SUSAN, leopold@igc.org, Executive Director of United Plant Savers
CHAMBERLAIN, JAMES (Virginia Tech University, Blacksburg, VA)
KINDSCHER, KELLY, University of Kanas,
DEANGELIS, PATRICIA, US Fish and Wildlife Services
DENTALI, STEVEN, American Herbal Products Association

**Conservation of Appalachian Medicinal Plants**

**Introduction:** United Plant Savers is a non-profit organization that has been advocating for conservation of native medicinal plants for the last 15 years. UpS established an at-risk list and a to-watch list to bring awareness to herb industry, and those that work with medicinal plants. This panel discussion will be an opportunity to engage in a discussion that addresses some of the difficult questions facing researchers, policy makers, government agencies and non-profit organizations. **Topic Discussion:** Identifying issues that are affecting efforts to conserve medicinal plants. How can United Plant Savers At-Risk tool serve as a means to prioritize species in need of critical attention? How do we address sustainable harvesting and can we achieve it? How do we transition from wild harvesting of at-risk medicinal plants to sustainable management of these important resources?

**PANEL 2: 1:00-2:00 PM, ARMAH, 133, LANE CENTER**
SNYDER, CHERIE, csnyder@allegany.edu, Allegany College of Maryland, Cumberland, MD
ROCKS, BILL
JILANIS, PAULA
ROHRBAUGH, STACEY
SMITH, RAE ANN

**Plants, People, and Practice**
Introduction: This interactive workshop introduces the audience to the many ways plants are utilized in professional health care practice and personal self-care. Objectives: (1) To demonstrate an interdisciplinary approach to integrative (mind/body) health care that incorporates plants for health and healing. (2) To identify a variety of practices which utilize plants for personal self-care. Methods: This interactive workshop will utilize a case study to engage the audience in a dialogue about the role of plants in health and healing, both from a biomedical as well as a folklore perspective. With the case study as the starting point for discussion, an interdisciplinary panel of health care professors from Allegany College of Maryland will present the various ways plants are used within their professional discipline. The professions represented on the panel will be social work, respiratory therapy, occupational therapy, medical laboratory technology, and therapeutic massage. The workshop will include an overview of the professional literature and research supporting the practices applied to the case study. Results: The audience will participate in the development of an integrative patient treatment plan incorporating plants for health and healing and also identify ways plants can be used in their own lives for self-care and wellbeing. Conclusion: Plants are an essential component of integrative health care practice. Keywords: mind/body, health, healing

SYMPOSIUM 01 continued: APPALACHIAN MOUNTAIN CULTURES, ARMAH (133)

SY01006, 2:00-2:15 PM
JOHNSON, TERESA L., teresa@foodsynergies.net, Johns Hopkins University Bloomberg School of Public Health
FAHEY, JED W., Johns Hopkins University Bloomberg School of Public Health
Black Cohosh: Coming Full Circle?

Introduction: Black cohosh (Actaea racemosa L.), Ranunculaceae, thrives in temperate climates east of the Mississippi River in the USA. It is economically important to the Appalachian region where it is wild harvested, but it has resisted most efforts at deliberate cultivation. Black cohosh has been used for many centuries both in Europe and in the US (by indigenous peoples and subsequent Caucasian medical practitioners), most notably for indications of premenstrual syndrome, menstrual pain and cramping. Objectives: To highlight black cohosh as an example in which disregard for the ethnobotanical and ethnopharmacologic usages of a plant has perhaps hindered modern scientific attempts to understand the mechanism of action of its bioactive phytochemicals, and ascribe cause to effect. Results: Research on its mode of action has historically focused on its presumed hormonal (phytoestrogenic) activity, but very recent work suggests that it may in fact be acting as an antinociceptive agent. Re-examination of some of the writings of 19th and 20th century physicians and folk literature suggests that this mode of action may have been overlooked in modern experiments, in vitro, and animal studies and in the very few well conducted human trials to date. Conclusion: The common folk perception of this plant as a "remedy for female problems" may thus require revision, as it may possess more general analgesic properties. In the broader context, ethnopharmacologic indications for other herbal remedies must be revisited in light of the explosion in understanding of mechanisms of action of small molecule effectors of which actein and cimicifugoside (from black cohosh) are only two examples. Keywords: analgesic, antinociceptive, Actaea racemosa, premenstrual syndrome (PMS), reproductive pharmacology, triterpenoids, Traditional medicine Northern America
Using Herbarium Specimens to Compare the Habitat Associations of Closely-Related Medicinal Plant Species: An Example from the Genus Acorus

Introduction: Acorus is an important genus of medicinal plants that are used across temperate regions of the world. Commonly referred to as sweetflag or muskrat root, North American Acorus species have at least 229 uses for 30 Native American tribes and First Nations in the United States and Canada. In Mi'kmaq and Maliseet communities of northern Maine and New Brunswick, Acorus is the most commonly used plant medicine. However, community members have recently learned that two species of Acorus exist in their landscape. Only recently recognized as distinct species, A. calamus was introduced from Europe, and A. americanus is a circumboreal species. While the two are virtually identical in appearance, A. calamus contains the pro-carcinogen beta-asarone, while A. americanus does not. Gatherers are concerned about the potential effects of A. calamus, and need effective ways to distinguish between the two species. While data about species morphology and chemical composition exists, little attention has been given to distinguishing between the habitat types in which these plants are found. Objectives: To determine if A. americanus and A. calamus occupies different ecological niches through the use of herbarium specimens. To provide medicinal plant gatherers with information about species distribution. Methods: Accession data from over 300 herbarium specimens of Acorus from the northeastern United States and eastern Canada were analyzed. While studies of herbarium specimens can suffer from sample bias, they can provide geographic and temporal breadth as well as detailed information about site conditions. Specimens whose accessions contained appropriate data were re-identified to species and classified according to five categories: river, lake, marsh, wet soil/field, and stream/brook. Results: Statistical analyses of Acorus herbarium specimens demonstrate a highly significant difference in species habitats. A. americanus exists most frequently along rivers and lakes, while A. calamus primarily occupies wet fields and marshes. Conclusion: Understanding the different habitat types occupied by Acorus species can provide medicine gatherers with important information as they decide where (or where not) to harvest plants. Herbarium specimens are a useful tool for ethnobotanists who are interested in identifying distinguishing characteristics in the habitat associations of closely-related species. Keywords: Acorus calamus, Acorus americanus, Maine, New Brunswick, Maliseet, Mi'kmaq, beta-asarone

Using a traditional method of preparation to reduce the carcinogenic compound safrole from sassafras tea

Introduction: Sassafras tea, syrup, and other products from Sassafras albidum are commonly prepared by Appalachian peoples, particularly members of the Eastern Band of Cherokee Indians, a Native American tribe with 13,000 members in Western North Carolina. Preparations use the roots of Sassafras, a tree common to the Eastern coast of the United States, especially in the mountainous regions. Products made from sassafras are banned from the market
by the US Food and Drug Administration (FDA) due to a carcinogenic compound, safrole, found in the unprocessed root in the 1960’s. Previous research following traditional methods of preparation of related and other species (Cinnamomum carolinense and Piper methystichum) has shown that these traditional end products had reduced or eliminated safrole. **Objectives:** The purpose of this research is to investigate whether safrole concentrations are affected during traditional preparation methods of making sassafras tea from the root of Sassafras albidum. The project also includes elements of education and outreach to return the results of the study to the Cherokee community as well as contribute resources emphasizing the cultural and historical importance of sassafras. **Methods:** Sassafras roots were harvested, processed, and prepared based on knowledge gained during conversations with Cherokee and non-Cherokees on the traditional methods of making tea. Traditionally prepared tea and the FDA method of extracting safrole were analyzed using high-performance liquid chromatography (HPLC). These two methods were compared for effectiveness of eliminating or reducing safrole levels. **Results:** The FDA method resulted in little to no safrole content. A small amount of safrole was still present in the traditionally prepared tea, but the amount of safrole was reduced compared to agitate samples. The agitate samples were extracted in water without heat and used to gauge a baseline concentration of safrole present. **Conclusion:** The FDA method was effective at eliminating safrole, though it resulted in a colorless and odorless product. While the traditionally prepared tea contains safrole, low levels of safrole are permitted in Europe due to the small concentration found in common spices. Compared to the agitate samples, the traditional method of preparation significantly reduced safrole concentrations. **Keywords:** Eastern Band of Cherokee Indians, HPLC, Sassafras albidum, Economic Botany

SY01009, 2:45-3:00 PM
AMJAD, HASSAN, hamjad@cwv.net, Jafary Medical Clinics
AMJAD, QUARTEL-AYNE

**Franklinia alatamha, An American Medicinal Tea Plant**

**Introduction:** Franklinia alatamha is a small tree of historical significance that has been extinct from the wild for nearly 200 years. All current trees are cultivated plants derived from the original seeds brought to Philadelphia by Bartram. Dried leaves, when chewed, have a taste similar to green tea, **Camellia sinensis**, which leads to our research of catechins. **Objectives:** To detect and quantify catechins, xanthines, theophylline, and theaflavins in leaf extracts. **Methods:** Powdered leaf extract was subjected to HP-TLC, bands are detected after Vanillin/sulfuric acid application. Further analysis was conducted with Agilent HPLC system with DAD-mobile phase methanol-acetonitrile and then LC-MS analysis. **Results:** Catechins (0.35%), Epicatechins (0.51%), Epigallocatechins (0.33%), Epigallocatechin Gallate (0.1%), caffeine (0.18%), theophylline (0.02%), Theobromine (0.006%), Theoflavin (0.05%). LC-MS analysis of leaves done on mass spectrometer using electroscopy ionization (ES) in negative mode. Summary of MS infusion analysis for molecular weight of known compounds Epicatechin Gallate were detected. Sample gave strong signals at m/z 291 and 443 with comparison by literature, indicates the compounds found in Franklinia leaves are EC and ECG. **Conclusion:** Franklinia alatamha has compounds similar to green tea, **Camellia sinensis**. Therefore, we expect to see the same medicinal benefits that green tea offers.
Early Frontier Food: Feeding Spanish Soldiers at Fort San Juan, Western North Carolina, A.D. 1567-1568

Introduction: The Pardo expedition left Santa Elena in December, 1566, arriving at the Native American town of Joara at the foot of the Appalachian Mountains on January 1, 1567. After negotiating with the local chiefs, a compound named Fort San Juan, consisting of five structures, was built beside the native settlement. The Berry Site (31BK22) is recognized as encompassing the burned remains of Fort San Juan, which was destroyed by the natives in 1568.

Objectives: To learn what Pardo’s men ate, where the plant foods came from, where the foods were processed and prepared, whether or not preferences or avoidances are manifested, and what social dynamics came into play as both European and indigenous actors furthered their larger political agendas.

Methods: Excavation, flotation recovery, and laboratory analysis of paleoethnobotanical remains from structures and features at the Berry site produced the information summarized here. These data are compared to the material recovered from the native village occupation at the Berry Site and to assemblages from nearby early Colonial Period sites.

Conclusion: The Spanish soldiers evidently were provided with and consumed a wide variety of native crops and wild or managed plant foods, with maize, hickory nuts, and acorns serving as staples. Native women probably produced, processed, and provided most plant foods. High frequencies of maypops and grape seeds demonstrate a preference for sweet dishes or drinks, raising the possibility that fermentation of native fruits was attempted.

Keywords: Paleoethnobotany, Pardo Expedition, Colonial Foodways
TEACHING TUESDAY, JUNE 5, 2012,
SYMPOSIUM: THE FUTURE OF ETHNOBIOLOGY EDUCATION

SY02001, 9:00-9:10 AM
HARRISON, PAT, Botanical Research Institute of Texas
Welcome and Introduction to the Open Science Network

Are we preparing ethnobiologists with the skills needed to address 21st century challenges? Join in the movement taking place in undergraduate ethnobiology classrooms as teaching strategies evolve and student engagement is enhanced. Connect with educators and students in a full day of professional development led by leading instructors in the field. Teaching Tuesday will shift the focus from research to teaching and highlight the importance of effective teaching practices that inspire the new generation of ethnobiologists within and outside higher education. Whereas research skills are rigorously taught and assessed, teaching skills and competencies often lack the same rigor. This day will address this gap by focusing on innovative teaching techniques and assessment strategies, along with recommended common practices for ethnobiology curricula and instruction. The morning symposium and afternoon workshops are hosted by the Open Science Network (OSN), an NSF-funded group of educators working to share peer-reviewed educational ethnobiological materials on an open, web-based platform. OSN will share preliminary work on the creation of an ethnobiological Vision and Change statement (based on the AAAS report Vision and Change in Undergraduate Biology Education: A Call to Action) and recommendations for both ethnobiological literacy and ethnobiological curricula at the college level. These initial suggestions will serve as a springboard for continuing the discussion about the teaching of ethnobiology and open the door for anyone interested in participating in an open-source network of teachers and learners.

SY02002, 9:10-9:30 AM
BURGESS, TONY, Texas Christian University
Training the Next Biospherians

Tony Burgess’ 19 year career with Biosphere 2 as ecosystem designer and Columbia University professor placed him at the intersection of science and complex social systems and gives him unique insight into the critical need for training future thinkers and problem solvers. This presentation will draw parallels with the evolving field of ethnobiology and challenge educators to question whether we are adequately preparing students with the knowledge and competencies required for the unprecedented challenges of the twenty-first century.

SY02003, 9:35-9:55 AM
BROSI, SUNSHINE, Frostburg State University
WAGNER, GAIL, University of South Carolina
Vision and Change for Ethnobiology: recommendation for core concepts and course objectives

The Open Science Network (OSN) is at the forefront of a movement in education. OSN was inspired by educators participating in the Society for Economic Botany who desired a common forum for the exchange of innovative curricula and ideas as well as a community that supports professional growth. In its fourth year of a NSF Research Coordination Network grant,
the Open Science Network is moving from the formation phase to the creation of a sustainable network for ethnobiology educators facilitating 21st century undergraduate classrooms. Ethnobiology educators from 33 universities and institutions across the US and Europe are currently working towards consensus on essential elements of ethnobiology curricula and teaching strategies. This presentation will present those recommendations. It will demonstrate the web-based curriculum portal and invite educators and students to participate in the peer review process.

SY02004, 10:15-10:35 AM
HALL, KAREN, Clemson University
Assessing Student Learning of Interdisciplinary Curricula
Curricula created by participants in the Open Science Network can serve students in multiple disciplines, including anthropology, biology, botany and others. Using our draft ethnobiological versions of the 'Vision and Change in Undergraduate Biology Education' paper, how can we assess student learning in an interdisciplinary fashion while making sure students are prepared to meet the challenges of the future?

SY02005, 10:40-11:00 AM
MCCLATCHHEY, WILL, Botanical Research Institute of Texas
University of Hawaii at Manoa, Department of Botany
BRIDGES, KIM, Botanical Research Institute of Texas, University of Hawaii at Manoa, Department of Botany
YAMAMOTO, BRIAN, Kaua`i Community College
REEDY, DAVID, Botanical Research Institute of Texas, University of Hawaii at Manoa, Department of Botany
HUDDLESTON, MIKE, Dallas County Community College, North Lake College
Implementation of Vision and Change Ethnobiology 1.0 Recommendations in a Field School Setting
Vision and Change Ethnobiology 1.0 (V&CE) was developed as an action agenda responding to the call for changes in biology education made by AAAS/NSF/HHMI Vision and Change 2010. Through a series of Open Science Network meetings, recommendations were developed for instructional content in ethnobiology courses. In February, 2012 a university level conservation ethnobiology field school was held in Kaua`i, Hawai`i. This was the ninth time that this course has been offered however, the course was upgraded and the revised curricula were implemented for this field school. We present an assessment of this teaching experience including observations on implementation of V&CE. We conclude with recommendations for broad implementation of V&CE within biology training that is predominantly field/lab based and replacing traditional classroom methods.

SY02006, 11:05-11:30 AM
VOUGIOUKALOU, SONIA, Department of Biology, University of Kent, Canterbury, UK
HUIISH, RYAN, Department of Biology, Hollins University
SHIELS, LAURA, University of Hawaii-Hilo
An evaluation of educational trends in ethnobiology: teacher and student perspectives on pedagogy and accreditation

Trends in ethnobiology education such as teaching tools, use of online resources and learning technologies, and how ethnobiology modules fit within other programs of study has changed significantly over the years. A previous survey on trends in ethnobotany education in the United States (McClatchey W., Paul A., Flaster T. & McClatchey V. 1999) highlighted lack of research funding, lack of respect for the field and lack of good mentors, strong university programs and post-graduation occupational opportunities. Members of the Open Science Network in Ethnobiology and the Education and Outreach Committee of the Society for Economic Botany revisited some of the questions asked in this survey and adapted the content to monitor changes in the growing international field of ethnobiology education. Data were collected through two online questionnaires disseminated to ethnobiology faculty and staff as well as students in universities across the globe. Data was anonymised, tabulated and processed. Preliminary results provided by over 100 respondents will be presented on the profile of staff and students who are involved in ethnobiology education, their perceptions on how ethnobiology enriches anthropology and/or biology education, instruction methods and assessment, program strengths and weaknesses, use of online tools and views on accreditation. This survey aims to enhance reflective practice and professional skills development in ethnobiology education by synthesizing the collective experiences of educators and students to inform a more outwards-facing, employable and credible discipline.

The Biocultural Diversity Project

Learn how to run classroom research projects that may span a number of years, involve college students from sophomore to graduate level, involve multiple classes at the same institution, and even involve multiple cooperating institutions. The Biocultural Diversity Project is used as an example and serves to invite your participation in this world-wide project shared between students and institutions. Learn about classroom management, student preparation, human subject research issues, grading rubrics, and how to help students write hypothesis-driven papers based on original research.

Developing an On-line General Education Ethnobotany Course
A general education natural science and diversity course was developed in an on-line format. The content of the course was focused on the culture related aspects of ethnobotany to meet the University's goals for general education natural science and diversity in the United States and International.

**WORKSHOPS, Tuesday, June 5th, 2:00-5:00 PM**

W01, W01-001: 2:00-2:50 PM, W02-002: 3-3:50 PM, W02-003: 4:00-5:00 PM, Identical 50 min workshop, presented 3 times

**How to Replace Papers with Student-Made YouTubes**, (2 hour workshop), *Compton 330*

GAIL E. WAGNER, Department of Anthropology, University of South Carolina.

In this hands-on workshop, learn how student-made “movies” for posting on YouTube can substitute for an academic paper, and why YouTube lends itself to such a classroom practice. Practice using free PC software to create movie-like slideshows with images, words, narrated voiceover, and music. During the workshop set up a personal YouTube account. Discussion covers fair use copyright, best practices in academic paper-writing, using grading rubrics, and other practical issues. Handouts supply instructions and useful links for taking this practice back to your classroom. For examples of student work, see: [http://www.youtube.com/3StudentWork](http://www.youtube.com/3StudentWork) or [http://www.youtube.com/2KnowNature](http://www.youtube.com/2KnowNature) Although not required for participation, come prepared by bringing a thumb drive with some digital still shots (photos) you can use for practice.

W02, W02-001: 2:00-2:50 PM, W02-002: 3-3:50 PM, W02-003: 4:00-5:00 PM, Identical 50 min workshop, presented 3 times

**A fiber runs through it…hand papermaking across cultures and materials**, *Compton 316*

KAREN C. HALL, Clemson University

Paper, from dispersed plant fibers, was invented in China during the reign of Emperor Wu, sometime between 140 BC - 86 BC. As papermaking spread across the globe, different cultures have explored many different types of materials and ways of making a paper sheet. Paper has been made from mulberry (kozo), mitsumata (Edgeworthia papyrifera), gampi (Daphne spp.), bamboo, hemp and more. Innovations in paper technology also include the different ways in which a paper sheet is formed. We’ll explore both of these ideas (materials and paper sheet formation) in this class. You’ll see examples of different fibers and have the opportunity to make paper of your own to take home.

W03: W03-001: 2:00-2:50 PM, W03-002: 3-3:50 PM, W03-003: 4:00-5:00 PM, Identical 50 min workshop, presented 3 times

**Ecology in the Garden**, *Compton 2nd floor lobby*

LAURA SHIELS, University of Hawaii-Hilo

Gardens provide a great outside-of-the-classroom, hands-on teaching tool for educators wishing to engage their students with biological learning objectives while incorporating a human dimension to which students can relate. This session will provide examples and suggest some methods for teaching students about biological and ethnobiological concepts in the garden setting.
which incorporate core ethnobiological learning objectives. Workshop participants will then organize into smaller subgroups to explore the garden as a learning tool and collaboratively design learning activities following the theme(s) of their choice while referring to the core ethnobiological learning objectives. The workshop will conclude with the subgroups sharing their ideas with the larger group and leaving with a homework assignment to refine the learning module they created and submit it for posting on the OSN website. Participants should bring what they anticipate needing to be comfortable outside for an hour, being in a garden, and any tools/technologies they may wish to utilize during the workshop. This may include comfortable shoes, sunglasses, a hat, sunscreen, drink/water bottle, natural insect repellant, notebook and pen, camera, etc.

W04: W04-001: 2:00-2:50 PM, W04-002: 3-3:50 PM, W03-003: 4:00-5:00 PM,
Identical 50 min workshop, presented 3 times

**Lab activities for the classroom, Compton 218**
CASSANDRA L. QUAVE, Emory University, Center for the Study of Human Health.

The integration of dynamic demonstrations and “hands-on” activities into the classroom adds value to the lesson being taught, often making learning both more *engaging* and *fun* for students. Such demonstrations can add a tactile and visual element to the lesson which cannot otherwise be achieved through traditional lecture formats. In this workshop, we will learn about and create some interactive activities for incorporation into the classroom. We will do so by dividing our efforts into 3 parts: First, some fun class activities useful for ethnobiology courses (i.e. medical botany, intro ethnobotany, food and health, and etc.) will be demonstrated. Next, workshop participants will be divided into small groups and tasked with creating some fun activities for teaching different topics/lessons common to ethnobiology curricula. Lastly, groups will present their ideas to the other workshop participants. All information about these activities (such as instructions, materials, and learning objectives) will be posted on the OSN website for ethnobiology educators to use and share.
The Baobab Culture of the Island of Tobago

Introduction: It is well known that the baobab (*Adansonia digitata*) is one of Africa’s most culturally significant trees, but its introduction to the Americas and its practical and inspirational uses, especially in African-descendant communities, has been little documented. Objectives: This paper discusses the distribution and cultural importance of the baobab on the Caribbean island of Tobago based on a survey done in May 2011. Methods: Using published accounts and interviews, all the baobab trees of Tobago were identified, measured and mapped. Flowering and fruiting were noted, and fruits were collected whenever possible. Comparative drawings of the fruits are presented as well as number of seeds. Results: While there are some Tobagonians who do not know the baobab, fourteen trees were identified by interviewing those who knew the tree because they grew up eating the fruit. There were also those for whom the tree held great historical and spiritual significance. Conclusion: The African baobab is more widespread and cultural significant in the Americas than is generally recognized. The baobab culture of Tobago is a case in point. Keywords: Guinea tamarind, monkey tamarind, Jamaica tamarind, flour tamarind

Documenting and Conserving Ethnobotanical Knowledge in the Sultanate of Oman

Introduction: The Sultanate of Oman is located on the southeast coast of the Arabian Peninsula. Oman has a long ethnobotanical history, with archaeological evidence dating back 8000 yrs BP. Much of this ethnobotanical heritage is still practiced in the mountain villages, however apart from a small number of key texts very little of this knowledge has been formally documented. As pressure to live in remote areas increases many young people are leaving for the cities, which is having a negative impact on the conservation of traditional knowledge. The loss of information and experience in relation to traditional plant practices in Oman is a very real problem. Oman Botanic Garden, currently under construction has established an emerging ethnobotany department with the express purpose of tackling the issues outlined above. Objectives: Document and conserve ethnobotanical knowledge in Oman. Safeguard this
information and use it to promote a wider appreciation of Oman’s unique plant heritage both nationally and internationally. **Methods:** Focusing initially on pilot studies in the Al Hajar mountains the Oman Botanic Garden team is establishing links and dialogue with local villagers. Data and artifacts relating to plant uses, including medicinal, agricultural and craft are being collected systematically from each location. These data are stored on a database at Oman Botanic Garden. The methodologies employed are evolving as the team grows in experience. The methods honed in these small scale studies will be used to guide a more extensive country wide ethnobotanical conservation program over the coming years. **Results:** An ethnobotanical database has been established at Oman Botanic Garden. Data from all available literature relating to ethnobotany in Oman has been extracted and entered on the database. Links with four villages in the Al Hajar mountains have been established. Data, artifacts and herbarium voucher material for locally important medicinal plants and traditional crop species in the four villages were collected in 2011 and 2012. **Conclusion:** Oman Botanic Garden’s ethnobotany research and conservation program is in the early stages. The team is growing rapidly in its remit, experience and capacity and will continue to expand over the coming years. **Keywords:** Arabian Gulf, Conservation, Traditional.

**Diffusions of Knowledge and Plant Species between West Africa and Jamaica: Historical Biogeography of Jamaican Maroon Ethnoflora**

**Introduction:** In this paper we analyze the historical biogeography of the Jamaican Maroon and tropical West African ethnopharmacopoeia. **Objectives:** It is hypothesized that traditional ethnobotanical knowledge was transferred from West Africa to the Caribbean during the trans-Atlantic slave trade and has been perpetuated in Jamaican Maroon ethnomedicine. In addition, it is hypothesized that tropical West African Akan ethnomedicinal species not available to Jamaican Maroons have been substituted with botanically related species. **Methods:** The focus of this comparative study is on medicinal plant species selected in both areas, using evidence from ethnography, voucher collections, historical documents, and early descriptions of the Jamaican and Gold Coast landscape and culture. **Results:** The hypotheses are supported with the identification of several species, or related congeneric species, utilized medicinally in both Jamaican Maroon and various West African ethnopharmacopoeia, including Ghanaian Akan and Nigerian Yoruba. **Conclusion:** Maroon ethnomedicine developed at least to some degree under influence from West African Akan traditional knowledge. **Keywords:** African Diaspora; Ethnopharmacopoeia
Introduction: The encounter between Moses and a deity physically manifesting in a burning shrub, described in the book of Exodus, has analogs in contemporary West Africa. In an ethnographic survey of 22 villages in Mande, Songhai and Gouin cultural areas of Mali, Niger and Burkina Faso, we identified 11 different villages with a sacred tree reported to have burst into flames without being consumed. These trees are understood to be inhabited by djinn, some of whom are feared for a track record of causing harm to humans, while others are venerated as the village protector. The tree species involved varied between villages, with at least nine taxa represented. The audible manifestations of the djinn also varied, with some tree deities reportedly speaking clearly to the people in vernacular language “to guide or inform”. In the Exodus account, the tree deity YHWH encountered by Moses at Mt. Horeb became the patron god of the emerging nation of Israel. However, allegiance to YHWH competed with allegiance to the Canaanite thunder god Baal, another mountain deity manifesting in sacred trees. Close parallels can be seen between Baal and the Songhai thunder god, Dongo. The connection extends also to northern Europe, where reported sacrificial rites performed at the thunder god’s tree during the Middle Ages are almost identical to current practice among the Zerma in Niger. Similarities between tree divinity traditions of West Africa, the Levant, northern Europe and elsewhere suggest that core practices and beliefs were carried out of Africa in prehistoric times. Tree-centered rites were prominent in many areas of the world until suppressed or eradicated by formal, organized religions, especially Islam and Christianity, whose historical roots ironically trace back to tree deities. Keywords: Sacred trees, elonim, djinn, thunder gods, prehistory, religion.

Plants of the Bible—a historical review and present work

Introduction: Bible plants have been the subject of many studies since New Testament times. I am distinguishing five epochs based on dominant epistemologies: Aristotelian, Reformation/advent of printing, Mosaic physics, Bible encyclopedias, and modern. Each phase tended to interpret Bible texts and relevant plants in their respective manner. In this way numerous errors were perpetuated. Present day studies must take into account the dramatic environmental degradation so widespread in the Middle East such as deep mechanical plowing which destroys traditional segetal species as tulips and narcissus. Also to be considered are changes in cropping and orchard patterns which have resulted, for example, in the present distribution of carob (Ceratonia siliqua), the disappearance of flax (Linum usitatissimum) and the change in the type of chickpea (Cicer arietinum). While most of the plants mentioned in the Bible are well known, a few are still controversial. Algum/almug remains a mystery. On the other hand, current analytical methods such as NMR mass spectrophotometry, archeobotanical studies of phytoliths, tomography, among others, have helped determine the origin of several plant products. Examples include Pistacia resin for mummification, Salicornia and related plants in glass manufacture, emmer wheat (Triticum durum) as the most widespread wheat in ancient times, and myrrh (Commiphora sp.) as a wine adjunct. Keywords: Old Testament, New Testament, Apocrypha Paudel.
Farmer Perceptions of Climate Effects on Tea Agro-Ecosystems in the Highlands of Southwest China

Introduction: Changing climate patterns threaten agro-ecosystems and pose a risk to farmer livelihoods. The extent of these impacts depends in part on farmer perceptions and adaptations to climate variability. Objectives: This study examines tea farmer perceptions and adaptations to climate variability and their correspondence with climate data. Methods: One hundred semi-structured household interviews were conducted during 2012 in four montane communities managing tea agro-ecosystems in Xishuangbanna Prefecture of Yunnan Province in southwest China. Informant responses were compared with climate data recorded at meteorological stations near the study sites. Results: Findings indicate that at least 50% of informants perceive either increased temperature, humidity, or variability of rainfall in the past 10 years. This has been accompanied by increased tea-leaf budding and yield during the monsoon season and perceptions of decreased tea quality. Concurrently, farmers perceive greater pests and soil erosion in their agro-ecosystems during the rainy season. Climate data indicate that total precipitation has increased during the monsoon season in the past 50 years. Informants perceive that tea agro-forests managed at high altitudes and under high canopy coverage are more resilient to climate effects than terraced tea agro-ecosystems in the lowlands. Conclusion: Agricultural and land-use policy promoting tea management practices should consider farmer perceptions and adaptations to climate variability to mitigate effects of this global challenge. Keywords: climate change

How does pollen analysis detect poor rice harvest?

Introduction: Rice is an important staple food in Japan. In the long history, a number of famines prevailed over the country. The analysis of documentary records in the Edo period (17-19 centuries) suggested that crop failures devastated the society, resulting in starvations and the associated riots. However, few have ever investigated societal influences of crop failures in older periods because of less availability of documentary records. High-resolution pollen records from lake sediments have been useful to reconstruct past changes in vegetation and climate. Because pollen records are essentially indices of biomass activity, it is worth examining pollen analysis as to whether it can perform as an indirect indicator of past crop failures. Objectives: This study presents relationships between recent records of bad rice crops in Japan and extremely high-resolution (annual) pollen spectra from Lake Fukami-ike, central Japan. Methods: The sediment
core was recovered from Lake Fukami-ike in Nagano prefecture, central Japan. According to an archival record, the lake was formed in AD1662 due to a landslide by an earthquake. Throughout the last 350 years since then, the lake was stable, constantly forming very thick annually laminated sediments with several event layers intercalated. Therefore, the annual layer can be separated and analyzed. A precise record of rice harvest is available over the last 100 years. Pollen in the sediments was extracted and analyzed. The Gramineae pollen flux of each year was compared to the record of rice harvest from 1918 to 1970. Results: Three major crop failures were recorded in 1953, 1956 and 1964 for Nagano prefecture. In the record of rice harvest indicates that the 1953 bad crop was the most severe. The harvest has been much improved after the World War II and the bad rice harvest was much better than the harvest before the World War II except 1953. However, the Gramineae pollen flux dropped in these years, namely these were clearly recorded in lake sediment. However, the degree of failure cannot be detected. Conclusion: It seems that lake sediment records crop failures as well as other things, such as weather. However, the degree of failure cannot be estimated from the record. Keywords: crop failure, pollen analysis, Lake Fukami-ike, annually laminated sediment

SY03008, 10:30-10:45 AM
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How resilient is the on-farm conservation of cultivated potato genetic resources in the Peruvian Andes? Spatial, varietal and socioeconomic dimensions.

Introduction: Farmers in Peru are well known to maintain high levels of intra- and infraspecific diversity of the potato crop. Accelerated socioeconomic and environmental change in the Andes is commonly considered to pose a threat for the future conservation. Objectives: To quantify the conservation status of on-farm conserved potato genetic resources in selected hotspots in the Peruvian Andes and determine the impact of perceived threats. Methods: Two contrasting regions where selected in terms of their access to infrastructure, markets and new technologies: Huancayo (Junín) / Paucartambo (Cusco). In each region the following methods were applied among a total of 202 households: (i) participatory GIS, (ii) field-level cultivar sampling, (iii) choice experiments. Results: Andean households in both region maintain high levels of varietal diversity which is spatially concentrated at the upper altitudinal limits of where agriculture is possible. Displacement of native varieties does occur, but is not straightforward: no “one-on-one” replacement. Varietal loss is uncommon and not a linear phenomenon. Conclusion: Contemporary highland cropping systems and farmer strategies are resilient in terms of their capacity to conserve genetic diversity. Keywords: agrobiodiversity, loss

SY03009, 10:45-11:00 AM
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An investigation of the molecular and chemical differences among Asian eggplant lineages in the context of their history of domestication and utilization

Introduction: Eggplants (Solanum melongena L.) were domesticated in tropical Asia where they are commonly used as both food and medicine. Human selection has produced hundreds of landraces that differ in morphology and in chemistry that may be related to ethnobotanical preferences in certain locales. Here we synthesize the results of a multi-disciplinary project that explored the genetic, phytochemical, and ethnobotanical diversity of Asian eggplant landraces and wild relatives. Objectives: The aim of the project was to use Solanum species and eggplant landraces to identify differences in molecular function and chemistry that correlate with domestication events and possible selection pressures. Results: Population genetic analyses using AFLP and molecular phylogeny revealed that eggplants appear to have been domesticated at least three times, in India, southern China, and the Indo-Malayan islands (Malesia). Phytochemical analyses of the abundance of 43 phenolic compounds using HPLC showed significantly different levels of hydroxycinnamic acid polyamine amides (HCAAs) among putatively independently domesticated lineages. These HCAAs are thought to contribute to the flavor, health-benefits, and even texture of eggplant fruit. qRT-PCR-based study of mRNA expression levels of 12 enzymes in the phenolic pathway revealed differences among lineages, notably in the expression of spermidine hydroxycinnamoyl transferases, which may underlie some of the differences in phytochemical profiles. Contemporary and historic ethnobotanical data on eggplant from India, China, and Malesia, gathered through semi-structured interviews and literature review, was compared to archaeobotanical and linguistic records of cultural interactions among these regions. Conclusion: Results lead to new hypotheses on the dates of eggplant domestication in Malesia, a region that lacks a historic record. Results also suggest that cultural preferences for mild flavor and soft fruit texture may explain the gene-regulatory and chemical differences among Asian landraces. Keywords: crop, Solanum melongena, Solanaceae, artificial selection, phylogeography, phenolic compounds, crop progenitors

SY03010, 11:00-11:15 AM
MANZALI DE SÁ, IVONE, ivmanzali@gmail.com, National Museum of Rio de Janeiro; University of Hawaii Manoa

Açai Samurai: The Commoditization of a Local Foodstuff

Introduction: This case study traces what was at its base a myth and popular misconception about a convenient local foodstuff “traditionally” valued for warding off hunger among tribes of northern Brazil to a (later) popular source of quick energy among active sportsmen – mainly surfers and ju-jitsu practitioners of Rio de Janeiro, to what eventually became – and is now touted as – a “superfood” for Americans. Objectives: This presentation analyzes the circulation and subsequent transformation of knowledge and application associated with açai (Euterpe oleracea Mart.), a palm native to Amazon region, as its use expanded from local to ultimately international arenas over the course of three decades. Specific considerations are given to its changing value as a “food” among rural and urban Brazilians (Caboclos, Ribeirinhos and Cariocas) and Americans living in Hawaii – a population completely divorced from the “Brazilian” experience. Methods: Contemporary qualitative and historical analysis of academic and popular media supplemented by field observation both in Brazil and Hawaii inform this discussion. Results: Açai has evolved from a simple “wine” to a dizzying array of
products ranging from soaps to fruit drinks, dessert treats, and health supplements; from a food with basic nutritional value to one high in antioxidants, "anti-aging" qualities, and other therapeutic benefits that are yet to be delimited. **Conclusion:** The story of açaí cannot be divorced from its link to folk beliefs and “lay” science, commerce, mass media, and the ever burgeoning dietary supplement and “natural products” movements in the West. The role of each is considered as contributing to its popular adoption as are the implications of this phenomenon for local production and ecology. **Keywords:** Euterpe oleracea; antioxidants; traditional foods; Amazonia, Hawaii.

SY03011, 11:15-11:30 AM
RAGONE, DIANE, ragone@ntbg.org, Breadfruit Institute, National Tropical Botanical Garden
**Breadfruit: Conservation and Use of a Traditional Oceanic Crop**

**Introduction:** The National Tropical Botanical Garden in Hawaii has been involved in the conservation of breadfruit germplasm since 1977 and established the Breadfruit Institute in 2003 to promote the conservation and use of breadfruit for food and reforestation. The Breadfruit Institute manages the largest and most diverse collection of breadfruit in the world, with 326 accessioned trees and more than 120 cultivars from 34 Pacific islands conserved in field genebanks. Some of the accessions are rare or extinct in their home islands. Within this collection are accessions that represent breadfruit’s entire domestication process, including the two wild progenitor species Artocarpus camansi and A. mariannensis, domesticated A. altilis, and interspecific hybrids between A. altilis and A. mariannensis. **Objectives:** This collection provides unique opportunities to study this important staple crop. **Methods:** Research includes assessing genetic and morphological diversity, evaluation of nutritional composition, yield and fruit characteristics and seasonality, insecticidal properties of male flowers, and soil mycorrhizal associations. **Results:** Our research has identified accessions with distinct traits that will help guide future germplasm conservation initiatives and nutrient-rich, productive cultivars that can make significant contributions to food security in the tropics. **Conclusion:** This talk will provide an overview of the work of the Breadfruit Institute to collect and document breadfruit diversity in the Pacific Islands, the challenges in establishing and managing a germplasm collection, and using that collection to enhance our understanding of this crop for conservation and utilization. An initiative to distribute selected cultivars for tree planting projects to support sustainable agriculture, agroforestry, and income generation will also be discussed. This initiative involves collaboration with university researchers, the private sector, and government and non-governmental agencies. It is a model for benefit sharing of revenues derived from commercialization of a traditional Oceanic crop. **Keywords:** crop germplasm, benefit sharing, cultivars

SY03012, 1:00-1:15 PM
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"Tuujinak se usa para el techo, pero ya casi no hay" - implications of language on resource conservation in the Andes and the Amazon of Peru and Bolivia
Introduction: The maintenance of local language is often assumed to be the prerequisite for the conservation of traditional knowledge, in particular when related to plant use. Very little comparative research has been done however to proof or disprove this hypothesis. Objectives: Based on a large scale study of palm use in the Bolivian and Peruvian Andes and Amazon, with 16 indigenous and local communities participating, we try to evaluate whether the maintenance of original language has a major impact on the use and conservation of palms as a resource. Methods: After obtaining permission from the local councils, and establishing prior-informed consent, usage information was gathered in structured interviews in a sixteen communities (50% indigenous and 50% mestizo or colonist) in Amazonian Tierra firme and inundated forests as well as Andean montane forest in Bolivia and Peru. The interviews were conducted with informants in the respective villages as well as during walks in the woods along the established transects. In each community, 30 participants (50% men and 50% women) within 5 age-classes (18-30; 31-40; 41-50; 51-60; >60 years), were interviewed. The interviews covered information related to 1.) palm species used for medicinal and nutritional purposes, 2.) use descriptions based on ethnobotanical categorization, 3.) socioeconomic data about the informants and the communities they live in. In each community we included key expert informants to work with in the quantitative palm inventories in the transects. All interviews were be conducted in Spanish or/and the respective local language with help of local translators. Vouchers of the species used will be collected as needed. Results: Our preliminary results indicate that at least with regard to the use of Arecaceae, the still availability of the resource is much more important for the maintenance of traditional uses and associated knowledge than the maintenance of traditional language. Conclusion: The maintenance of original language is of tremendous importance for the maintenance of traditional culture. However, the maintenance of language alone does not guarantee the conservation of traditionally used resources, nor the maintenance of the associated knowledge.

SY03013, 1:15-1:30 PM
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HORN, CHRISTA M., San Diego Zoo Global

Biocultural Conservation in the Peruvian Amazon – A Case Study of the Maijuna

Introduction: The Maijuna, also known as the Orejón, are a western Tucanoan people of the northeastern Peruvian Amazon. Approximately 400 Maijuna individuals live in four communities along the Yanayacu, Algodón, and Sucusari rivers. As in many indigenous communities worldwide, the biological and cultural resources of the Maijuna are currently threatened. Community-based biocultural conservation projects that are addressing the conservation, development, and resource use questions and concerns of the Maijuna will be discussed in detail. Significant components of this work include establishing a protected area that would formally and legally protect Maijuna ancestral territory and developing management plans for Maijuna biocultural resources, among others. Objectives: To empower and help the Maijuna to conserve their ancestral territory and biocultural resources. Methods: Community-based projects targeting the conservation of Maijuna biocultural resources are developed and carried out in collaboration with the Federación de Comunidades Nativas Maijuna
(FECONAMAI), a Maijuna indigenous organization that represents all four Maijuna communities. Participatory methodologies are utilized to identify, address, and solve the conservation, development, and resource use questions and concerns that the Maijuna have identified as important. **Results:** A 391,000 hectare Maijuna protected area was recently established that formally and legally protects Maijuna ancestral territory. Management plans for economically, ecologically, and culturally important resources (e.g., *Mauritia flexuosa*) have also been developed. Other initiatives targeting the conservation of Maijuna biocultural resources are ongoing. **Conclusion:** The unprecedented decline and loss of global biocultural diversity highlights the need for ethnobiologists, whom often work in areas and communities experiencing enormous sociocultural and environmental change and challenges, to do more collaborative, applied, and community-based research projects. We envision host communities becoming full and equal partners in all aspects of the ethnobiological research process. We view this approach as a more ethical research model and an absolutely necessary step if the field of ethnobiology is to have any meaningful role in addressing and stopping the loss of global biocultural diversity. **Keywords:** Community-based conservation, Biocultural diversity, Amazonia

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**SY03014, 1:30-1:45 PM**

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GILMORE, MICHAEL P., New Century College, George Mason University

ENDRESS, BRYAN A., Institute for Conservation Research, San Diego Zoo Global

**Towards Ecologically and Economically Sustainable Management of Aguaje (*Mauritia flexuosa*): Two Indigenous Communities in the Peruvian Amazon**

**Introduction:** *Mauritia flexuosa*, locally known as aguaje, is an ecologically important non-timber forest product whose fruits are often harvested destructively. In the Peruvian Amazon, the Maijuna indigenous group has recognized the need to manage this resource to sustain and increase income earned from the fruit. Initial efforts in two Maijuna communities to transition towards sustainable management have had mixed results. **Objectives:** To better understand the social, economic, and ecological factors affecting the development of sustainable management practices for aguaje in two Maijuna indigenous communities. **Methods:** Focus groups and semi-structured interviews provided information on historical harvesting patterns and current community and NGO efforts to manage aguaje, while household surveys supplied data on household incomes as well as current harvest rates and methods. We also conducted an ecological survey of 12 harvested aguaje stands, including abundance, population structure and sex ratio. **Results:** The aguaje stands are degraded, with a sex ratio of 3.48 males for each female and low female densities. However, the overall abundance and population structure of aguaje is encouraging. Half the aguaje harvested was obtained using non-destructive methods (climbing harnesses): many current and past harvesters were not trained to climb and only seven harnesses are available for use. Aguaje harvest rates are relatively low and represent only 5% of community income. Low stocks combine with low prices and irregular market access for a low return on effort for harvesting. **Conclusion:** Cases where forest resources have already been degraded, transitioning to more sustainable management alternatives can be impeded by a number of ecological and socio-economic factors. Low resource stock, market barriers, the limited access to climbing technology and training, and limited organizational experience at a community level all interact to hinder sustainable management of aguaje on Maijuna lands. Each
should be addressed to make aguaje an ecologically and economically sustainable resource.

Keywords: NTFP

Documenting regional patterns of *Mauritia flexuosa* extraction in the Peruvian Amazon: implications for conservation and sustainable management

Introduction: Fruit from the aguaje palm is critically important for wildlife and rural communities in the Peruvian Amazon. The large city of Iquitos (est. pop. 500,000) creates an enormous demand for this non-timber forest product. This demand provides a potentially important sustainable source of income for Amazonian communities. Unfortunately, this opportunity is often unrealized because of the practice of destructive harvesting of female palms. To maintain a source of income for communities and ensure the continued existence of fruit-bearing females for wildlife, many organizations have promoted alternative non-destructive harvesting techniques. Yet destructive harvesting remains widespread and it is difficult to know how or where to prioritize efforts over such a vast area. Moreover, the full extent of Iquitos’ impact on the regions aguaje palm swamps and the wildlife remains poorly described.

Objectives: To: (1) quantify and document spatial and temporal patterns of the commercial aguaje fruit harvest in Loreto, Peru and (2) identify priority areas for capacity building and sustainable management.

Methods: Aguaje imports into Loreto are tracked daily in various ports and markets throughout the city and information regarding the amount and source location of aguaje is recorded. Data is then cross-referenced with data from wholesaler. Information is then entered into a GIS database to analyze spatial and temporal patterns of extraction across the region and then to other information including protected area delineations, current and historical sustainable harvest initiatives, and mode of harvest (destructive or not).

Results: Five major river basins supply the city of Iquitos (Maraon, Nanay, Ucayali, Napo, and Amazonas). Fruit arrives year round and hundreds of thousands of fruit enter the city each day. Villages several hundred kilometers away sell aguaje to Iquitos, highlighting the important role of aguaje in the regional economy as well as the potentially serious ecological consequences of destructive harvest.

Conclusion: This study will be the first regional assessment of this conservation problem despite the fact that concern about destructive aguaje harvest has been noted for over 20 years. It will highlight extraction hotspots based on local and regional conservation priorities, allow decision makers to see where destructive harvesting (i.e. communities without management plans or training) is occurring at high rates, and prioritize and implement engagement and capacity building efforts.

Keywords: NTFP, palms, Areacaceae

Of Palaces and Pet Kot: Agroforestry Studies of the Ancient Maya at Tikal
**Introduction:** Paleoethnobotanical analyses of wood and other plant remains from recent excavations at the Tikal site provide clear indications of the forest management practices of the ancient inhabitants. **Objectives:** The objectives of this study are to: 1) assess the impact of Maya agroforestry practices on the Tikal environs across its nearly 2000 year occupational history, 2) evaluate the importance of "bajos" (seasonal wetlands) to ancient Maya agriculture, and 3) determine the array of wild and domesticated plants that the Maya used to sustain their great polity. **Methods:** Several middens were excavated in plazuela groups adjacent to the site core of Tikal. Phosphate testing was used to locate areas of high organic content, i.e., where middens were likely to occur. Flotation samples were collected from each cultural strata excavated and processed in a modified SYMAP tank especially constructed for the project. Isotopic analyses were completed on sediments from numerous strata around the city. **Results:** Middens were discovered, numerous plant remains were identified, carbon isotopic data were generated and pollen data were recovered. **Conclusion:** The results are reflective of the changes in forest structure that occurred over a major portion of the occupation time of the site. The results help to define the role of human agency that influenced environmental changes on a broader scale. **Keywords:** pollen, carbon isotopes

SY03017, 2:15-2:30 PM
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ORR, BLAIR, Michigan Technological University

**Economic and cultural significance of non-timber forest products for three cultural groups in the southwest Rhodope Mountain region of Bulgaria.**

**Introduction:** The Southwest Rhodope Mountain region of Bulgaria is home to three distinct sub-cultures that rely on non-timber forest products (NTFP’s) collected from the same resource base but with different emphases on economic, cultural, and medicinal purposes. Their ecological knowledge of NTFP’s is pertinent to the continued proper management of forests in this region for the preservation of the culture and livelihoods of the people. **Objectives:** The main objective of this study was to present knowledge of local sub-cultures in the Southwest Rhodope Mountain region of Bulgaria and how their knowledge of the multiple purposes of non-timber forest products for economic, medicinal, and cultural value can affect the management of the forests for the livelihoods of the people living there. **Methods:** Interviews with local people of all ethnicities were performed until a point of saturation was reached. Furthermore, participant observation was also employed in order to confirm the results of the interviews and to gather more information. **Results:** The three sub-cultures, or different ethnicities, living in this region rely on NTFP’s collected from the same resource base for varying reasons. The Roma population relies mostly on mushrooms for their economic value to supplement their income. The Orthodox Bulgarian population relies on herbs for its medicinal value, because pharmaceutical medicines can be expensive. They also rely on mushrooms and berries for cultural purposes; this is explained as generations of people spending time in the mountains collecting non-timber forest products as a pastime. Lastly, the Bulgarian Muslim population relies on mushrooms, herbs, and berries for economic, medicinal, and cultural purposes. All of these can be sold to the market, eaten fresh, used medicinally, or preserved in the home for winter months when the garden is no longer available to provide food. Using non-timber forest products supplements in the income in that medicines and food are not needed to be purchased at stores or market. **Conclusion:** The people living in this region have useful knowledge of NTFP’s,
where they grow, and how forest management practices to varying degrees affect their availability. In areas of Bulgaria, such as this one, where many do not have jobs and rely on NTFP’s for income, medicine, food, and cultural purposes, proper forest management needs to include the preservation of the NTFP’s while utilizing the knowledge that already exists of the local people. **Keywords:** Bulgaria, ethno-botany, non-timber forest products

SY03018, 2:30-2:45 PM  
VIRAPONGSE, ARIKA, arikav@ufl.edu, University of Florida  
**Examining the link between NTFP value chains and livelihood strategies in Maranhão, Brazil**

**Introduction:** Non-timber forest products (NTFPs) are often promoted as a conservation and development tool to manage natural resources and improve or stabilize household economies. NTFP markets can be made up of different actors who are joined together through value chains and face unique sets of risks, opportunities, and accessible resources. The social complexities of NTFP systems can make it difficult to understand the relationship between forest product utilization and livelihood systems. **Objectives:** This paper examines how changes in the value chain of buriti (*Mauritia flexuosa*) handicrafts impacts livelihood strategies of different actors in Barreirinhas, Maranhão (Brazil). **Methods:** Data were collected during 2009 to 2011 by employing structured and semi-structured interviews with 149 selected individuals who were owners of buriti resources, extractors of buriti derivatives, artisans of buriti fiber handicrafts, and handicraft vendors in markets. Socio-economic data were analyzed using multivariate, value chain, and qualitative analysis. **Results:** Results of the study show that actors can overcome constraints to participate in the buriti market by relying on their livelihood assets and cooperating with other actors. Modifications in the participation of an actor or accessible resources, however, can lead to repercussions along the value chain. **Conclusion:** Conclusions show that NTFP studies must consider social heterogeneity in order to understand the dynamics of NTFP markets among local communities and effectively implement conservation and development strategies regarding NTFPs. **Keywords:** *Mauritia flexuosa*, livelihood systems

SY03019, 3:00-3:15 PM  
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WIEGAND, RICHARD H.  
**Orchid Decline in the Catoctin Mountains, Frederick Co., Maryland as Documented by a Long-term Dataset**

**Introduction:** Of all the land plants the orchids are among the most speciose and charismatic. The Catoctin Mountains of Maryland are reported to support 27 species of orchids including 25 native and 2 non-native. **Objectives:** To monitor the long-term population trends of the Catoctin Mountain Orchids. **Methods:** Annual species counts were conducted at 153 individual sites in the Catoctin Mountains over 25+ years inventoring 21 orchid species (20 native and 1 non-native). **Results:** These counts have documented a shocking decline in all species of orchids except for *Platanthera ciliaris* and *P. flava*. The reasons for *Platanthera ciliaris*’ continued population success is largely due to site specific habitat management at one site with all other sites for this species showing an overall decline in individuals. Alarming trends are documented for common species such as *Galearis spectabilis*, which has declined at 21 sites...
from 1319 individuals in 1985 to 257 individuals in 2008 and *Cypripedium acaule* which has declined at twenty four sites from 1168 individuals in 1984 to 160 in 2008. An additional three species known from 30 study sites were lost. Of all 21 species surveyed during this long-term study 10 have seen a decline of at least 90% while the remaining species have undergone similar but less severe declines. **Conclusion:** This loss of orchid diversity is likely caused by a number of factors. The most significant being a large deer population. **Keywords:** Orchids, decline, long-term data, deer

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**Notes on the distribution and human-mediated ecology of *Carex*, section Phaestoglochin in Maryland**

**Introduction:** The genus *Carex* (Sedges; Cyperaceae) is comprised of over 2000 species that are globally distributed and that occur in almost every biome. The Maryland *Carex* flora is diverse with 179 taxa representing 162 species. *Carex*, section Phaestoglochin includes five species that are undergoing relatively rapid range expansions where the major dispersal vectors appear to be humans. The cryptic nature of these species in the field and poor representation of
Maryland material in local and regional herbaria have complicated assessments of conservation ranks. I discuss the ecology, distribution and current conservation status of five species that are at or near the northern or eastern extents of their geographic ranges: *C. aggregata* Mack., *Carex australis* (Small) Mack., *C. gravida* Bailey, *C. leavenworthii* Dewey and *C. mesochorea* Mack. **Objectives:** To assess appropriate conservation ranks for taxa that appear to be extremely adaptable to anthropogenic changes on the landscape according to a simple conceptual model based on phylogenetic context, historical records and current landscape condition. **Methods:** Following my conceptual model I searched local and regional herbaria for historical and recent specimens and then field tested the model with field surveys focusing on anthropogenic habitats. **Results:** I located over 106 Maryland specimens in herbaria and through surveys I added over 50 specimens comprising multiple new locations within known counties of distribution and several new county records. **Conclusion:** Human activities may have introduced new populations from distant and perhaps disparate source populations leading to changes in demography and adaptive potentials. **Keywords:** *Carex*, Cyperaceae, Sedge, Ecology

SY03022, 3:45-4:00 PM
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**Seed Conservation Policies to Increase Agricultural Biodiversity, IPR and Benefits Sharing**

**Introduction:** Seed conservation has been going on for close to 30 years at Native Seeds/SEARCH, a non-profit organization that focuses on collecting and conserving agricultural heirloom seeds from Indigenous farmers, gardeners, vendors and communities of the Southwestern U.S. and Northwestern Mexico. **Objectives:** To identify strategies of benefits sharing in a conservation framework amid the growing number of international treaties and concern over seed patents. **Methods:** The organization’s Native American Committee and Advisory Panel assisted in creating roundtable discussions and surveys with multiple Indigenous groups (Hopi, Navajo, Gila River Indian Community, and New Mexico Pueblos). **Results:** Along with a new Code of Ethics, a working draft has been created on the Guidelines for Intellectual Property Rights and Benefits Sharing from the input gathered from the roundtable discussions. In addition a Director of Native American Outreach has been hired to facilitate further relationship building and benefits sharing projects including a Seed Keeper program to help with education programs focused on seed saving and associated agricultural heritage tailored to individual groups. **Conclusion:** While benefits sharing of this non-profit organization have included the conservation of heirloom seeds, free seed program, outreach and select Sierra Madre projects; there is also currently a food and seed aid donation drive for the Tarahumara. Native Seeds/SEARCH strives to ensure any seeds collected from Indigenous groups and geographical regions are continually linked through database archives, a review of international treaties and other seed bank’s agreements will determine developments for additional IPR protections. **Keywords:** indigenous, southwest, native, ethics

SY03023, 4:00-4:15 PM
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MANDLE, LISA, University of Hawai‘i at Manoa
GANESAN, R., Ashoka Trust for Research in Ecology and the Environment (ATREE)
Disentangling the drivers of decline of culturally important plants

Introduction: Wild populations of many culturally and economically important species are in decline. However, wild-harvested plants are often subject to other sources of disturbance in addition to harvest, and the factors driving population decline are often complex and poorly understood. Objectives: We present two case-studies from the Western Ghats mountains, South India to illustrate the importance of disentangling the causes of population decline. We focus on (i) Indian gooseberry (*Phyllanthus emblica* and *P. indofischeri*), heavily harvested for medicinal fruit and (ii) mountain date palm (*Pheonix loureiri*), heavily harvested for leaves, which are used to make brooms. In both studies we ask: What are the drivers of population decline? How does harvest interact with other drivers? Methods: For Indian gooseberry, we carried out a 10 year demographic study in dry forests of the Biligiri Rangaswamy Temple Wildlife Sanctuary. For mountain date palm, we studied the demography of 14 populations across different savanna woodlands over 2 years. In both studies we recorded rates of harvest, as well as growth, survival, reproduction, frugivory and herbivory by other animals, and measures of other types of disturbances. We used population projection models to assess the effects of harvest and its interactions with other kinds of disturbance on long term population growth rates. Results: Two invasive species – a non-native understory shrub lantana and a native mistletoe - not fruit harvest - are the main drivers of decline of Indian gooseberry. Lantana limits recruitment even in areas without lantana by indirectly increasing grazing by wild herbivores. Spread of both is at least in part a result of the banning of traditional fire regimes. For mountain date palm, fire frequency drives population dynamics by altering intensities of both harvest and grazing by wild and domestic herbivores. Conclusion: Our results indicate that the current conservation policies that ban harvest alone will not be effective in conserving these and other wild-harvested species. Disentangling the drivers of population decline is complex but critical for conservation of wild-harvested plants and the cultural traditions and local livelihoods that depend on them. Keywords: population viability, India, medicinal plants

Perceptions, Adaptations and Mitigations of Climate Change in Manang Village, Western Nepal

Introduction: The people of Manang village in the Annapurna Mountains of Western Nepal are witnessing rapid changes to their local environment as a result of climate change. Perceptions of a changing climate include decreased snowfall and snow cover, increased temperature and rainfall, and the retreating Gangapurna glacier and expanding glacial lake. Spiritual explanations of changes in precipitation, warmer temperature, and extreme weather events abound. As snows melt and the mountains surrounding Manang become black, villagers declare that the gods are deserting them and search for a way to make amends for their offense. Adaptations to a wetter and warmer environment include changes in Manangi home construction, agricultural crops, diet, and personal clothing. Current carbon mitigation strategies include increased planting of tree crops suitable to a warmer climate and the gradual replacement
of wood burning stoves with more efficient gas stoves at the household level. Advances in technology and village development have changed the Manang village lifestyle dramatically over the last 20 years. Now largely dependent on seasonal tourism, Manang villagers worry that increased extreme weather events and other climate related changes will decrease tourism and threaten their livelihood. While the people of Manang adapt day by day to changes in their environment, the village has reached a tipping point where gradual changes in climate have resulted in dramatic changes in village life: from yak herding to vegetable farming and fruit production. Obtaining information about climate change perception and adaptation in Manang can provide valuable insight for policy makers and village leaders to adapt to and mitigate the influence of climate change at the village level. Keywords: No words used in Title

SY03025, 4:30-4:45 PM
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EDELMIRA LINARES, Universidad Nacional Autónoma de México
Continuity of inter-regional trade of medicinal and edible plants of the Sierra Tarahumara, Chihuahua, Mexico

Introduction: The Sierra Tarahumara is located at the northern limit of the Sierra Madre Occidental (Western Mother Mountains), the largest of the three major mountains chains of Mexico. The flora includes more than 2000 species of vascular plants. The Tarahumara, the dominant Native American group in the region, employ over 500 species of edible and medicinal plants, some of which have been subject to trade and commercialization for over a century.

Objectives: To determine the continuity of edible and medicinal plants derived from the tropical barrancas and the temperate mountains of the Sierra Tarahumara that were recorded in inter-regional trade during the 19th and 20th century.

Methods: Continuity was determined by the permanence of plants (thematic unit) and their use (context) between 1890 and 2010. Data pertaining to the taxonomic identity and the use of plants were derived from herbarium specimens and literature for the periods 1890, 1910, and 1930 and compared to contemporary surveys in the markets of Chihuahua.

Results: Thirty plants have been documented in inter-regional trade among the Tarahumara Indians of the mountains northern Mexico between 1890 and 1930. Over one half of those species continue to be commercialized today. The endemic gum, arí, derived from Coursetia glandulosa continues to be valued in the preparation of sauces and drinks. The medicinal applications of chuchupate (Ligusticum porteri) among other herbals have amplified in terms of illnesses treated as well as geographic area of commercialization.

Conclusion: Half of the plants traditionally traded from the mountains continue to be commercialized in Chihuahuan urban markets. Other species have been abandoned due to: 1) scarcity caused by over-collection and habitat modification or 2) substitution by the same species from other geographic areas or by other plants. Keywords: markets

SY03026, 4:45-5:00 PM
SIGSTEDT, SHAWN, nature@worldpark.org, Colorado Mountain College Alpine Campus; World Park Educational Institute; Healing Planet Herbs
World Park - a unified nature conservation strategy and educational initiative with beneficial biological consequences.
Introduction: We are exploring the educational and biological benefits of teaching using a positive solutions-based scientific perspective, that the whole world is a global ecosystem, a World Park. The benefits of this worldview for nature conservation and education are many. During a series of steps including familiarization with a chosen native species, local biodiversity and biomimicry, students explore native ecosystems for new potential innovative technologies and insights into nature. Students produce digital storytelling movies including a Species Report as they become guardians of a native species, and later with a Conservation Report as they explore how they would like to design global nature conservation strategies for the future. Through this program students explore the value of getting to know native organisms, species, populations, and primary ecosystems and sometimes learn about inner innovative technologies of indigenous people who have been living sustainably with nature for thousands of years near thriving primary ecosystems, often with a high quality of life. An example of World Park educational studies and thinking will be presented as a model of a Navajo herbal wild-harvesting tradition with *Ligusticum porteri* (Osha) and *Ursus americanus* (Black Bears) for insights into biomimicry and primary ecosystem sustainability. Objectives: To educate about the biological benefits and educational advantages of teaching undergraduates using a global ecosystem and World Park Studies approach. Methods: Designing and applying an evolving World Park Studies educational conservation biology program to 750 undergraduate students over five years and measuring the positive solutions based attitudes of students using a scale of irreversibility and ecological triage. Results: The World Park Studies program was increasingly successful in improving the conservation biology insights and positive solutions based attitudes of students. Conclusion: A World Park Studies approach to conservation biology is highly beneficial to students, and natural ecosystems. Keywords: Conservation biology, inner innovative technologies, biomimicry, ecological triage
SY04001, 8:30-8:45 AM
MOLLIK, ARIFUL HAQUE, mollik_bge@live.com, Peoples Integrated Alliance
Documentation of vegetable plants growing inside the Khulna division used by the Buno people of Bangladesh

Introduction: Different ethnic groups of Bangladesh and their colorful lifestyles have significantly enriched the entire culture of Bangladesh. Buno is an ethnic minority people of Bangladesh mostly found in the Rajshahi, Rangpur, Khulna, and Dhaka division. They are nomadic ethnic people like Romani, and Bede people. They do not live in a single place permanently. They often move one village to another village. The exact figure of the population of Buno people is unavailable. Perhaps, 100000 to 200000 Buno people exist throughout Bangladesh. Objectives: This ethnic group is less studied and less known to scholars. A survey was conducted to document the information regarding vegetable plants used by the Buno people inhabiting within the Khulna division of Bangladesh, which area because of its proximity to the Sunderbans forest region contain a diversity of vegetable plants. Methods: Extensive interviews were conducted of the Buno people, and information collected as to vegetable plant otherwise parts used, and the ailments treated. All vegetable plants were identified and vouchers were stored at the Bangladesh National Herbarium, under the author's collector series. Results: Information on twenty-four vegetable plants was obtained. The vegetable plants used by the Buno people included Achyranthes aspera L., Agaricus campestris L., Aloe vera (L.) Burm.f., Amaranthus spinosus L., Basella alba L., Amaranthus gangeticus L., Cardiospermum halicacabum L., Centella asiatica (L.) Urb., Colocasia esculenta (L.) Schott, Corchorus capsularis L., Crotalaria pallida Aiton, Cuscuta reflexa Roxb., Euphorbia hirta L., Glinus lotoides L., Heliotropium indicum L., Ipomoea aquatica Forssk., Nymphaea nouchali Burm.f., Orthosiphon aristatus (Blume) Miq., Paederia foetida L., Phyla nodiflora (L.) Greene, Piper longum L., Sida cordifolia L., Wedelia chinensis (Oseck) Merr., and Xanthium italicum Moretti. Conclusion: These vegetable plants having nutritional values provide promising scope of utilizing them as normal or scarcity or famine foods too. Thus chemical analysis may be carried out on these vegetable plants to estimate their chemical composition and nutritive values. Also it may further be mentioned that over exploitation of vegetable plants in the name of food may lead some vegetable plants ultimately to the disappearance in future. Therefore attention should be made on proper exploitation and utilization of the vegetable plants. Keywords: Sunderbans forest, Nomadic ethnic people, Nutritional values.

SY04002, 8:45-9:00 AM
PAUDEL, BABU RAM, brp2033@gmail.com, Prithvi Narayan Campus, Tribhuvan University
Ethno-Phytotherapy in the Lekhnath Municipality,Kaski, the Mid-Hills of Nepal

Introduction: Lekhnath Municipality,extends, in the 'Oriental Realm', between the north parallels of 250 7' and 280 10' and east meridians of 83050' and 84050'. Situated in the mountainous region of the southern Himalayas and trapped between the higher Himalayas in the north and Mahabharat range in the south, it occupies central position in the country. Lekhnath Municipality is rich in both biodiversity and cultural diversity. It includes the biodiversity rich forest and wetlands, both of which are declared as biodiversity hot spot in Nepal. Objectives: The study analyzed the indigenous knowledge of medicinal plants and their uses among the
different ethnic groups living within the municipality. **Methods:** Data were collected in one year period through interviews, interaction and workshop with local people and traditional healers (Baidhya, Dhami and Amchis) and traditional followers. **Results:** A total of 217 plants were found being used by the local healers for the treatment of more than 50 different prevailing diseases within the communities. Spiritual belief, minimum or no side effect, cheap and easy availability are the causes of dependency on traditional healing practice. **Conclusion:** Enforcement of local bodies in management of plant resources and legitimating traditional knowledge and practice could help to preserve indigenous knowledge. **Keywords:** Traditional healers, ethnic groups, indigenous knowledge

SY04003, 9:00-9:15 AM
SHRESTHA, SUSHMA, shrests@muohio.edu, Miami University
**Gurung ethnobotany and baseline floristic survey for biodiversity conservation in Manaslu Conservation Area, Nepal**

**Introduction:** The Himalayan Mountains are considered the “hotspot” for biodiversity conservation because of high species richness, endemism, and its threatened status by human activities. For montane landscape where forests are already highly modified and are limited to higher elevations, understanding how plant resources are distributed across complex landscape and used by local people is critical for conservation strategies. **Objectives:** To compile and integrate ecological and ethnobotanical knowledge about forest community types and woody plants accessible and utilized by Gurung ethnic communities of Manaslu Conservation Area, Nepal. **Methods:** Participatory maps obtained from four Gurung villages were used to determine montane forests with high use in the local landscape. Based on these maps, 108 ecological plots were established in the resource areas located at various elevations (1500m to 3000m) to examine the composition and structure of forest types. Corresponding ethnobotanical data on the usage of woody plants were gathered using semi-structured interviews, transect walks, and participant observations. **Results:** Preliminary results suggest that Gurung communities widely use various “Nak” (forest patches) situated above their villages. The temperate forest stands which are closest in distance to the villages were mostly modified for fuel wood, fodder and food resources. The upper temperate and subalpine forests which were difficult to access and were further in distance from the villages, were used mainly for construction resources. Gurungs listed 134 useful trees, 34 shrubs and 9 vine species of which 101 were also recorded in the plots. Few grass and herb species were classified as shrubs. *Cycllobalanus glauca* (Sul) showed the highest use value. *Abies spectabilis* (Jhi) and *Larix himalaica* (Kal) were listed as most important plant species. **Conclusion:** Gurungs mainly obtain their forest resources from the mixed temperate forest patches. Although highly modified and mostly secondary in nature, temperate forests are rich in woody plant species. Culturally important and most frequently used species that are rare in the resource areas can serve as a basis for conservation discussions and its application via enrichment and sustainable use. **Keywords:** Gurung, ethnobotany, Manaslu Conservation Area

SY04004, 9:15-9:30 AM
SHRESTHA, NAVAL, nawalshrestha@gmail.com, Chinese Academy of Sciences
SHRESTHA, KRISHNA KUMAR, Tribhuvan University
**Rare and Endangered Medicinal Plants of Rasuwa District, Nepal: Status and Utilization**
Introduction: Rasuwa district is a Himalayan district in Central Nepal dominated by ethnic Tamang community. Ethnomedicinal practice in Rasuwa is highly prevalent with large number of household relying chiefly on the herbal medicines. Higher demand followed by illegal trade and unsustainable harvesting practices have made several species rare in the area. Objectives: To assess the status of high valued, rare and endangered medicinal plants of Rasuwa district in Central Nepal with a note on their ethnomedicinal use. Methods: Semi structured questionnaire was used to obtain information from local people on the status of medicinal and aromatic plants, localities of their occurrences, local utilization and trade issues. Fifty key persons were interviewed from Syaphru village and 30 from Langtang village. Resource mapping was done with the help of field survey, secondary literatures and response from local people. Vulnerability assessment test was carried out to quantify the level of threat. Results: About 80% of the households in Rasuwa depend upon the traditional healthcare system for treating various medical ailments. Relying on their traditional knowledge, they use wild medicinal herbs largely administered by local healers. About 100 species were found to have ethnomedicinal use based on various studies. Twenty species of Himalayan medicinal plants were found to be vulnerable in Rasuwa district. Conclusion: Medicinal plants are crucial to the livelihoods of the rural Tamang people. Besides local utilization, there is high collection pressure on these species due to growing trade demand. This has encouraged illegal trade and unsustainable harvesting practices which in turn has increased the extinction risk of many Himalayan medicinal plants. Keywords: Himalayan plants, ethnomedicine, Tamang

SY04005, 9:30-9:45 AM
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PAUDEL, PRAJWAL, University of Alabama
SETZER, WILLIAM N., University of Alabama
Bioactivities and Chemical Composition of Himalayan Aromatic and Medicinal Plants
Introduction: Nepal is a small country in South Asia, located between two emerging giants of the Asian continent: India and China. However, like the Himalayan range, Nepal’s biodiversity, a mosaic of species, is unmatched giant in its own right. In coordination with botanist and chemist from Tribhuvan University in Nepal and lab facility at University of Alabama-Huntsville, 75 essential oil samples were collected and further analyzed using GC-MS for components as well as cytotoxicity, anti-microbial, brine shrimp lethality, allelopathy, termiticidal activity, was conducted. Objectives: The purpose of this project is to find medicinal value of Himalayan plant and their chemical composition. Methods: GCMS analysis of chemical composition, Microbial activity testing, Brine Shrimp lethality bioassay, Mosquito larvicidal activity, molluscucidal activity, Cytotoxic activities were tested for Himalayan essential oils from Nepal. Results: The results showed a remarkable range of essential oils, varied biological activity. Conclusion: Natural products of Himalayan ranges are most important source for alternate natural medicine. Keywords: Bioactivity, Essential oils, Himalayan Region, Nepal

SY04006, 9:45-10:00 AM
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LAMXAY, VICHITH, National University of Laos, Dongdok campus
BJORK, LARS, Uppsala University
Steam sauna, hot beds and mother roasting: Medicinal plants and postpartum recovery among the Brou, Saek and Kry (Laos)

Introduction: The Brou, Saek and Kry inhabit the upper reaches of the Nam Theun watershed in the Annamite mountain range in Central Laos. Both childbirth and postpartum recovery have a complex of practices that are strictly observed, with those of the Kry being vastly different from those of the Brou and Saek. Objectives: Our research focused on documenting perinatal practices, and medicinal plant use, with the objective of identifying opportunities for culturally-sensitive integration of modern healthcare practices into traditional custom. Methods: Brou, Saek and Kry women were interviewed by female interviewers in 10 villages in the period 2006-2010. Respondent data was analyzed and complemented during subsequent interviews. Medicinally used plants were collected and identified. Results: The Brou, Saek and Kry all use medicinal plants during postpartum recovery. Medicinal plants are drunk in decoctions, eaten in food, boiled for steam sauna and steam bath, and used heated in hot beds and mother roasting. All groups observe a 14-28 days postpartum confinement period in which both mother and infant practice dietary proscriptions, and steam baths and sauna. The Brou and Saek practice hotbeds and mother roasting. The Kry have a complex system of spatial taboos, where the mother gives birth outside the village in a birthing hut, after which she recovers in her menstruation hut, before returning to the family house. Conclusion: Postpartum confinement practices are an integral and important part of childbirth for the Brou, Saek and Kry. Infant and maternal mortality could be reduced through improved monitoring by trained midwives or nurses, and availability of modern pharmaceuticals, such as antibiotics and synthetic oxytocin. For Kry women giving birth in clinics instead of a traditional birthing huts would be an option, as long as these are outside the village to respect Kry taboos. Keywords: Women's health, Confinement, Parturition

SY04007, 10:00-10:15 AM
BROWN, ADAM, arbrown2@uncg.edu, University of North Carolina Greensboro
CECH, NADJA, University of North Carolina Greensboro

Can every plant improve antibiotic effectiveness? Studies on bacterial efflux pump inhibitors in land plants.

Introduction: Due to the increasing number antibiotic resistant bacteria, the development of new strategies combating these difficult to treat infections is important. One potential route to treating these infections is the combination of existing drugs with different compounds capable of acting as synergists, and such synergies have been observed in various seed plants. One (of several) mechanism by which some microbes become resistant to antibiotics is the overproduction of toxic compound efflux pumps which extrude antibiotics from the cell, the presence efflux pump inhibitors in a given extract can render it a synergist of many antimicrobials. Objectives: The purpose of this study is to evaluate the distribution of two phenomena (synergy with other antimicrobials and efflux pump inhibition) in land plants senso lato, and testing the hypothesis that the production of efflux pump inhibitors is the primitive condition of land plants. Methods: The first bioassay tests for synergy between an extract and the natural product berberine, an antimicrobial and known efflux pump substrate; the second tests for activity against bacterial toxic compound efflux pumps. A group of eight plants was selected to represent the major groups of land plants including bryophytes, fern allies, gymnosperms and angiosperms. Results: The results from both assays show that both the ability of a plant to act as
a synergist and the presence of efflux pump inhibitors are extremely common. **Conclusion:** The bryophyte extract (*Marchantia* spp.) was active in both assays, lending positive support the hypothesis. **Keywords:** Synergy, antimicrobial resistance, NorA

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SY04008, 10:30-10:45 AM  
MUELLER, NATALIE G., ngmueller@gmail.com, Washington University  
**Mound Centers and Seed Security in Middle Woodland Illinois**  
**Introduction:** The Middle Woodland period (0-500 CE) in the midwest and midsouth of the United States is marked by the emergence of agricultural systems and by the appearance of networks of elaborate earthworks and trade. How were these phenomena connected? **Objectives:** I use the botanical assemblage from the Mound House site in the Lower Illinois Valley (LIV) to evaluate the hypothesis that floodplain mound centers were institutional supports for the intensifying agricultural systems of Middle Woodland societies. I review ethnographic examples of local institutions for the exchange of seed that provide insights into how small scale farmers mitigate risks and improve seed stock. **Methods:** I analyzed that charred botanical contents of a large midden from one such earthwork, the Mound House site, in comparison to previously published assemblages from five other sites in the Lower Illinois Valley: three habitation sites and two other mound complexes. **Results:** Plant refuse at Mound House differs significantly from that at other habitation sites in the valley. The relative abundance and patterning of crop seeds suggests that harvesting and processing did not take place at the site; seeds present at Mound House represent transported stores and provide circumstantial evidence for exchange. Ethnographic studies of seed exchange networks among subsistence farmers reveal the potential utility of mound centers in improving seed security for Middle Woodland farmers. **Conclusion:** Without mechanisms for the dissemination of seeds and knowledge, agriculture is risky and unpredictable. Even for today’s subsistence farmers seed insecurity and breakdowns in networks of mutual support can lead farmers to abandon the cultivation of crops altogether. I suggest that mound complexes may have played a role in nurturing the emergence of an archaeologically visible agricultural system during the Middle Woodland period in the Eastern United States. **Keywords:** Eastern Agricultural Complex, Exchange, Pre-Columbian Agriculture

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SY04009, 10:45-11:00 AM  
SPENGLER III, ROBERT N., rnspengl@wustl.edu, Anthropology Department, Graduate Student, Washington University in St. Louis, CB1114, One Brookings Dr., St. Louis M.O. 63130  
**Agriculture during the Bronze and Iron Age Interface: the Mountain Foothills of Eastern Central Asia**  
**Introduction:** The cultural dynamics and economies that underpin the development of Eurasian societies of the steppe are thought to have undergone significant changes at the start of the Iron Age (ca.800 B.C.). An increase in size and quantity of burial mounds and occupation sites are argued to be indicators of a transition. However, these transition models are usually characterized by increased mobility and reliance on pastoralism. **Objectives:** I discuss new paleoethnobotanical data from the pivotal time period of the early Iron Age, looking at three archaeological sites in Semirech’ye, Kazakhstan (Tuzusai, Begash, and Mukri) in an attempt to understand the economic processes taking place. **Methods:** Sediment samples were floated in the field using either a SMAP machine or simple bucket flotation depending on the site. A minimum sieve size of 0.355 mm was used for light fraction and 1.00 mm was used for heavy
fraction. All samples were sorted in the paleoethnobotany laboratory at Washington University in St. Louis. **Results:** High densities and ubiquitousness of domestic grains were identified from the Tuzusai site specifically, notably free-threshing wheat, hulled and naked barley, broomcorn millet and foxtail millet. In addition, grape pips were recovered. **Conclusion:** While agricultural products were used in the region as far back as the Middle Bronze Age, agriculture became a major economic pursuit in the early Iron Age, sparking a ‘Neolithic’ transition (much later in time than other parts of the world) and corollary demographic shift, increased cultural complexity, and heightened archaeological presence. **Keywords:** Domestic Grain, Steppe

SY04010, 11:00-11:15 AM
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XU, JIANCHU, Kunming Institute of Botany, Chinese Academy of Sciences, 3/F Library Building, Heilongtan, Kunming, Yunnan 650204, China

**On the Origin of Hops (Humulus, Cannabaceae)**

**Introduction:** The three species concept of *Humulus* (*H. lupulus, H. scandens,* and *H. yunnanensis* Cannabaceae) is supported by morphological investigations; however, the genetic variability and phylogenetic relationships of *Humulus* exclude significant sampling in China, which is the proposed region of origin for the genus. **Objectives:** To clarify the distribution of *Humulus* in China, as well as to elucidate the taxonomic and evolutionary relationship of the endemic *H. yunnanensis*. **Methods:** DNA extracted from specimens held at the Kunming Institute of Botany Herbarium, Chinese Academy of Sciences was added to an existing DNA data set of specimens from USA herbaria (BRIT and HAW). Polymerase chain reactions and sequencing reactions were performed under standard conditions, followed by nucleotide base calling using Sequencer 5.0. Automatic sequence alignment and phylogenetic trees were conducted with MEGA 5. **Results:** Sequence analysis of nuclear (ITS2) DNA supports the three species concept for *Humulus*, while sequence analysis of chloroplast (petL-psbE) DNA supports a four taxa model for *Humulus*. **Conclusion:** Nuclear DNA supports the three species concept of *Humulus*. Two clades of *H. lupulus* are observed for chloroplast DNA, separating taxa into the New World and the Old World accessions. A review of taxonomy in this anemophilous genus is highlighted with proposed revisions. Additional molecular and agronomic analyses of *H. yunnanensis* are needed to successfully support or refute the taxon’s potential applications for the brewing and medicinal industries. Resequencing the hop plant’s genome and comparing it to the only other published genome in the Cannabaceae, Cannabis sativa L., will provide a genomic database for a small plant family that allows researchers the opportunity to study the origins, mechanisms of evolution, and domestication events in the most important economic plant family. **Keywords:** ethnobotany, phylogenetics, hop plant, hops domestication

SY04011, 11:15-11:30 AM
RUELLE, MORGAN L., mlr245@cornell.edu, Cornell University

**Farmers’ phenological knowledge and climate adaptation in the Ethiopian highlands**

**Introduction:** Mountain communities have been among the first to observe and respond to climate change. In the northern highlands of Ethiopia, indigenous farmers have observed a general warming trend, shifts in the seasonal distribution of precipitation, and increased inter-
annual variability in temperature and rainfall. Farmers have adapted to these challenges in multiple ways, including adjusting the times of year that they sow, tend, and harvest cultivated and non-cultivated plants. Farmers’ phenological knowledge about plants is a vital asset for climate change adaptation. **Objectives:** By compiling phenological knowledge generated by farmers living at a range of elevations, we hope to help mountain communities anticipate the impacts of climatic change on the temporal relationships within their agroecosystems. **Methods:** We conducted 64 interviews with farming families in 16 villages in the Debark woreda (district) of northwestern Ethiopia. Villages were selected along an altitudinal gradient ranging from 2650 to 3000 meters above sea level. We asked each family to generate a list of the plants within their farmlands and to describe the seasonal availability and use of each plant. We analyzed the distribution of plant species, plant phenologies, and temporal relationships between plants at different elevations. **Results:** Farming families listed between 13 and 56 plants, generating a list of 143 plants that are used for food, medicine, fiber, construction material, fuel, and fodder. Farmers describe the seasonal availability and use of plants in relation to the Ethiopian Orthodox calendar and precipitation, but rarely refer to temporal relationships between cultivated and non-cultivated plants. Our analysis of farmers’ knowledge at different elevations indicates that while some plant phenologies shift in tandem, many temporal relationships change, resulting in different patterns of plant availability. **Conclusion:** Farming communities at a range of elevations rely on different synchronicities and complementarities in the seasonal availability of useful plants. Climate change may have similar effects on the temporal relationships between plants, and therefore require comparable modifications in the timing of agricultural activities. Building on farmers’ knowledge, researchers can help develop effective phenological calendars that will facilitate climate adaptation and enhance the food sovereignty and livelihood security of mountain communities. **Keywords:** seasonal calendars, mountain communities, agrobiodiversity, temporal relationships, farming systems.
plant species’ biology or if the methods use in harvesting developed to be non-detrimental. The results of this research will be provided to Park and Tribal officials in hopes of producing a collecting agreement that maintains the Park’s mission and the tribe’s treaty rights. Keywords: Nisqually Tribe, Traditional Practices, TEK, Cascade Mountain Range

SY04013, 1:15-1:30 PM
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Wild harvest patterns and trade of epiphytic orchid species in Oaxaca, Mexico

Introduction: In Mexico, legal restrictions on wild orchid harvest have been introduced as a conservation measure for endangered species; however, little is known regarding this policy’s interlocution with existing cultural practices and traditional ecological knowledge. The harvest of wild plants is of cultural and economic importance for the lives of hundreds of millions of people worldwide and the potential for over-harvesting has generated concerns as a threat to species conservation. In the state of Oaxaca, various species of epiphytic orchids are harvested for market sale and for use in religious practices. Harvesters belong to indigenous communities who have traditional management practices and continue to exercise management rights over their natural resources.

Objectives: The overall aims of this project are to assess detailed information on the patterns of trade and wild harvest of orchid species in Oaxaca, and the local ecological knowledge associated with these activities in order to provide recommendations for management strategies.

Methods: We surveyed the largest market in Oaxaca state over a one year period and interviewed orchid sellers and harvesters. We recorded the diversity and volume of species, price, location of harvest and demographic information of orchid sellers. We also conducted interviews with 25 harvesters from four indigenous communities where orchid harvest is prevalent.

Results: In the market, 22 epiphytic orchid species were found being sold; however, three species constitute the majority of the volume of the orchid trade. Species harvested vary seasonally according to blooming seasons and demand is driven by local holidays such as Christmas and Easter with volume and sells peaking during the months of April and December. A vast majority of sellers were women who harvested the plants themselves in their communities and brought them to the urban market to be sold. In the communities 63% of harvesters interviewed were women, but orchid harvest is a family activity where men may harvest plants while they are doing other activities in the forest. We traced knowledge linked to the harvest of orchid species back 3 generations.

Conclusion: Despite a legal ban on orchid harvesting, and it still associated with cultural celebrations. The volume of plants being sold during the holiday seasons is striking. We have identified the species being sold in market that may require the attention of local indigenous groups who design management plans for their lands and local conservation organizations. We recorded traditional knowledge associated with orchid harvest in the area that can be incorporated into management plans. Interview results indicate that harvesters previously managed harvest according to practices informed by traditional ecological knowledge but that ban on orchid harvest by national and local authorities prompted a shift to more aggressive harvesting techniques with the potential to negatively impact orchid populations. Keywords: Traditional ecological knowledge, market
Can cultivation reduce pressure on wild populations?

**Introduction:** Cultivation of over-harvested plant species has frequently been proposed as a conservation strategy to reduce pressure on wild populations; little research supports this assumption. **Objectives:** The aim of this study is to understand under what conditions cultivation can reduce pressure on wild populations using a bioeconomic model. **Methods:** I developed a bioeconomic model and use a palm species (*Chamaedorea ernesti-augusti*) harvested and cultivated in Guatemala and Belize to parameterise the model. Semi-structured interviews were conducted to estimate costs and benefits of cultivation and harvesting. **Results:** I identify the relative importance of different drivers of the system, including the level of enforcement, changes in opportunity costs and the price paid for the plant material. We identify the policy levers that can be used to encourage cultivation as an alternative to wild harvesting. **Conclusion:** The results from this study can help guide conservation interventions for wild harvested plant species. With increasing harvesting pressure on many wild populations, cultivation may be one conservation option. However, barriers to establishing cultivation may restrict the feasibility of this as a conservation strategy. **Keywords:** harvesting, bioeconomics, conservation
species are used locally for medicinal, spiritual, edible, construction, or agricultural purposes. Locally important plants were clustered in four distinct vegetation areas (lowland forest, higher forest, grassland, and rocky coast), each area was valued for different cultural uses. Our results suggest that the reliance and local plants use is changing at different rates in the two communities with evolving economic and social situations. Conclusion: The littoral landscape provides importance resource for these two communities to sustain the local cultural practices. Our results provide key information on plant use within the reserve which should be used in the development of a collaborative conservation and management plan for the reserve in order to consider the needs and uses of the two local villages. Keywords: traditional healers, ethnobotany, collaborative forest management

SY04016, 2:00-2:15 PM
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Ethnobotanical Traditions of the Island of Kumejima

Introduction: The Ryūkyūan people (Okinawan: Rūchunchu) are the indigenous inhabitants of the Ryūkyū Islands, a culturally distinct and formerly independent kingdom currently under Japanese jurisdiction. Six distinct languages are recognized, all are endangered. War, assimilation-policies, economic development and urban expansion have been destructive to both culture and biota. Ryūkyūan have one of the highest life expectancies in the world but the continued loss of traditional ethnobiological knowledge and values is reversing this. The island of Kumejima is home to speakers of several dialects of the Okinawan language who have maintained rich botanical traditions- some of which have been brought overseas into the Ryūkyūan diaspora. These are not well documented. Objectives: To record various ethnobotanical traditions as preserved by a family from eastern Kumejima including emphasis on mountain plants. Methods: Select members of a Ryūkyūan family from Kumejima were interviewed in order to ascertain their ethnobotanical traditions. Cultural works from other parts of the Ryūkyū Islands were consulted in order to find relationships between Kumejima and the broader ethnobotany of the Ryūkyūans. Results: The importance of plants permeate all areas of traditional life including medicine, textiles, religious practice, music, and dance both on Kumejima and within a diasporic context. The gathering of food from the mountains and the oceans provide a sustainable means of nourishment. This knowledge is disappearing amongst younger generations with the onslaught of urbanization and fast food. Conclusion: Plants form an important component of traditional culture on the island of Kumejima as well as in the rest of the Ryūkyūans. The importance of these plants is also maintained within the Ryūkyūan diaspora. In order to ensure cultural and ecological survival, the traditional importance of these plants should be perpetuated. Keywords: Okinawa, Ryūkyūan, Kumejima, ethnobotany

SY04017, 2:15-2:30 PM
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A Synthesis and Interpretation of Early Meiji Japanese Wood Collections with Plant Portraits

Introduction: This work analyzes the origins, historical context and broader significance of five sets of illustrated wood blocks from early Meiji Japan (1878), in the holdings of various economic botany collections. Each board is constructed from the wood of an economically important tree or palm, painted to depict the botanical details of the species, framed with its bark and cornered with cross sections of its branch. To date, 220 stylistically similar boards representing 150 different species are held among five collections in Europe, North America and Japan. Three of these sets have only been linked with the other collections this year. Despite their artistic, botanical and historical importance, little has been known about their origin, intended purpose and details of their acquisition. Objectives: A collective analysis of the five known sets of wood blocks (xylotheques) is undertaken to better understand similarities and differences between the sets, along with details of their origin and broader significance.

Methods: All five sets have been photographed and compared across details of their construction, labels, species, style, and preservation. Data from the boards themselves are collated with English and Japanese historical accounts that reference the boards. Results: A careful analysis of the wood collections supports that there were several duplicate sets created around the same time, most likely by a team of artists under the direction of Chikusai Kato, the botanical illustrator at the Koishikawa Botanical Garden. The boards were commissioned and purchased by the Imperial University (later the University of Tokyo) as an instructional tool for teaching botany. Details of their arrival into their contemporary collections are poorly documented. Conclusion: The painted wood blocks created at the Imperial University of Japan and their unique fusion of western and eastern botanical art and pedagogy are important artifacts for understanding the rapid changes in scientific philosophy in post-Meiji Japan. Greater understanding of their historical context and significance was only possible through analysis across multiple collections. This research highlights the importance of collaboration, inventory and standardization in economic botany collections. Keywords: xylotheque; economic botany collections; botanical art; Chikusai Kato

SY04018, 2:30-2:45 PM
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Medicinal Plants of Northern Thailand Used by Traditional Doctors to Treat Mild Cognitive Impairment in the Elderly

Introduction: Mild Cognitive Impairment (MCI) is the transition stage between normal aging and dementia. Memory impairment, in excess of what is considered normal for age, is the most common symptom of MCI.1 Some forms of dementia can be treated by increasing the amount of acetylcholine in the synapses of neurons by preventing its breakdown by the enzyme acetylcholinesterase. By inhibiting this enzyme, more acetylcholine is available to the brain and, more specifically, in the parts of the brain responsible for memory like the hippocampus, striatum and cortex.2. Objectives: The objective of this project is to investigate Thai medicinal plants with potential to slow the progression of Mild Cognitive Impairment to dementia, and treat the memory loss that accompanies this disorder. Methods: Numerous interviews were conducting with traditional doctors in Northern Thailand to locate plants with cognitive enhancing and neuroprotective activity. In vitro bioassays measuring total phenolic content, and anti-oxidant and acetylcholinesterase activity were performed. One plant was selected for in vivo
behavioral and enzymatic testing in normal, female rats. Behavioral models such as the Morris Water Maze and Object Recognition test were used to measure spatial and non-spatial memory and retention. Enzymatic tests determined the levels of acetylcholine and enzymes marking free radical oxidation levels in three different portions of the brain, the hippocampus, striatum and cortex. Results: Many of the selected plants and plant formulas demonstrated anti-oxidant and acetylcholinesterase inhibition activity. My research successfully identified a single plant, which enhanced spatial memory, possessed strong acetylcholinesterase activity and offered protection against free radical oxidation. Conclusion: This research demonstrates the ability of traditional medical systems to provide solutions to modern problems. This work will substantiate Thai traditional plant knowledge and potentially provide leads for the development of therapeutic remedies by Thai scientists thereby providing an avenue for the protection and use of their local knowledge. Keywords: Medical Ethnobotany, Thai Traditional Medicine, Dementia
interventions. Keywords: *Fagopyrum*, Himalaya, crop diversity, landscape genetics, agroecology, AFLP, traditional agriculture

SY04020, 3:15-3:30 PM
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Seeing the meadow beyond the grazing yaks: grazing pressure, alpine plant distributions, and the role of Rhododendron shrubs as “grazing shields”

Introduction: Alpine meadows of the Eastern Himalaya have been shown to be home to enormous plant diversity. More than 60% of that diversity is utilized by local people for medicines and other cultural purposes. The meadows are also important as grazing lands for yaks. In recent years, the number of yaks has increased dramatically leading to enhanced grazing pressure on alpine forb species. Interviews with local yak herders suggest that Rhododendrons may act as a refuge for many forb species. Objectives: We investigated the role of poisonous Rhododendron shrubs, a ubiquitous component of alpine meadows, as potential “grazing shields” that enhance the survival and reproductive success of alpine forbs growing near or under the shrubs. Methods: 120 plots in three alpine meadows were censused to compare species composition and abundance of forbs growing directly under Rhododendron shrubs, on the margins of shrubs, and in the open meadows. Results: The species composition for forbs growing both under and on the edge zones of Rhododendron shrubs was found to be significantly different from open meadow areas. In addition, the shrubs enhance flowering success for plants growing under their protective area. Conclusion: Increasing pressure from grazing and land use changes suggest that these shrubs may play a key role in maintaining the high diversity of alpine areas in the Eastern Himalaya as well as protecting the needed medicines of the local peoples. Keywords: Eastern Himalaya, grazing pressure, facilitation, alpine diversity

SY04021, 3:30-3:45 PM
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Cultivation of peyote by native Americans: Past, present and future

Introduction: Current data on supply and demand of peyote (*Lophophora williamsii*) for religious use by the Native American Church (NAC) show that the plant is being unsustainably harvested from wild populations in Texas and Mexico. To provide adequate supplies of peyote for ceremonial use, the NAC is considering greenhouse cultivation as an alternative to wild harvesting. Objectives: To determine the historical and actual role of cultivation of peyote in native American cultures, and to assess its potential role in preserving the peyote religion and in conserving the vulnerable species *L. williamsii* in the future. Methods: Review of the literature and direct field observations provided data on instances of peyote cultivation by native cultures in the past. Invited participation in policy discussions of the NAC of North America (NACNA) provided current data on native American attitudes toward cultivation of peyote. Technical aspects of cultivation of peyote were investigated by interviews with horticulturists and experimental work with *Lophophora* in a greenhouse environment. Results: Cultivation of peyote is ancient practice. There are documented instances of prehistoric plantings of peyote at native encampment spots in Texas. NACNA attitudes toward NAC cultivation of peyote have
become more positive in recent years as the crisis of peyote scarcity has deepened. To be acceptable to the NAC, cultivation techniques must produce natural peyote. Grafting of peyote onto other cactus species may be appropriate to expedite seed production, but grafted plants are not themselves intended for ceremonial purposes. **Conclusion:** Many members of the NAC recognize that cultivation of peyote constitutes a means whereby local churches can exert control over the supply of their sacrament. Widespread local implementation of greenhouse cultivation would reduce the harvesting pressure on wild populations, thus preserving the medicine for future generations. **Keywords:** Lophophora williamsii, vulnerable species, excessive harvesting, Native American Church, greenhouse horticulture, conservation

SY04022, 3:45-4:00 PM  
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**Ancient uses of hemp fiber and seed for fishing in Eurasia: Theoretical and archaeological considerations**

**Introduction:** This paper discusses the utilization of both true hemp (*Cannabis*) fiber and seed to catch fish from prehistoric to modern times. It is hypothesized that the use of these hemp resources for net production and bait food played a significant role in human culture history by encouraging settled living with the provision of more stable protein sources. **Objectives:** The main objective of this paper is to determine the early ecological adaptation of humans and the possible related role of hemp fiber and seed use in the development of fishing technology in Eurasia, and to test this hypothesis with archaeological and archaeobotanical evidence supporting the idea that such use was part of a crucial cultural development in human resource exploitation. **Methods:** The archaeological and archaeobotanical record of hemp fiber and seed use throughout the Holocene in the vast region of Europe has been extensively reviewed and used to test the hypothesis. **Results:** There is evidence from various Eurasian areas over the depth of the Holocene epoch that humans have used hemp seed and fiber for various purposes. It is argued in this paper that a strong case can be made for hemp fiber and seed playing an important role in the crucial resource development of early fishing, a technology that persists today in various areas where freshwater fishing is still practiced, including along many lowland and mountain streams. **Conclusion:** Hemp use in fishing has long been part of human food resource exploitation over vast areas of Eurasia. **Keywords:** Cannabis cordage, Cannabis achenes, prehistoric and present fish procurement

SY04023, 4:00-4:15 PM  
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**Medical Ethnobotany in the Balkans: A Comparative Analysis of Results from Field Studies in Albania, Kosovo, and Serbia**

**Introduction:** The geographic features of the Balkans – encompassing the countries of Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Kosovo, Macedonia, Moldova, Montenegro, Romania and Serbia – offer a unique opportunity to study the high biocultural diversity of a mountainous terrain that is home to diasporic communities influenced by ancient and recent migrations. In fact, this area of SE Europe has increasingly become the focus of more ethnobotanical field studies that often share a common goal of documenting and conserving traditional knowledge of plant use by the people of this region. **Objectives:** To identify
commonalities and differences in the use of the Balkan medicinal flora by diasporic groups with disparate cultural and linguistic backgrounds. Methods: Several ethnobotanical field studies with a focus on medical ethnobotany have recently been undertaken in different regions of the Balkans, including Albania [1] (and unpublished data from a 2012 study), Serbia [2], and Kosovo [3]. In all studies, PIC was obtained prior to conducting interviews with study participants. Voucher specimens of all species were collected and deposited in herbaria of the respective host country. Consensus indices were constructed based on the frequency of quotation of particular species and uses. Results: Several medicinal species demonstrated high consensus across the field sites, including *Crataegus monogyna* Jaq. (Rosaceae), *Hypericum perforatum* L. (Hypericaceae), *Malva sylvestris* L. (Malvaceae), *Matricaria chamomilla* L. (Asteraceae), *Plantago major* L. (Plantaginaceae) and *Urtica dioica* L. (Urticaceae). The frequency of use of other species, such as *Origanum vulgare* L. (Lamiaceae), is heavily influenced by cultural factors. Conclusion: The use of plants in traditional medical practices still makes up an important aspect of rural healthcare in the Balkans. Cultural adaptation within diasporic communities plays a large role in how TK for health-seeking strategies is shared and shaped. Keywords: medicinal plants, Europe, migrations

SY04024, 4:15-4:30 PM
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**Englerins and Schweinfurthins, Plant-Derived Compounds with Cancer Drug Potential**

**Introduction:** Plants have long been a source of new cancer drugs. In this presentation, I will discuss the status of two classes of compounds currently in the pipeline at the US National Cancer Institute: englerins, and schweinfurthins. **Objectives:** The objectives are to discover potential drug leads for cancer and to understand how the compounds work in cancer cells and in tumors. **Methods:** Bioinformatics led to the identification of two plant extracts with selective activity in the NCI 60-cell screening program. Bioassay-guided fractionation provided novel pure compounds. While both plants were African Euphorbiaceae, the chemistry and biological selectivity were quite distinct. **Results:** Natural schweinfurthins are selectively active in vitro against CNS tumor cell lines, however, activity in mouse models was only found with a synthetic analog. Tumors defective in the tumor suppressor NF1 appear to be sensitive to the compounds. Englerin A, which is selectively active in kidney cancer cells in vitro, is also active in murine xenograft models. It appears to act on tumors through effects on glycolytic mechanisms. **Conclusion:** Plants remain a viable source of new cancer drug candidates, with the opportunity of discovering novel chemistry and novel mechanisms of action. **Keywords:** Cancer, Plants, Africa, Sesquiterpenes, Stilbenes, Kidney cancer, CNS cancer

SY04025, 4:30-4:45PM
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**Uso tradicional de goiabeira-serrana (Acca sellowiana Berg. Burret) no sul do Brasil**
**Traditional use of feijoa (Acca sellowiana Berg. Burret) in Southern Brazil**
Introduction: The feijoa (Acca sellowiana Berg. Burret) is a native tree in South America belonging to the Myrtaceae family. The tree is characterized for producing edible fruits of peculiar taste with excellent organoleptic and nutritional potential. Its area of natural dispersion is located in the southern highlands of Brazil, northern Uruguay and, more recently, northeastern Argentina. Little is known about its small-scale distribution and ecology, as well as about the ways in which southern Brazil’s inhabitants use the plant. Objectives: The objective of this study is to determine the characteristics of Feijoa’s use for “Brazil type” in the mountainous region of the Serra Gaúcha, Rio Grande do Sul, Brazil, and for “Uruguay type” in the region of the Pampas of Rio Grande do Sul, Brazil. Methods: Both regions were surveyed. Feijoa plants were found through the snowball methodology. Data on the plant’s use was collected by means of semi-structured interviews. Value of use (VDU) was calculated as number of citations of each category of use, divided by the total number of citations for each category of use. Results: In the Serra Gaúcha region (municipalities of Ipê, Monte Alegre dos Campos and Antonio Prado), 39 “Brazil type” A. sellowiana users were found. In the region of the Pampas (municipalities of Pelotas and Santana do Livramento) 12 users were found. The Serra Gaúcha region presented 10 categories of use. In addition to using the fruits as food (VDU = 0.27), it was also utilized as consumption of petals (VDU = 0.13), feed for livestock (VDU = 0.13), in infusions for intestinal diseases (VDU = 0.11) and the use for commercialization of popular stores showed relevant application. In the region of the Pampas, 12 categories of use were found, the two new categories in this region were, the use in recreation activities and the use in apiculture. For the “Uruguay type”, in addition to the use as food (VDU = 0.33), other uses included the use of leaves in infusions for intestinal diseases (VDU = 0.13), as feed for livestock (VDU = 0.10), as an ornamental plant (VDU = 0.10) and the transformation of fruits into different types of products (VDU = 0.08). Conclusion: Although there are fewer users of A. sellowiana in the region of the Pampas than in Serra Gaúcha, the “Uruguay type” feijoa has a greater diversity of uses than the “Brazil type”. In addition to the use of fruit for consumption, the medicinal uses and the use of fruits as feed for domestic animals stands out within both regions. Keywords: use, value of use, feijoa.

SY04026, 4:45-5:00 PM
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Ethnobotany and market potentiality of two mostly preferred edible forest species from Eastern Himalaya of India

Introduction: The state of Arunachal Pradesh is located in Eastern Himalayan region of India and is well known for rich biodiversity. The state is also rich in indigenous tribal culture and heritage which is represented by 26 major tribes who mostly depend on wild resources. Due to the richness in floristic and cultural diversity, the region has become a paradise for ethnobotanical works. Objectives: To identify the edible forest species widely used by tribal
communities having market potentiality and documentation of ethnobotanical knowledge about such species. **Methods:** Field and market survey were conducted in highly populated areas comprising 8 districts across the state. Data collection was made using standard pre-structured questionnaire followed by extensive interviews with local communities and traders in local markets. **Results:** The local tribals use a large number of edible forest species mostly for vegetable, medicine, fruit and condiments. Based on wider ethnobotanical preference and large scale collection two species namely Piper pediciellatum and Zanthoxyllum armatum are found to be having high commercial and economical potential. The leaves and young shoots of former are used as vegetable while the fruits of the latter species are used as spice and condiments. Both the species are also used as ethnomedicinal plants. Due to high preference as food items with ethnomedicinal value the local markets are heavily flooded with the products of the two species generating good revenue to the poor tribals. **Conclusion:** Tribals of Arunachal Pradesh by and large, depend on forest resources. Various plants are collected and gathered by the people for their livelihood support. However, these species are still collected from the wild sources and because of the large scale collection for economical value, the populations of these species are reducing rapidly with a possible threat to the survival of the population. Sustainable management of such species will not only help in socioeconomic development but also in conservation of the species. **Keywords:** Arunachal Pradesh, Tribals, Vegetable, Condiment, Ethnomedicine.
**Actaea racemosa** TDC1 and TDC2 are L-tryptophan decarboxylases that catalyze a key step in serotonin production

**Introduction:** Black cohosh (*Actaea racemosa* L., syn. *Cimicifuga racemosa*, Nutt., Ranunculaceae) is a dietary supplement used for menopausal symptoms. Serotonergic (5-HT) activity may be one mode of action of black cohosh, and the tryptamine-analogue, N-methylserotonin (NMS), was identified in this plant. The genes and enzymes for the production of tryptamine-derived compounds in black cohosh are unknown. **Objectives:** To identify the biochemical route to tryptamine-derivatives in *A. racemosa*. **Methods:** Two previously identified *A. racemosa* genes, TDC1 and TDC2, predicted to encode L-tryptophan decarboxylases, converting L-tryptophan to tryptamine, were functionally expressed in Saccharomyces cerevisiae. PCR-directed site-directed mutagenesis of TDC1 and TDC2 was used to identify amino acid residues critical for activity. Yeast cultures expressing native and mutagenized TDCs were analyzed for tryptamine production by UPLC-MS-TOF. In addition, selected tissues of black cohosh plants were screened for tryptamine production and expression of TDC genes by reverse-transcription qPCR. **Results:** TDC-expressing yeast cultures accumulated tryptamine, whereas control cultures without TDCs did not. TDC1 had approx. 4-fold higher activity than TDC2, and interchanging a Cys/Ser variable residue in the predicted TDC active site switched the activity levels of TDC1 and TDC2. Addition of L-tyrosine or 5-hydroxy-L-tryptophan to TDC-expressing cultures did not result in accumulation of the predicted decarboxylated products, tyramine or 5-HT, respectively. Expression of TDC genes was low in all black cohosh tissues examined, but showed significant correlation with increased accumulation of tryptamines in flower and mature leaf tissues. Sequence analysis and functional assays of expressed transcripts revealed an unexpectedly large variety of TDC sequences closely related to TDC1 and TDC2 in *A. racemosa*. **Conclusion:** TDC1 and TDC2 from *A. racemosa* are tryptophan decarboxylases, displaying high substrate specificity similar to other plant aromatic L-amino acid decarboxylases. Activity differences between TDC1 and TDC2 appear to be due largely to a single amino acid change in the active site. Demonstration of TDC activity and correlation of TDC expression with accumulation of tryptamines support the hypothesis that TDC genes in black cohosh are involved in the biosynthesis of tryptamines, including NMS. The presence of tryptamines in black cohosh results from a rich diversity of TDC genes in this plant. **Keywords:** Black cohosh, tryptamine, aromatic L-amino acid decarboxylase.
Chemotypic variation and adulteration factors in Actaea racemosa L.

Introduction: Black cohosh (Actaea racemosa L.) is a perennial herb native to deciduous woodlands in Eastern North America producing a tall raceme persistent from midsummer into the fall. Traditionally, rhizomes have been used medicinally for musculoskeletal pain and is used to support uterine function during PMS, childbirth, and menopause. Today, extracts obtained from rhizomes of black cohosh are marketed primarily for use in relieving hot flashes associated with menopause. A majority of the raw material supplying this growing global market is harvested from naturally occurring populations in Appalachian woodlands resulting in mortality of individual plants and potential losses locally-adapted populations. Two major concerns of consumers are consistency in concentration of active constituents and authenticity of material sold as A. racemosa. Chemotype variation throughout the region is unknown, but the high degree of variability in the products available to consumers as black cohosh extracts is becoming of increasing concern. Objectives: This study describes: variation in rhizome size as a result of location and reproductive or non-reproductive state, annual variation in rhizome size, the concentrations of five representative medicinal compounds in rhizomes harvested from two different physiographic regions, the concentrations of said compounds in rhizomes harvested from six different locations within these two physiographic regions, the mean concentrations of the medicinal compounds in rhizomes from raceme-bearing and non raceme-bearing plants, relationship between mass of rhizome and concentration. Methods: UPLC-MS was used with methanolic extracts of root and rhizome tissue to establish variation of five constituent compounds. Results: We report that within Maryland, variation in four out of five target compounds (actein, 23-epi-26 deoxyactein, ferulic acid and caffeic acid) was significant between physiographic regions with a 33, 43, 10 and 10 percent changes respectively. Only N-methylserotonin did not show a significant variation between regions. Annual variation was also significant for actein (p<0.001), deoxyactean (p<0.001), ferulic acid (p=0.011) and caffeic acid (p=0.037) but not for N-methylserotonin (p=0.072). Conclusion: Choosing only plants with reproductive parts insures correct identification and did not sacrifice medicinal yield in any of these five compounds. Harvesting and marketing of reproductive A. racemosa will also reduce contamination and ensure viability of related species. Keywords: authentication, black cohosh, chemical ecology

Salicylic Acid and Wounding Cause Increases in the Level of Actein and Deoxyactein in Black Cohosh (Actaea racemosa L.) Rhizomes

Introduction: Native to eastern North America, Actaea racemosa (Black Cohosh) is most often in woodland openings. Black Cohosh is most often used as a treatment for menopausal
symptoms and has potential to reduce the risk of breast cancer. Black Cohosh supplements accounts for nearly $9.7 million of the U.S dietary supplement and herbal sales. Traditionally, *A. racemosa* rhizomes and roots are the part of the plant which is ground into the herbal supplement. The secondary metabolites, actein and deoxyactein are two compounds (among many others) associated with activity and are many times used for standardization of supplements. However, due to the nature of the *A. racemosa*, it is typical that only a small quantity of active ingredients is produced in each rhizome. These low yields cause many plants to be harvested from wild populations as Black Cohosh cultivation is not always profitable. Increasing the yield of actein and deoxyactein would help conserve wild populations that are relatively unstudied and may be eliminated because of harvesting. Secondary metabolites, such as actein and deoxyactein, are triterpenes and are typically synthesized as a defense mechanism of the plant. In times of predator attack the production of secondary metabolites are increased in an attempt to prevent continued predation. **Objectives:** In order to gain an understanding of what defensive pathways are controlling actein and deoxyactein synthesis, plant defense signaling compounds will be used to try to stimulate actein and deoxyactein production. **Methods:** Black cohosh rhizomes were either wounded or treated with one of three plant defense signalling hormones, jasmonic acid, salicylic acid or ethylene. After 24 hours rhizomes were dried, ground to a fine powder and assayed for actein and deoxyactein using TLC. **Results:** Wounding only increased the levels of actein and deoxyactein when the inactive side of the rhizome was wounded. Treatments of jasmonic acid and ethylene did not cause any change in the levels of actein or deoxyactein. Salicylic acid treatment of rhizomes resulted in significant increases in the levels of actein and deoxyactein (Student’s t-test; p-value < 0.05). **Conclusion:** With the determination of signaling molecules that can stimulate the production of actein and deoxyactein, the function of actein and deoxyactein can begin to be elucidated. The ability to increase active ingredient levels in cohosh rhizomes may serve to help in the conservation of closely related species because fewer rhizomes may need to be harvested to meet market demands. **Keywords:** plant defense, jasmonic acid, ethylene

**SY05004, 9:15-9:30 AM**  
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**Insect Pollinators of Black Cohosh (*Actaea racemosa*) in the Western Maryland Region**  
**Introduction:** The species of insect pollinators for multiple *Actaea* species are known, but pollinators for Black cohosh (*Actaea racemosa*) have not been determined. Understanding the pollinators and pollination ecology is essential for conservation, management and economic development of this important medicinal herb of the Appalachian region. **Objectives:** To determine the pollinators of black cohosh, the three main goals are 1) capture of insects visiting black cohosh flowers, 2) identification of pollen loads on the individual insects to determine relative proportions of flowers being visited, and 3) installation of insect exclusion bags to determine the degree to which black cohosh pollination depends on insects. **Methods:** We conducted field collection of insect visitors of black cohosh (*Actaea racemosa*) in summers of 2010 and 2011. Forest sites included two private land sites in Western Maryland, one in Savage River State Forest and one in the U.S. Forest Service Fernow Experimental Forest in Northern West Virginia. Insects were captured during multiple 30 minute sessions at each site. During each 30 minute session, all visitors that landed on flowers were captured. The insects were later
identified to species with the help of expert collaborators. **Results:** We captured, preserved and
identified approximately 1000 individual insects and other invertebrates on black cohosh
flowers. Specimens from 2011 include 568 individual bees, most of them likely pollinators to
varying degrees. The most often observed species included *Hylaeus affinis/modestus* (34% of all
visitors), *Lasioglossum heterognathum* (21%), *Bombus impatiens* (18%), *Apis mellifera* (6%)
and *Bombus sandersoni* (4%). Another 26 species of bees, and multiple species of beetles, flies
and other invertebrates were also recorded as visitors. No endangered species were captured.
**Conclusion:** Our list of visiting species and rankings based on visitation frequency shows that the
species visiting black cohosh overlap with those visiting *Actaea podocarpa* and *Actaea rubifolia*
(Pellmyr 1986a, 1986b). After pollen analysis (currently underway), we expect to determine that
*A. racemosa* is pollinated by a similar set of generalist native bumblebees, sweat bees and
syrophid flies as well as non-native honeybees. **Keywords:** pollination ecology, Appalachian
herbs, bumblebees

**SY05005, 9:30-9:45 AM**
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**Black cohosh - does the research validate traditional and contemporary clinical applications?**

**Introduction:** *A. racemosa* is an indigenous herb to Appalachia with a strong tradition of
use by Native Americans, European settlers and contemporary herbalists. It is also marketed
internationally as a standardized product for the relief of symptoms of menopause. Despite
widespread contemporary use, to our knowledge there has been no formal documentation of its
use amongst American herbalists. **Objectives:** First to conduct a comprehensive review of
clinical and biomedical research literature for *A. racemosa*, with emphasis on findings that
validate or challenge documented traditional use. Second to develop a profile for clinical use
within the Tai Sophia community of herbal practitioners, using a combination of quantitative and
qualitative methods. **Methods:** Conduct an online survey of practitioners, interview selected
practitioners, review case studies and conduct an analysis of Tai Sophia Institute herb dispensary
records. **Results:** Literature search revealed many similarities of traditional use between different
cultures and practitioner groups in the Appalachian regions and beyond. Contemporary use by
herbalists reflects both traditional use and clinical research. The results of the practitioner survey
are not yet available. **Conclusion:** Most clinical research is focused on hormonal issues,
particularly relating to menopause. There is a need for studies that focus more on traditional
indications such as menstrual cramps and rheumatic pain. The Practitioner survey results will
further reveal to what extent current clinical herbal practice reflects research findings and/or
traditional uses. **Keywords:** *Actaea racemosa*, practitioner survey, menstrual cramps, menopause

**SY05006, 9:45-10:00 AM**
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Appalachian health beliefs and disparities

Introduction: People within the Appalachian population have health beliefs that are unique to their area, including using certain botanicals as medicines. They also face health disparities that result from a combination of socioeconomic, geographic, and cultural influences prevalent within the region. Core values and traditional perspectives may play an intrinsic role in current health beliefs and health behaviors of the Appalachian population. Objectives: To provide an overview of current public health literature which identifies health beliefs and health disparities experienced by the Appalachian population. Methods: A systematic approach in reviewing the literature was utilized through academic journal health databases provided by the Pennsylvania Association for Higher Learning. Any peer-reviewed articles with keywords or titles relevant to the topic were acquired for the use of this paper's content or for background information. Results: Many from within the Appalachian population ascribe to core values of individualism, self-reliance, and traditionalism, which play a vital role in health beliefs and behaviors. Health disparities such as obesity, diabetes, illicit drug use, and poor oral health are prevalent among this population. Traditional perspectives on the causes of diseases may provide a key insight to health behaviors experienced by this population. Conclusion: The Appalachian population's historical approach to health is complex and may have an impact on current health behaviors. A greater degree of research is necessary in order to fully understanding the current health beliefs and behaviors of the Appalachian population. This may lead to understanding botanical usage in greater depth, the creation of more successful health promotion programs, and lastly, may increase the availability of successful treatments. Keywords: obesity, diabetes, oral health, drug use, traditional perspectives, botanicals

SY05007, 10:00-10:15 AM
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Training of Contemporary Clinical Herbalists in Appalachia

Introduction: While herbal medicine remains a strong traditional practice in Appalachia, there is also a movement to train contemporary herbalists to better integrate into a modern medical environment. In addition to the contemporary healthcare sciences, modern herbalists train in a variety of philosophical and medical applications of herbal medicines and associated healthcare strategies. Many of these aspects are a direct extension of the practice of traditional herbal medicine in Appalachia. Objectives: Examine the training for modern clinical herbalists practicing within a contemporary biomedical system. Methods: Examine, integrate and present common themes and aspects of training programs for modern clinical herbalists. Results: The clinical practice of herbal medicine is defined by a number of common and key characteristics and is often a unique clinical practice. Conclusion: The herbalist as an intervention is potentially of comparable therapeutic value to the herbs themselves. Keywords: education phytotherapy medical practitioner
SY05008, 10:30-10:45 AM
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What “Giving Back” Means to Botanists: The Results of a Survey

Introduction: Scientists vary greatly in their backgrounds and perspectives, and this lends
diversity to their relationships with the communities in which they work. The very definitions
of the terms “community” and “giving back” to the community are uncertain amongst scientists.
As government funding, especially in the US, increasingly focuses on the broader impacts of
scientific research, scientists must be able to describe the benefits of their research to a broader
community. Exactly how this is to be done is still disputed in the scientific community.

Objectives: By collecting an array of scientists’ experiences and opinions on the definition of
community and giving back, we analyzed the differences and similarities in definitions between
groups of scientists.

Methods: Beginning with the BSA/SEB conference in July 2011 until
October 15, 2011, a structured online survey was posted and distributed on surveymonkey.com.
Questions were open-ended or scaled. Demographic information included academic training,
nationality, and field of inquiry.

Results: In all, 157 scientists participated, with 52% holding a PhD, 20% with a Master’s Degree, 22% with a Bachelor’s Degree, and 6% with other. Most respondents were in academic institutions, but some combined academia with business, non-profit, or government work. A range of different fields of inquiry were self-identified by participants. The majority of respondents (76%) were American, but several other countries were represented. Responses to personal questions varied broadly, giving insight to potential problems and possible solutions to working with communities, either in laboratories at universities or in remote villages around the world.

Conclusion: Scientists defined communities as local groups and laboratories where they worked and also as groups in distant areas, most often delineated by language and cultural beliefs. Ways of giving back varied, but a general theme included the use of the scientist’s expertise to assist in improving the lives of community members. From the various comments and suggestions of participants, we bring forth common problems that scientists face when working with communities and possible solutions.

Keywords: Communities, Broader Impact, Access and Benefit Sharing

SY05009, 10:45-11:00 AM
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Using Community Resources to Supplement Introductory Ethnobotany Courses

Introduction: The interrelationships of plants with people have been recorded over time in
various formats and venues: historical documents, local and exotic plant gardens, archaeological
digs, storytelling compilations, old newspapers and other publications, and even ethnobotanical
research! Many of these collections are found in or nearby college towns. Objectives: Exercises
and knowledge modules were developed to help students connect information discussed in the
classroom and text books, with those found in the community. These local activities are usually
untapped resources to teach ethnobotany in a practical, meaningful way, and to better understand
the interrelationships of people and plants.

Methods: Initially in the 1960's and 70's, instructor-
conducted tours were made to a natural history museum to illustrate people-made objects derived from plants, and the university arboretum to see the actual plant life. In 2005, worksheets were developed for students to complete to visits to different community resources, on their own, as part of the concept of student-driven learning. The three visits included a natural history museum, botanical garden, and maritime center. Results: The worksheets contained questions with short answers to be completed by the students. With the “temporary closure” of the maritime center in 2009, a substitute was created, which required the student to find a community-sponsored (non-commercial) event, activity, show, exhibition, festival, or meal with an ethnic, cultural, or plant food theme, with instructor approval. Admission receipts or other proof of attendance are attached to the worksheet. The questions are revised on a regular basis. Each written account is 5% of the final course grade. Conclusion: The field trips showed students the cultural and economic value of plants, required them to find the relationships with the course topics, enabled them to realize the plant connections within the community, and demonstrated the importance of plants in historical and contemporary times. Since most colleges and universities are located in the county seat or other areas of larger population, which have historical or natural history museums, plant collections, and other sources, instructors would find the inclusion of available community resources as a valuable teaching tool of introductory ethnobotany. Keywords: collections, education, gardens, history, museums, plants

SY05010, 11:00-11:15 AM
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The Encyclopedia of Life: A Vision for a Global Collaborative Project

Introduction: The Encyclopedia of Life (EOL, eol.org) is an unprecedented partnership between scientists and the public. Our goal is to build a multilingual, freely accessible, reusable online collection of information about all species known to science. To this end, we collaborate with prominent natural history museums, research consortia, and citizen science initiatives on six continents. While most data are provided by professional biologists, contributions from the public are encouraged and facilitated through targeted data harvests of popular sites like Flickr, YouTube, and Wikipedia. A suite of tools for participation and interaction supports an active member community who review, sort, rewrite, translate, and annotate our content. EOL has over 50,000 registered members, including over 700 expert curators. More than 200 partner projects provide content for over 900,000 taxa, and over 1.2 million taxon pages have links to the literature made available through the Bio diversity Heritage Library (BHL). The text, maps, images, videos, and sounds we aggregate from our partners are available for reuse under creative commons licenses and can be downloaded via application programming interfaces. We always seek to improve the breadth and quality of our collection by engaging new data partners. We invite the Economic Botany community to explore our site as a platform to showcase research results and to reach out to new collaborators and audiences. Keywords: biodiversity informatics, international collaboration, open access

SY05011, 11:15-11:30 AM
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Reconnecting East Asian Mountain Children to Place and Plants

**Introduction:** Throughout the globe people utilize plants in a variety of ways. In all parts of the world, when elders pass away, often the information they know dies with them. This research was conducted in the highlands of East Asia, exploring plant use and preservation. **Objectives:** The project looks at the use and the concept of teaching children how to do their own ethnobotanical studies. Furthermore, this research explores the idea of rural students teaching city participants about their own local plant lexicon and the meanings associated with these specimens. The study addresses the kinds of plants that children choose to include in an ethnobotanical project of their own making and the universality of children’s plant use across varying world regions. **Methods:** The research was conducted with local, rural children living and studying in the region, students from other major Asian cities, as well as students from the United States. Utilizing semi-formal and informal interviewing techniques, qualitative data was collected on plant use, the transference of knowledge and connection to nature. The youth were trained in how to interview, and then they collected their own data from their elders. **Results:** The students created a book of their own cultural knowledge, and then presented their findings to the fellow group members at a local symposium. Rural East Asian youth choose plants of importance differently than those expected by the researcher. In terms of ethnobotanical education and empowerment, it proves most effective to listen to the students and follow what they deem as important. Furthermore, teaching young people how to record their own cultural information enables them to independently pursue their own plant and place awareness. **Conclusion:** Empowering rural children through helping them record their own knowledge and that of their community helps to reignite pride in their homeland culture and environment. **Keywords:** Teaching, Cultural Remembrance, Environmental Awareness

P3001, 11:30-11:45 AM
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Maryland and Appalachian Forest Economies

**Introduction:** Maryland's Forest Economy contributes $7 billion to the residents of Maryland. In Mountain Maryland, forestry ranks third in economic development and is critical for family forest landowners. This series of discussions presents some of the critical issues for maintaining healthy vibrant forests, forest industry and forest economies in Maryland. **Objectives:** To explain the relationships that exist between family forest landowners, forestry businesses, and forest products operators and discuss the importance these three groups play in maintaining healthy vibrant forests and communities. **Methods:** As the president of the Maryland Forests Association, I will lead a panel discussion that presents the following: (1) John Jastrzembski - Appalachian Forest Economies Juls Wood, LPF- A Family Forest Economy: Preserving Forests by harvesting Chris Holmgren - A Wasteful Economy: Growing a business from urban wood waste. (2) Brandan Hosselrode - An Untapped Economy: Growing the forestry economy through Maple syrup. (3) Jon Kays- A burning Economy: Forest Energies, Economic Growth and Community Stability. **Results:** The attendants will learn about the complexities of maintaining viable, productive, and healthy forests and sustainable economies and culture in Appalachia and Maryland. **Keywords:** Family Forest Landowners, Forest Economies, Forest Industry

68
Waste stream to mainstream; using urban and suburban timber

Introduction: The U.S. Forest Service has stated that if all of the waste wood produced in the U.S. was sawn into lumber it would equal 3.8 billion board feet of lumber annually. We want to see this wood utilized. Objectives: To capture municipal and private waste wood and utilize it based on its highest value. Methods: To ramp up an existing private operation to maximize its potential for waste wood utilization. Secure a supply of logs. Acquire and put to use equipment needed to process wood to its highest value. Results: We have a blueprint for wood processing centers that we believe can be applied almost anywhere. Conclusion: There is no such thing as "waste wood".

The Economics of Maple Syrup Production

Introduction: The demand for maple syrup is increasing worldwide. However, maple syrup is only produced in the northeastern United States and southeastern Canada. These areas provide the species distribution of the sugar maple (Acer saccharum), which is the main source of maple sap. In addition, these areas provide the temperature variations needed for the flow of maple sap. The supply of maple syrup is not meeting the high demand for the product, which as stated above has grown to be a consumer’s desire domestically as well as internationally. Objectives: The high demand of maple syrup begs the question if producing maple syrup is a profitable business. Methods: An economic analysis was made to determine the profits and costs for a maple syrup operation. The analysis was run for different tap counts ranging from 500 to 10,000 taps. Costs included fixed costs and variable costs. Profits include syrup sales (bulk and retail), maple candy, maple cream, and other maple confections. Results: After reviewing the economic analysis, maple syrup production was found to be a profitable business. High tap counts and efficient equipment prove vital to whether the business will thrive or fail. Using the most efficient equipment to lower labor costs and reduce time is essential for the business. Conclusion: Maple syrup production can be a very lucrative business. The main variable that determines profitability is tap count, which is the amount of holes drilled in the trees throughout the sugarbush. Since the high cost items in the camp are fixed costs, the more taps drive these costs down making profits. Many people own maple camps and generate their sole income from maple syrup and its byproducts. Keywords: Taps, Sugarbush, Profit

A Burning Economy: Wood energy, Economic Growth and Community Stability

Introduction: Wood is the fastest growing residential heating fuel in Maryland, increasing 33% between 2000 and 2010. Residential and institutional applications will reduce fossil fuel and electric use. Best of all, using woody biomass from forests and urban sources is truly renewable and sustainable, while providing green jobs locally. Advances in wood burning technology have created a well-deserved image of woody biomass as a low emission renewable fuel. Finally, woody biomass has proven to be affordable and price stable, with significant fuel
saving compared to fossil fuels and electricity. **Objectives:** The Maryland Wood Energy Coalition was organized by the University of Maryland Extension in April 2010 with the goal to increase the adoption of high efficiency, low emission wood energy technologies that meets Maryland air quality standards. **Methods:** The Coalition is made up of representatives from state environmental, energy and regulatory agencies, university extension, non-profits and wood-based industry. **Results:** The group developed a 20-page research based prospectus, released in February 2012, for advancing biomass thermal energy in Maryland that includes specific policy changes to increase wood energy adoption. **Conclusion:** The prospectus is part of a larger wood energy program that can serve as a model for other states and communities. The contribution to building local communities and managing sustainable forests will be discussed.
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**Hessian Fly Responsive genes from wheat (T. aestivum) inhibit the development of fruit fly (D. melanogaster) larvae**

**Introduction:** Insects are a major player when it comes to crop loss, not only in the US but also worldwide. Losses cause not only a lack of food within certain regions, but also severely impact farmer profits. Although many strategies exist for limiting insect attack and for improving crops, the identification and incorporation of genes into crop plants from many species has advantages. Three genes from wheat, Hessian fly responsive –1, -2 and -3, with the potential to inhibit insect growth were transformed into tomato using Agrobacterium tumefaciens methodology. Plants carrying one of the three genes were selected using kanamycin resistance and the presence of the transgene in tomato was confirmed with PCR. **Objectives:** Evaluate the potential of the Hfr-1, Hfr-2 and Hfr-3 genes as tools to inhibit the growth and development of insect pests of plants. **Methods:** Leaf tissue from multiple transgenic lines carrying one of the three Hfr genes was used to create aqueous extracts. These extracts were then incorporated into artificial Drosophila growth media. The media was inoculated with flies and the resulting insect progeny were monitored for 21 days for pupation and eclosion. **Results:** Extracts from Hfr-1 and Hfr-3 plants significantly delayed the time of pupation of larvae by 0.61 days (p-value <0.05; Students t-test). In addition, time to eclosion was delayed by Hfr-1 and Hfr-2 carrying plants by 0.79 and 0.57 days, respectively (p-value <0.05; Students t-test). **Conclusion:** This delay in development would allow for greater opportunities for predators of the larvae. Future studies will include the evaluation of the Hfr genes in delaying/controlling insects from other Orders (e.g. Lepidopteran, Coleopteran). The identification of genes and their products useful in protecting plants from damage and herbivory will enable the production of the additional food needed to feed a growing world. **Keywords:** transgenic, tomato, insect

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**Attempting to Clone the Anthocyaninless (anl) Gene from Brassica rapa**

**Introduction:** Brassica rapa, commonly known as Wisconsin Fast Plants has two stem coloration phenotypes, one purple and one non-purple. The purple coloration is caused by a pigment called anthocyanin. The anthocyaninless gene in Wisconsin Fast Plants codes for a protein related to the anthocyanin biosynthesis pathway. The purpose of this study is to begin to determine where this mutation occurs. **Objectives:** To identify the physical mutation resulting in the Anthocyaninless phenotype using sequence analysis. **Methods:** Genes of the anthocyanin biosynthesis pathway of Arabidopsis thaliana were used as a basis for designing PCR primers for gene amplification. Primers were designed by comparing BAC sequences of Brassica rapa to the sequences of biosynthesis pathway genes in various Brassica species. DNA from three genotypes of Brassica rapa was isolated and purified (true-breeding purple plants, true-breeding non-purple plants, and F1 generation plants from the cross of the two parents). PCR reactions with genomic DNA as template were initiated with the primers designed from the closely related Brassica species. **Results:** Ten of the eighteen PCR reactions showed positive results. The UGT, DFR, and
GST genes were positive for all three phenotypes. The LDOX gene was positive for the F1 genotype. PCR products were then purified and sequenced (both directions) in order to arrive at a consensus sequence for each of the genes. Conclusion: Once consensus sequences are determined within each phenotype a more in depth DNA comparisons can be conducted among the genes from the two phenotypes (purple and non-purple). In addition, full-length gene sequences (including promoters and terminators) can be generated and compared between the two different phenotypes. Identifying mutations will identify the mutation that causes the two phenotypes, and thus the identity of the anthocyaninless gene. Keywords: Fast Plant, anthocyanin

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Conserving wheat land races in the Al-Hajar Mountains in Northern Oman

Introduction: Wheat (Triticum spp.) has been cultivated in Oman for more than 3000 years (Guarino, 1990). Wheat landraces are still grown in many remote oases of Oman’s Al Hajar mountain range. Surveys by the Omani Ministry of Agriculture indicate that modern cultivars of wheat are rapidly replacing Omani landraces, which has led to a decline in the total area cultivated by the latter from 1000 ha in 1988 to 238 ha in 1996 (Anonymous, 1995).

Objectives: Document and conserve wheat landrace varieties and their associated cultivation practices in the Al-Hajar mountains in Northern Oman. Cultivate and display each wheat variety in specially constructed terraced fields in Oman Botanic Garden. Promote public awareness with regards to the rapid loss of this valuable resource, knowledge and associated practices.

Methods: Visit remote villages in the Al-Hajar Mountains. Explain our aims and methods to local farmers. Establish enduring links with villagers and work together to document and conserve traditional agricultural and general ethnobotanical practices. Gather data on traditional wheat landraces, including local variety names, cultivation and storage methods. Collect seed from each wheat variety for inclusion in the Oman Botanic Garden seed bank. Propagate, grow and display the traditional wheat varieties in specially constructed traditional agricultural terraces at Oman Botanic Garden.

Results: Seven villages in the Al-Hajar Mountains were visited between March and April 2012. Good working relationships with the local farmers were quickly established. So far our research has documented information and gathered seed material from six Omani wheat landraces, three of which are very rare and were thought to be no longer used. Work on this project is ongoing and will continue until 2014. Conclusion: The rapid loss of wheat landrace varieties and the associated cultivation practices from Oman’s Al-Hajar mountains is alarming. The documentation and conservation of the remaining wheat varieties and their genetic diversity is essential. Many villages are being encouraged to use Government supplied ‘improved’ varieties. This practice has potential to erode many generations of genetic adaptations to, for example salt and drought tolerance. We hope our intervention will radically slow this loss and in time promote the reintroduction of these important, locally adapted landraces. Keywords: Traditional crops, Triticum spp., Locally adapted.
Farmers’ Acquisition of Planting Materials for Taro (Colocasia esculenta) and Sweet Potato (Ipomoea batatas) in Papua New Guinea

Introduction: The vast majority of farmers in Papua New Guinea (PNG) practice ‘traditional’ low-input agriculture in mixed crop gardens. Sweet potato and taro are two crops essential to many PNG production systems, yet little is known about how PNG farmers acquire and share planting materials for these vegetatively propagated crops. **Objectives:** To identify the ways in which farmers across four different sites obtain planting materials for taro and sweet potato and whether these systems are resilient to environmental changes and shocks. **Methods:** Fifteen group and eight individual interviews were undertaken with farmers and key informants; ten market sellers were also interviewed in local and regional markets. From this, a household survey was designed and carried out, sampling 189 highland sweet potato farmers, across two sites, and 180 lowland taro farmers, across two sites. It is planned to follow up on this work in conjunction with a crop evaluation exercise in Autumn 2012. **Results:** Farmers source planting materials from their own gardens, though there is also a considerable amount of off-farm acquisition, particularly through social networks, making personal ties outside the community a key source for acquiring new material. Payment and market acquisition are rare, particularly for sweet potato, but may be growing. Cultural practices, such as marriages and feasts, also structure exchanges. These systems are generally able to source new varieties to respond to changed economic/cultural/environmental conditions, though climate shocks can result in loses that may require outside intervention for recovery. **Conclusion:** The farmers studied, representing four distinct economic-cultural arrangements in Papua New Guinea, have multiple methods for acquiring planting materials for taro and sweet potato. Generally these are resilient to long-term changes; though they may be challenged by short-term climate shocks such as droughts and those without familial ties may be cut off from some exchanges. **Keywords:** seed systems, Oceania, environmental change

Homegrown Hops in the Hawaiian Islands

Introduction: German brewers have been using wild and cultivated hops (female flowers of the hop plant, Humulus lupulus (Cannabaceae)) to flavor their brew for hundreds of years. For this same purpose, the hop plant was introduced to the United States from England in 1629, with the first commercial hop yard in the United States being established in New York in 1808. New York remained the leader in hops production until the crop was virtually wiped out in the eastern states by downy mildew in the 1920’s, and today, the Yakima Valley in Washington produces the majority of hops grown in the United States. However, American homebrewers may be interested in growing the hop plant for local use but lack a suitable in-ground space to do so. This study investigates the growing of the hop plant in containers in a common garden on the island of Oahu. **Objectives:** To support or refute the hypotheses: (1) the hop plant produces hops in the Hawaiian Islands and (2) the hop plant requires a period of vernalization to produce hops. **Methods:** A male hop plant accession was retrieved from Lyon Arboretum and grown in a hop yard with online purchased rhizomes of the hop cultivars Chinook, Cascade, Willamette, and Northern Brewer, and Newport. Five gallon buckets were used for containers and sufficient
potting soil was purchased from local gardening retailers. Water and cultural care was followed according to online and how-to-do-it manuals. **Results:** Hop plants do produce hops on the island of Oahu, and hop plants do not require a period of vernalization to produce hops. A four year old male hop plant is growing in a hop yard with three and two year old female hop cultivars with success and vigor from both sexes. Photoperiod is very important due to the hop plant being a short-day plant. Vartetal success is variable and requires increased replicates across the variable island ecosystems found in the Hawaiian Islands. **Conclusion:** Hops, a medicinal flower and flavor used by the brewing industry, have a long history of successful cultivation in a variety of environments. This study is the first known report of *Humulus lupulus* successfully cultivated in the Hawaiian Islands and supports the hypothesis, hops production does not require a period of vernalization. Resequencing the hop plant’s genome and comparing it to the only other published genome in the Cannabaceae, *Cannabis sativa* L., will provide a genomic database for a small plant family that allows researchers the opportunity to study the origins, mechanisms of evolution, and domestication events in the most important economic plant family. **Keywords:** ethnobotany, hop plant, homegrown, common garden, Oahu, Hawaiian Islands

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**Local Produce Trends in Allegany, Garrett and Washington Counties Maryland**

**Introduction:** Undergraduate Ethnobotany Majors conducted a survey targeted to consumers in western Maryland including Allegany, Garrett, and Washington Counties about their interest in local produce. **Objectives:** Our survey was designed to give us a broad understanding of the customer base, aspects of available information or products that may need future improvement, what influences consumer’s decisions about local produce and to foster further thought on the part of the in the community regarding consumer choices for what is put on their tables. **Results:** We found that community supported agriculture (CSAs) had the highest consumer satisfaction with local produce availability, that local is of interest to the community but people don’t think it is available, and that we have many more questions to ask. **Conclusions:** We plan to extend our research base to the farms themselves by surveying what they produce, who their customer base is and what markets they sell from. This is tentatively planned for winter 2012-2013, when life is less hectic for farmers. We are also planning to set up an outreach event at a local venue in early summer. The plan is to serve local foods while farmers talk to the community about CSA’s, production methods, etc. thereby expanding community awareness of these local practices.

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**Toxicity of Mid-Michigan Plants in the Brine Shrimp Lethality Assay**

**Introduction:** Michigan is home to several medicinal plant species of economic significance, including *Podophyllum peltatum* L. (Berberidaceae), *Sanguinaria canadensis* L. (Papaveraceae), *Panax quinquefolius* L. (Araliaceae), and *Hypericum perforatum* L.
Hypericaceae) among others. Many native and introduced Michigan plants have been and continue to be used by Native Americans as medicine, though few of these have been thoroughly investigated. Study of the cytotoxic lignans from *P. peltatum* has led to the development of the cancer therapeutics etoposide and teniposide. It is likely that other plants from the region have biological activities that remain to be discovered. **Objectives:** The objective of this study is to screen Mid-Michigan plants for potential anti-cancer activity using the brine shrimp lethality (BSLA) and MTS cytotoxicity assays. **Methods:** Plants were collected from the Alma College Ecological Field Station in Vestaburg, MI. Methanol extracts were tested at 500 & 956 g/ml in the BSLA, and LC50 values were determined for active extracts. **Results:** Thirteen extracts demonstrated activity in the BSLA, including the wild geranium *Geranium maculatum* L. (Geraniaceae), which has not previously been investigated for cytotoxicity. Known cytotoxic plants *P. peltatum* and *Achillea millefolium* L. (Asteraceae) were also active. **Conclusion:** Of the roughly thirty extracts screened, thirteen demonstrated activity in the BSLA. These plants include both known cytotoxic plants as well as plants for which cytotoxic activity has not previously been reported. Active extracts are currently being tested in the MTS cytotoxicity assay in MCF-7 cells, and bioassay-guided fractionation is underway to isolate and identify active chemical constituents. **Keywords:** Native American, Cancer

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**Preliminary ethnobotanical and immunological assessment of the Palauan traditional adaptogen Phaleria nisidai**

**Introduction:** *Phaleria nisidai* Kaneh. (THYMELAEACEAE) is a small tree native to Palau with a long history of use there as an invigorating, strengthening and healing beverage. In Palau this plant is known as delalakar, which translates to "the Mother of medicine" and the leaves are brewed into an adaptogenic tea to maintain overall health and cure serious illnesses. It is taken by many laypeople and traditional healers every day. **Objectives:** To further investigate the use pattern of this traditional remedy and critically evaluate its most popular use as an immune enhancer using in vitro assays. **Methods:** 25 Palauans, including both laypeople and traditional healers from various age groups, were selected to provide in-depth information about the way Palauans prepare and use delalakar. Peripheral blood mononuclear cells (PBMCs) were used as an in vitro model for immune stimulation. PBMCs were cultured with various extracts of delalakar leaves and their response was measured by monitoring the levels of the immune-stimulating cytokine gamma-interferon (IFNγ) using an ELISA assay. The proliferation of PBMCs was measured in the MTT assay. **Results:** Palauans prepare and drink a tea of delalakar leaves to both prevent and treat sickness and maintain overall health. Many informants claim the tea can help stimulate the immune system. Water and organic extracts of delalakar were able to markedly and significantly increase the output of IFN611; in PBMC cell culture compared with negative controls. Extracts of delalakar were also able to expand the population of PBMCs. **Conclusion:** In vitro bioactivity studies of delalakar support the traditional use of this plant as an
immune-stimulating adaptogenic beverage and help confirm its value to the Palauan traditional medicine system. **Keywords:** Adaptogen, Palau, Micronesia, Ethnomedicine, Immune System

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**The Pittsburgh Botanic Garden**

**Introduction:** The Pittsburgh Botanic Garden is a new project on 460 acres in Settlers Cabin County Park, located 20 minutes from downtown Pittsburgh and the Airport. The site will serve the Greater Pittsburgh Area by providing diverse temperate forest gardens. Eighteen formal gardens, a visitor center, outdoor amphitheater, research facility, reception hall, and woodland forest are planned. A land reclamation project is in order due to extensive acid mine drainage on the site as a result of surface strip mining and deep mining, a characteristic seen across Western Pennsylvania. Once the mining reclamation work is completed, a multiyear project, construction on the formal gardens will begin. **Objectives:** Currently we are developing and managing the Woodlands of the World, sixty acres of eastern deciduous forest segmented into, Woods of the Appalachian Plateau, Cove Forest, Asian Woods, English Woods, and Eastern European Woods. **Methods:** Management of the woodland area proceeds through invasive species removal, native plantings, installation of blue bird houses and bird feeders, and community support from volunteers. **Results:** During 2011, 1,050 native trees, shrubs, and perennials were planted in the Appalachian Plateau, 1,450 tulips were planted on our white flowering dogwood trail, 9 acres of invasive species were managed, 2 miles of trail were installed with 2 memorial benches, and there were 20 volunteer days with a total of 290 volunteers. **Conclusion:** The county park we are located in has amended our lease to include a farmhouse, maintenance barn, and log cabin. Renovation of the buildings will begin June 2012, setting the opening of the woodland forest to the public for the spring of 2013. The farmhouse will serve as the offices, while the barn will become the Bayer Welcome Center and will house a reception hall and classrooms. As a nonprofit grassroots organization, over a decade in the making, we are connecting with the Pittsburgh community by providing Eagle scouts with diverse projects, volunteer days, a yearly plant sale, and educational outreach. **Keywords:** Invasive, native, economic, community, reclamation, education

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**C. F. Millspaugh, M.D.: pioneer of West Virginia botany**

**Introduction:** Charles Frederick Millspaugh, M.D. (1854-1923) was the first botanist to systematically catalogue the flora of West Virginia. Both a physician and a keen naturalist, he published American Medicinal Plants in six fascicles between 1884 and 1887 (reissued with modifications in 1892). In 1889, he was appointed Botanist and Microscopist to the newly founded West Virginia Agricultural Experiment Station (WVAES) at West Virginia University (WVU). **Objectives:** We examine Millspaugh's achievements in West Virginia botany, in the light of his interests in medicinal and agricultural plants. We analyze his collections, which provided the basis for the first state flora and formed the nucleus of the WVU Herbarium (WVA). **Methods:** We reviewed the literature to determine a timeline for Millspaugh's work in West Virginia. Label information was extracted from the WVA collection database and checked
against physical specimens when required. We summarized species, localities, and dates represented and identified economically significant taxa. 

Results: Upon joining the WVAES, Millspaugh undertook an investigation of agricultural weeds in the framework of a thorough botanical inventory of West Virginia. He collected and mounted specimens for farmers and others interested in West Virginia vegetation. The 1,580 specimens (plants and fungi) collected by Millspaugh remained with the WVAES after his departure in 1892. These became part of the WVU Herbarium in 1933. Currently, 976 of Millspaugh’s specimens remain in the WVU vascular plant holdings. By modern classification, 648 species in 112 families are represented, from 29 counties in the state. Two key publications resulted from these endeavours: Your Weeds and Your Neighbor’s (1892) and Preliminary Catalogue of the Flora of West Virginia (1892). Millspaugh retained an active interest in WV botany, subsequently publishing Flora of West Virginia (1896) and The Living Flora of West Virginia (1913).

Conclusion: Millspaugh was a pioneering force in bringing the scientific study of botany to West Virginia. His collections, including economic plants, formed the core of the WVU Herbarium, while his 1913 flora remained the definitive reference for West Virginia botany for over 30 years. Keywords: Agricultural Experiment Station, botanical inventory, Charles Frederick Millspaugh, economic plants, medicinal plants, weeds, West Virginia flora, WVU Herbarium

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Is the present BrackenRidgea Nature Reserve large enough to ensure the survival of Brackenridgea zanguebarica Oliv.?

Introduction: The Brackenridgea Nature Reserve or better known as the Mutavhatsindi Nature Reserve is a protected area that was established in 1987 by the provincial Limpopo Department of Economic Development, Environment and Tourism in a proactive attempt of protecting the population of Brackenridgea zanguebarica. In the whole of South Africa the species is found in only one small area around Thengwe in Venda. It is threatened with extinction due to its high demand as a magical and medicinal plant species (Netshiungani & Van Wyk 1980) and is classified as Critically Endangered in South Africa (Plants of southern Africa version 3.0: an online checklist http://posa.sanbi.org). Objectives: The study aimed to apply the methodology of Burgman et al. (2001) to assess if the size of the Brackenridgea Nature Reserve is currently large enough to conserve a viable population of B. zanguebarica. Several scenarios were run to investigate different levels of human-induced impact to derive the most promising and realistic target area to conserve the species. Methods: Sixteen plots of 50 x 10 m in size were sampled in the Brackenridgea Nature Reserve in order to obtain a quantitative measure of the density of the Brackenridgea zanguebarica population. The plots were constructed using 50 m tape measures, which were removed after sampling. The plots were constructed in a east-west direction of the Brackenridgea Nature Reserve at 10 m intervals. All Brackenridgea zanguebarica individuals within each plot were counted and recorded. The following parameters were recorded for each individual: (i) the diameter measurements of all stems (in cm), (ii) the height measurement of the trees (in m), (iii) the height to the base of the canopy (where the largest lowest branches are) (in m), (iv) the diameter of the widest canopy section (in m), (v) and the diameter perpendicular to that of the widest canopy (in m). Results: After sampling sixteen 50 m x 10 m transects in the reserve, the area sampled was 8000 m2 (50 m x 10 m x 16). A total
of 121 *B. zanguebarica* individuals were recorded in these 16 transects. Overall density in the sampled area was therefore: 151.25 *Brackenridgea zanguebarica* individuals per ha. However, the density of young plants with a stem diameter of 10 cm and below was 90 individuals per ha, while that of adult individuals with stem diameter of more than 10 cm was 61 individuals per ha. At the time of data gathering in 2007 the overall density (151 individuals per ha) was approximately the same as in 1990 (140 individuals per ha, data provided in Todd et al. 2004). However, the distribution among the size classes differed, with many more individuals in the 0 – 5 cm diameter size class in the 1990 survey. The fact that there were no individuals within the 0 - 2 cm stem diameter size class and very few in the >2 – 4 cm class is cause for concern. However, the 2007 survey indicated many individuals in the stem diameter size classes from 4 – 20 cm.

**Conclusion:** In conclusion, it is clear to note that the utilization of *Brackenridgea zanguebarica* from the Thengwe area for medicinal purposes cannot be stopped since the species is regarded an important medicinal plant and only located in one area in the whole of South Africa. It is therefore recommended that the area for conservation of *B. zanguebarica* be increased in order to increase the distribution of the species through the available potential habitat. Several sectors which have enough potential for the growth of *B. zanguebarica* population can be included in the conservation plan. In a situation where a single reserve cannot be constructed by extension from the existing one, several smaller reserves can be created along potential growth habitat as long as corridors are kept in place. The creation of corridors between the different sectors is important in enforcing the viability of the protected population. **Keywords:** Conservation, extinction, local tribal authority

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**Students Perceptions of Flowers and Weeds**

**Introduction:** Ethnobotanical research aims at identifying how individuals from varying backgrounds perceive and classify plants. One grouping often used by people is in classifying plants as useful or as weeds. Peoples’ perceptions of weed may vary across aesthetic condition instead of native or invasive state. **Objectives:** Our research project is focused on identifying peoples’ perception of weeds. **Methods:** Students at Frostburg State University interviewed other students to determine where they think weeds occur and the specific plants that they categorize as weeds. Categorization occurred by implementing pile-sorting techniques of images of common plants. One of our hypotheses was students would define weeds as ‘ugly’ or ‘unwanted’, and this was proven to be true. We also predicted students would often not consider flowering plants to be weeds. **Results:** In contrary to our hypothesis, there was not a significant difference in the data to prove this valid. **Conclusions:** This project will aid in ecological restoration by assisting in determining peoples’ attitudes towards particular plants. FSU is in the process of creating an online herbarium which focuses on ethnobotanical qualities of the featured specimens. A section of the website will be designated to learning about native species, weeds, and other plant categories.

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CAMPUS SUSTAINABILITY ASSESSMENT

Introduction: In recent years Frostburg State University has taken strong interest in sustainability. The University president's signature of the American Colleges and University President's Climate Commitment has sparked campus wide structural, academic, and habitual shifts towards sustainability. Although tangible change has occurred, the university community perception of this change has not been gauged. Objectives: The objectives of this project are to determine faculty, staff, and student perceptions of sustainability initiative at Frostburg State University. Methods: IRB approval (#FSU/USM-H2012-02) was obtained for this project. Around one-hundred faculty, staff, and students were randomly selected from three campus locations and interviewed with a survey prompt. Results: From our results we can conclude that while interest in sustainability initiatives is quite high, the level of reported engagement is significantly lower. Conclusion: This project will lead to a greater understanding of sustainability perceptions of faculty, staff, and students. Keywords: Sustainability, Surveys

SALEP A BIOCULTURAL CONSERVATION CONUNDRUM; COLLECTION OF WILD ORCHID TUBERS IN TURKEY

Introduction: Wild orchid tubers have been collected in Turkey for hundreds of years for use as a food and medicine called salep. Recently orchid collection for salep has been cited as the cause of orchid population decline. Inconsistencies in data used to assess orchid populations has obscured causes of orchid population decline. Perceptions of the issue by academics and urban dwellers are different to those of rural dwellers and collectors. Using botanical data as well as local linguistic data this research seeks to establish how orchid populations are effected by collection for salep; and to illuminate options to conserve biocultural diversity. Objectives: To provide a holistic approach to assessing the impact of collection of wild orchids in Turkey for consumption. Use of specific botanical data collected at species level for accurate assessment of orchid population dynamics will be interpreted in conjunction with ethnographic information, in particular from the perspective of orchid collectors. Methods: Quantitative data derived from transition matrix models of specific orchid species (likely to be A.morio) to assess the impact of collection of tubers on the ratio of flowering and non-flowering plants in an orchid population and whether flower plant surveys are reliable as a proxy for population numbers of specific species. Qualitative data will be collected via semi-structured interviews with different stakeholders in the collection of orchid tubers and their uses. Results: Initial results on ratios of non-flowering to flowering plants in A. morio populations. Conclusion: Initial conclusions to be developed over the next couple of months; likely to be in relation to the use of flower spike counts as a proxy for population numbers of specific species and the potential of transition matrix models for ethnobotanical research. Keywords: Combining quantitative and qualitative methods, Orchidaceae, Turkey
Vegetative Survey of Evergreen, Green Site Plan, Green Learning

**Introduction:** Vegetation surveys took place to document and monitor spring wildflowers at Evergreen Heritage Center. This is an experiential learning opportunity for techniques on documenting species presence and species diversity. Data was recorded about species present, how many were occurring and the percent of the sampling the species covered. **Objectives:** The survey is part of a master site plan for the Evergreen Heritage Center. The site plan result in a design that will support education programs, as well as programs in heritage tourism, agriculture, and recreation to enable the EHC to become financially self-sustaining. **Methods:** Between March 17th and April 22nd 2012, 60 plots were surveyed, with a total of 180 samples. Plots were placed 100 meters apart on a grid of the Evergreen property. Each plot had three samplings of an area each one meter squared. Data was recorded about herbaceous species present, how many were occurring and the percent of the sampling the species covered. **Results:** Forty eight species were identified. Eighty two percent of plots included invasive species, 40% of plots included garlic mustard, 45% of plots included multiflora rose, and the average plot sample cover was 27%. **Conclusion:** The average site conditions vary, but there were two main conditions noted. In the area below the train tracks, and above and to the right of the old road, there was fairly open forest, with limited multiflora rose and Japanese barberry; this is where we found most of the native plants with the fewest exotic invasive. Above the train tracks and to the left of the old road the forest was very full of multiflora rose and Japanese barberry, movement was challenging and there were many exotic invasive plants.

Plants of Xhosa people in the Transkei region of Eastern Cape (South Africa) with major pharmacological and therapeutic properties

**Introduction:** Xhosa are the major inhabitant of the Transkei region of the Eastern Cape of South Africa. For many years, the people of Transkei had no contact with the Western world and they relied mainly on the traditional knowledge they had of medicinal plants to meet their requirements. In spite of western influence of modern medicine in Transkei, the Xhosas still believe in the efficacy of herbal medicines and prefer to use traditional remedies. **Objectives:** The present investigation was undertaken to identify and record the plant materials and methods used by the Xhosa people of the Transkei region to combat disease and illness. **Methods:** The investigation was carried out in 15 districts of Transkei during different seasons for a period of two years. The information was obtained through a series of interviews with elderly villagers, rural and urban people. Field notes were taken on the medicinal uses of the plants following the methodology of Bhat et al. (1990). **Results:** Based on the interviews conducted, it is evident that the knowledge about the use of plants and herbal products is limited mainly to traditional healers, herbalists, and elderly people living in rural areas. The curative art of herbal medicines, however, is limited to a number of families with some sanctity and secrecy. The present investigation among the herbalists, traditional doctors, herb traders, tribal priests and other knowledgeable local people recorded medicinal and other uses of 35 plant species. Based on the nature of practice, the native doctors are generally known as “herbalists”; “diviners” or “traditional...
doctors’. **Conclusion:** The plant kingdom represents a source of food and medicine. Therefore, with the tendency in modern medicine to assimilate and re-assimilate natural remedies in common practice, under various forms, the potential of regional flora becomes very important (De Feo et al., 1992). **Keywords:** Xhosa, traditional healing, Transkei

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**Pharmacognosy Studies of Anti-Mycobacterial Ethnobotanicals of Laos**

**Introduction:** In Laos, old medical documents in the form of mulberry paper books and palm leaf manuscripts (PLM) provide an invaluable record of traditional treatments through history. Today, traditional herbal remedies are still frequently used (Sydara et al, 2005). Are these traditional remedies safe and effective for treating tuberculosis (TB)? **Objectives:** (A) to determine which plants were used to treat TB symptoms in the past by examining old medical documents. (B) to determine which plants are presently used to treat TB symptoms through interviews with traditional healers. (C) to collect and document the plants cited in the PLM and by healers. (D) to biochemically analyze the in vitro safety and effectiveness of plant extracts with various bioassays. (E) to return findings of this research to the people of Laos, in order to encourage the preservation of native biodiversity of the country, the preservation of indigenous knowledge passed orally between healers, and the preservation of indigenous knowledge contained in the palm leaf manuscripts. **Methods:** Medical PLM were searched for symptoms of TB and the corresponding treatments were translated into modern Lao and English. Simultaneously, ethnobotanical interviews were conducted with contemporary healers to see what they are currently prescribing. Plants samples and voucher herbarium specimens were collected and documented. Extracts of the plant samples were biochemically analyzed. **Results:** Samples were collected for 43 plants listed in the manuscripts and 50 reported by healers (19 were named in both the manuscripts and by healers). The samples were submitted to various in vitro assays to determine the amount of inhibition of virulent Mycobacterium tuberculosis H37Rv, as opposed to inhibition of other microbes and mammalian Vero cells. **Conclusion:** Some plants used in traditional medicines in Laos have demonstrated in vitro activity against Mycobacterium tuberculosis. While proof of consistent plant usage through time serves as a demonstration of the plants’ safety, the fractionation and isolation of active components and subsequent cytotoxicity assays has helped to affirm the degree of safety of the active components. **Keywords:** medical ethnobotany, Lao PDR, tuberculosis, traditional medicine

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**Studying Ethnobotanical practices of people of north West Himalayas**

**Introduction:** People of north west Himalayas in India are a store house of traditional ethnobotanical practices of using herbs as medicine. They have their own systems which have been passed to the present generation verbally and there has been no documentation of the methods, procedure, the curing agent of the plant etc. **Objectives:** This study was an effort to survey, justify and document the age old practices for wider use of future generations. **Methods:** Field surveys were done, samples collected, herbaria made, tested for the authenticity of the healing property in the light of modern medicines and devised ways to protect and ensure the sustainability of the ecosystem having these precious herbs and plants. **Results:** Many of these traditional methods have been incorporated into the modern system of medicine, they are effective and authentic, proving that the traditional systems need to be conserved and valued.
Conclusion: the plant, plant parts and the method and system and local methods used by people for curing simple ailments as well as complicated disorders. To conserve traditional medicinal system used by tribes and Himalayan people, there has to be documentation of these methods or they will be lost in this fast changing world and changing ecosystems.

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Studying Ethnobotanical Practices of People of Northwest Himalayas

Introduction: People of northwest Himalayas in India are a store house of traditional ethnobotanical practices of using herbs as medicine. They have their own systems which have been passed to the present generation verbally and there has been no documentation on the methods, procedure, the curing agent of the plant etc. Objectives: This study was an effort to survey, justify and document the age old practices for wider use of future generations. Methods: Field surveys were done, samples collected, herbaria made, tested for the authenticity of the healing property in the light of modern medicines and devised ways to protect and ensure the sustainability of the ecosystem having these precious herbs and plants. Results: Many of these traditional methods have been incorporated into the modern system of medicine, they are effective and authentic, proving that the traditional systems need to be conserved and valued. Conclusion: The plant, plant parts and the method and system and local methods used by people for curing simple ailments as well as complicated disorders. To conserve traditional medicinal system used by tribes and Himalayan people, there has to be documentation of these methods or they will be lost in this fast changing world and changing ecosystems.

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Chemical composition of volatile constituents of seven different species of the Lauraceae family from Nepal.

Introduction: There are more than 3000 species of plants belonging to the Lauraceae family worldwide. Within the flavor and fragrance industry, Lauraceae family is considered to be a major volatile oil source for commercial usage. In our study, seven species from Nepal were analyzed for leaf essential oil. Then species included: Mentha spicata, Mentha arvensis, Ocimum sanctum, Ocimum basilicum, Leucas aspera, Leucas indica, and Colebrookea oppositifolia. Essential oil compositions were determined using an Agilent 6890 GC coupled with Agilent 5973 mass selective detector. Further analysis of biological activity was accomplished via various bio-assays including: cytotoxicity, anti-microbial, larvicidal, brine shrimp lethality, and fire ant lethality. Results: Chemical compositional analysis showed taxonomic variation as well as geographical and climatic influences on the essential oil chemotype among the species. Biological testing showed wide variation in activity. Conclusion: Through our research, deeper understanding of chemodiversity and species differentiation within the Lauraceae family has been developed. In addition, bio-assay results have shown potential medicinal value of the...
Perceptions and concept of diarrhea by traditional healers from Vhembe District

Introduction: Diarrhoea illness has long been recognized as the cause of death of millions of people worldwide especially in developing countries (Nkwi 1994, Oviawe 1987). The disease is treated using western as well as traditional remedies. The knowledge of traditional healers and their practices can play an important role in building strength to promote the appropriate home management of diarrhea (Nations et al. 1988 and Anokbanggo et al. 1990). Traditional healers around the world have different beliefs and understanding of diarrhoeal disease and its treatment. Objectives: The aim of the project is to investigate the perception and concept of traditional healers on the treatment of diarrhoea in Vhembe district. The following objectives were looked at: (1) To investigate different belief and practices pertaining to diarrhoea by traditional healers of Vhembe district. (2) To investigate prevention methods used by traditional healers in order to ease diarrhoeal problems. (3) To investigate the classification of diarrhoea based on the traditional healers perceptions. (4) To investigate the medicinal plants used by traditional healers in the treatment of diarrhoea, the parts used, and also their preparation techniques and dosages. Methods: Twenty traditional healers from two municipalities (Mutale and Thulamela) around Vhembe district were interviewed. Data was collected through interviews using questionnaires. Interviews were conducted with individuals in their own languages and later translated. Results: According to Vhembe traditional healers diarrhoea is described as a disease which results in death due to loss of water in a patient body through vomiting and frequent toilet. Symptoms of diarrhoea include vomiting, loss of weight, change of skin, face, and eyes. Traditional healers also believe that their ancestors reveal the appearance of a patient, sickness and treatment (suitable plants for disease). Conclusion: Traditional healers of Vhembe district have better understanding of diarrhoeal diseases. They mention different categories of diarrhoel illness/diseases. There is a lack of information when it comes to the description of diarrhoeal illness on infants and children. Keywords: Preparation techniques, dosage, interviews and questionnaires

Black cohosh - state of the clinical research

Introduction: Actaea racemosa is an indigenous herb to Appalachia with a strong tradition of use by Native Americans and European settlers. Today it is a top-selling herb internationally, frequently prescribed by herbalists and widely available as across-the-counter products. It has also been subjected to numerous clinical investigations. Objectives: To review of clinical research literature for A. racemosa, with emphasis on findings that validate or challenge documented traditional use, and to develop a profile for clinical use among contemporary herbalists. Methods: Present key findings of literature search focusing on clinical research, and
develop an online survey of herbal practitioners regarding their use of A. racemosa. **Results:** Clinical studies are mainly focused on menopausal symptoms including osteoporosis, whereas traditional and contemporary use by herbalists is more focused on treatment of dysmenorrhea and other menstrual disorders as well as musculo-skeletal conditions. **Conclusion:** Clinical research findings for treatment of menopausal disorders are most promising, however there is also a need for studies that focus more on traditional indications. **Keywords:** Traditional use, menopausal, osteoporosis, herbal practitioners, online survey

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**Ethnobotany of the Ngäbe People of Panama**

**Introduction:** The Ngäbe, Panama’s largest indigenous group, rely on natural resources to provide food, shelter, goods, and medicine. Many Ngäbe live in remote areas and have limited access to modern healthcare services. Others do not have financial resources to visit health centers or confidence in the care they will receive there. Medicinal plants are used as an alternative to treat a variety of ailments and illnesses. Ngäbe botanicos, traditional healers, use their intricate knowledge of plants to treat or heal others. **Objectives:** To document the names and uses of medicinal plants by the Ngäbe in the Bocas del Toro region of Panama. **Methods:** I collected information on plants used for medicinal purposes by the Ngäbe using participant observation and plant collecting methods with the guidance of a local Ngäbe botanico. **Results:** I photographed, recorded names and treatment details for 160 different plants found in the Bocas archipelago and Northern Valiente Peninsula. **Conclusion:** The information collected will add to the knowledge of indigenous plant use and may aid in protecting native plants in the Bocas del Toro archipelago. **Keywords:** Panama, Ngäbe, Botanico

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**Ethnobotanical Study of Medicinal Plants Utilised by Newar Ethnicity in Chitlang Village, Makawanpur District, Nepal**

**Introduction:** The Himalayan country, Nepal has diverse ethnic groups settled throughout the country. Chitlang Village, situated at Makawanpur district is predominantly inhabited by the Newar community. Indigenous knowledge is common and important among ethnicity. **Objectives:** This paper documents indigenous knowledge of medicinal plants that are used by the Newar community of Chitlang Village Development Committee, Makawanpur District, Nepal. **Methods:** The present study was carried out by transect forest walk with knowledgeable local people and semi-structured questionnaires with local healers and key informants of different age groups and gender to record information on medicinal plants. **Results:** The medicinal uses of 116 plant species belonging to 108 genera and 63 families were recorded. Dominant families are Compositae, Leguminosae, Rosaceae. The most of the utilized species were collected from forest (41%), followed by home garden (29%), fallow land (27%) and markets. The scientific name, local Newari names, parts used, and preparations of the medicine are presented. Altogether 20 types of ailments have been reported to be used by using these 116 medicinal plant species, in their traditional modes of treatment of diseases such as cough and cold, diabetes, skin diseases, cuts and wounds, burns, itching, gastric, diarrhea and dysentery, rheumatism, bone fracture, jaundice. Decoction and paste was the most common method for indigenous use of preparation. Different plant forms such as bark, leaves, fruit, root, tuber, rhizome, bulb were also found to be in use by the Newar community as a medicine. **Conclusion:** Indigenous knowledge
systems are culturally valued and scientifically important. Indigenous knowledge of the use of plants as medicines remains mostly with the old woman. Indigenous knowledge of using medicinal plants are still used for treating diseases in Newar community of Chitlang VDC. But the young generation shows little knowledge to use medicinal plants. The young generation should be encouraged to learn the indigenous knowledge of using medicinal plants to preserve it from being lost with the older generation. Keywords: Indigenous knowledge, diseases, traditional medicine, conservation.

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Assessment of medicinal plants used for the treatment of snake bites by the Jumma people of the Chittagong Hill Tracts within Bangladesh

Introduction: The Jumma people are the indigenous peoples, of the Chittagong Hill Tracts region of present day Bangladesh. They are Chakma, Marma, Tripura, Tangchanya, Murang, Boam, Khumi, Kyang, Chak, Lushai, Reang, Usai, and Pankho. All of those indigenous groups together are called as Jumma people, accordingly their own cultivating system. The Jumma people have a long history of medicinal plant use and have its own medicinal practitioners, who usually administer medicinal plant formulations for treatment of various ailments. Objectives: There is little documentation of the medicinal plants knowledge was carried out in the Jumma people. An assessment was undertaken in the Jumma people to collect information from the medicinal practitioners on the use of medicinal plants for snake bites through questionnaire and personal interviews during investigation visits. Methods: Periodic field assessments were carried out in different villages of the Chittagong Hill Tracts within Bangladesh. Data were collected from the medicinal practitioners, local people, and village elders through personal communication and questionnaire. The data include the medicinal plant name, local name, part used, and therapeutic uses and the frequency of collection of medicinal plants etc. Voucher specimens were collected and identified by the referring standard Flora of Bangladesh. Results: In the assessment twenty-nine medicinal plants belonging to twenty-four genera and twenty-one families were found to be useful to cure snake bites. One medicinal plant was used to maintain the body in good health and so served as a preventive measure instead of a curative effect. The assessment also reveals that many Jumma people of the Chittagong Hill Tracts still continue to rely on traditional medicine for their primary healthcare. Conclusion: It was found that some of the present information has not so far been available in literature. Recent trend shows a decline in the number of medicinal practitioners in the region since the younger generation is not interested to continue this practice. In addition several wild medicinal plants are declining in number due to the destruction and unscientific collection of medicinal plants from forests. Hence there is an urgent need for exploration and documentation of the traditional knowledge in order to ascertain the local medicinal plants. Keywords: Traditional knowledge, Flora of Bangladesh, Medicinal practitioners.

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Traditional herbal remedies for gynecological disorder in women of Tehri District, Uttarakhand Himalaya

Introduction: Traditional remedies are part of the cultural and religious life of the rural peoples. In this paper nature and range of traditional medicines used for female complaints in relation to gynecological conditions and disorders. A wide range of herbal Traditional medicines are used to regulate the menstrual cycle, enhance fertility and as either abortifacients or anti abortifacients. Plants and plant based medicaments are the basis of many of the modern pharmaceuticals we used today for our various ailments. Objectives: To identify the natural materials used by traditional healers to treat health conditions and determine the methods used to prepare these remedies in the form of boiling, sanding, soaking, burning, roasting, and steaming. Methods: Information was compiled through scientifically guided questionnaires, interviews and general conversations. Although informants were not scientifically literate, they were born in the region and had lived there for most of their lives. Relevant information regarding the plant species, recipes, their local names, modes of administration and dosage were also collected to enhance permanent record. Results: The present paper reports with 24 plant species belonging to 22 families, mostly used for various gynecological disorders by the rural peoples of Tehri District, Uttarakhand Himalaya. The medical preparation practiced in day to day life of rural peoples living in remote forest or village. The use of herbal medicines is wide spread in this region with higher percentage of the tribal as well as non-tribal population relying on it. This is because of lack of awareness, shyness and lack of modern medical facilities available in their region and the high cost of medical system for treatment are unaffordable by tribal. Conclusion: Ethno-medicinal practices of tribal and non-tribal relating with human health. Ethno-medicine means the medical practices for the treatment of ethnic or aborigine people for their health care needs. Present study focuses on the utilization of plants available with the people of Tehri district, they are using the traditional knowledge for the treatment of gynecological disorders. There is an urgent need for systematic documentation of this knowledge by using scientific tools. Keywords: Traditional healers, gynecological disorder

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Exudates used as medicines by “caboclos river-dwellers” living in Unini River, AM, Brazil

Introduction: Few ethnopharmacological studies mention the use of exudates of plant species which showed several biological activities. However, the literature data do not afford some important information about the chemical composition of these plant material, which could be obtained using metabolomic approaches. Using the obtaines information, the studied exudates were classified in resins, latex, sap, gum, oil, and oleoresin. Objectives: To rescue and classify the exudates used as medicines by the “caboclos” river-dwellers from Unini River, Amazonas, Brazil, using metabolomic approaches, mainly 1H and 13C NMR spectroscopy. Methods: The plants and their exudates indicated during the fieldwork, conducted using an ethnographic approach, were identified and incorporated into the herbarium of the National Institute of Amazonian Research (INPA). For the classification of these exudates, the plant material was extracted using MeOH at room temperature and, after evaporation of solvent under reduced pressure, the obtained extracts were analyzed by 1H and 13C NMR spectroscopy. Results:
Seventeen exudates have been indicated by the “caboclos” river-dwellers and collected: Leite-de-sorva [Couma macrocarpa Barb. Rodr], Seringa-barriguda [Hevea spruceana (Benth.) Müll. Arg], Óleo-de-copaiba [Copaifera multijuga Hayne], Cipó-d’água [Doliocarpus sp.], Chico-dasilva [Protium decandrum (Aubl.) Marchand], Tamanquaré [Lecythis sp.], Leite-do-Amapá [Brosimum parinarioides Ducke subsp. Parinarioides], Breu-branco [Protium amazonicum (Cuatrec.) Daly], Breu-branco [Protium heptaphyllum Aubl.] Marchand], Breu-preto [Protium aracouchini (Aubl.) Marchand], Lacre [Vismia guianensis (Aubl.) Choisy], Andiroba [Carapa guianensis Aubl.], Jatobá-do-mato [Hymenaea courbaril L.], Jacareúba [Calophyllum brasiliense Cambess.], Castanha-do-Pará [Bertholletia excelsa Bonpl.], Cipó-cravo [Tynanthus panurenensis - Bureau ex Baill. – Sandwith] and Cipó-ambé [Philodendron solimoesense A.C.Sm.]. Among their therapeutic uses: analgesia and/or culture-bound syndromes (40%) and inflammatory processes (27%) are most recurrent. Furthermore, most of them are utilized in the form of cigarettes or the resins are burned and inhaled directly. Based in the chemical evidences, the obtained results, exudates were classified in resins (8), latex (4), sap (2), gum (1), oil (1), and oleoresin (1). Additionally, was possible the identification of coumarins in Calophyllum brasiliense, diterpenes in Lecythis sp., pentacyclic triterpenes in Doliocarpus sp., Copaifera multijuga, Protium decandrum, Protium heptaphyllum, and Vismia guianensis, as well as apolar derivatives such as fatty acids, triglycerides and/or hydrocarbons in Brosimum parinarioides, Bertholletia excelsa, Tynanthus panurenensis, and Philodendron solimoesense. Conclusion: The obtained results could contribute to the chemical/pharmacological approaches of these species, which have been used in Brazilian folk medicine. Keywords: ethnopharmacology, traditional knowledge, ethnobotany

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Time, Change and Botanical Knowledge Part 2: A Historic Comparison of the Pharmacopeias of the Delaware Tribes, Mennonites, and Amish in Eastern North America

Introduction: This study sought to compare the pharmacopeias of the Germanic Anabaptists in Eastern North America with those of surrounding cultures being used as benchmarks for comparison. Objectives: We expected to find that time, geography, and religious sect affiliation would all impact the retention and exchange of medicinal botanical knowledge to different degrees. Methods: Historical medicinal texts were combined with data from modern interviews to trace changes in knowledge across geography and time. Results: Plants used in human medicine were identified to represent a number of locations, cultural affiliations and times. The majority of the Germanic sources (including modern interviews), and the single English benchmark, show clear linkage. One source shows closer relationship with the Pharmacopeia of the Delaware tribes, but also contains numerous plants related to European knowledge. Conclusion: Time appears to be a stronger signal than either religious sect affiliation or geography. Keywords: Anabaptist, diaspora community, quantitative ethnobotany

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Conserving Chestnut Production in Northern Azerbaijan in the Face of Blight, Cryphonectria parasitica
**Introduction:** Ethnic minority highland inhabitants of Azerbaijan are negatively affected by the recent advances of the chestnut blight, *Cryphonectria parasitica*. Preliminary investigations reveal deep economic and cultural importance of the crop as well as strong community support for technical intervention. Early efforts to evaluate the efficacy of applied hypovirulence as a technical solution appear positive. **Objectives:** To demonstrate the urgency for intervention to conserve chestnut production to relevant institutions inside Azerbaijan and abroad. To synthesize a conservation strategy using applied hypovirulence based on input of community members and professionals. **Methods:** From two distinct communities, twenty-two families participated in a household budget survey focused on the economics of chestnut as well as in depth interviews on the overall importance of chestnut cultivation. From 120 trees in four regions of Azerbaijan more than 600 fungal isolates were collected for characterization by Swiss Federal Technical Institute. **Results:** The advances of the disease have created a volatile price environment for chestnut growers, but as of 2010 over fifty percent of annual income for chestnut growing families came from the sale of chestnut, while harvests are estimated to be significantly lower than in the past. Characterization of fungal isolates from Azerbaijan by the Swiss Federal Technical Institute demonstrate a low vegetative compatibility type diversity, encouraging the use of applied hypovirulence as a disease control measure. **Conclusion:** Minority ethnic groups which grow chestnut show heavy economic dependence on the annual income provided by the sale of the crop. Applied hypovirulence trials are recommended and will begin in Spring of 2012. **Keywords:** Chestnut, *Cryphonectria parasitica*, hypovirulence, minority highland peoples

**Introduction:** As part of our Arbor Day, Urban Forestry project for Ethnographic Field Techniques (Biology 428), we have conducted an ethnographic survey to determine what the student body at Frostburg State thinks about trees currently on campus and the possibility of increasing our campus canopy. Students received surveys via email and were approached by members of our group in select high-traffic locations on campus. **Objectives:** Our goal was to gather as random a sample as possible. Participants were asked about their previous experience with Arbor Day and planting trees, and to gauge the importance of trees on campus to them personally. **Methods:** We also recorded students’ opinions about the possibility of more trees being planted. We expected the results of this survey to show that FSU students do care about having trees in their environment, but may not be informed about the possibility for urban canopy growth. **Results:** Students overwhelmingly think that there is more room on campus for trees. Most students did grow up with a shade tree in their yard, but do not have one where they live in Frostburg. They are skeptical about the way money is being spent on campus maintenance. **Conclusions:** This survey could be used to influence decisions regarding the use of green space at FSU. It could also be used as a basis for further research within the student body and to track the effects of holding Arbor Day celebrations and Tree USA designation. **Keywords:** Urban Forestry, Interviews, Surveys
Traditional Knowledge, Cultural Values and Ethnobotanical Uses of Plant Diversity in Mountainous Regions -- A Case Study of Some Villages of Nuwakot District, Nepal

Introduction: Plants and their products play a key role in the life and economy of rural people living in the mountainous regions of Nepal. Rural people collect useful plants and their parts from various habitats and use those materials following traditional practices and techniques. In this paper, an attempt has been made to study species that demonstrate indigenous knowledge and utilization. Objectives: To document species used by people within villages of Nepal for medicinal and other purposes, and to explore the influence of cultural values, indigenous knowledge, and practices related to those species. To identify priority species for documentation and conservation that could improve the economic status of local communities and enhance rural development. Methods: Information related to uses, cultural values and traditional knowledge were gathered mainly through interviews and open-ended participatory discussions with local informants, and by direct observations on the way different plant materials were being collected and used. Results: 151 species of plants belonging to 90 families, used by the local people of the villages of Nuwakot District, Nepal, have been collected from various habitats. Local people have remarkably detailed knowledge of species identity, characteristics and uses. The study has also recorded some potential species useful for the development of rural industries and improvement of the living standards of these communities. However, at present, these traditional knowledge and practices are disappearing particularly due to unplanned land use and inadequate integration of local needs and cultural values in rural area development plans. Additionally, some species are under serious threat indicating urgent need for documentation and conservation of useful plants and their habitats. Conclusion: The studied villages are rich in diverse species and traditional knowledge systems due to significant cultural and environmental diversity. The traditional practices and technologies could be used for the improvement of the economic status of the local communities. However, the trends in decline of abundance of some very useful species show that action for conservation is urgently needed. Keywords: Ethnobotanical uses, cultural values, mountainous areas, Nepal

Dyes from invasive plant species in the South Carolina Piedmont

Introduction: We investigated the use of invasive plant species as a source for the production of fiber dyes to provide an alternative to the use of native plants, fungi, lichens, or commercially available dye materials. Objectives: Due to increased interest in the use of natural plant dyes for coloring natural fibers such as wool, silk, cotton, and flax we investigated the possibility of using invasive plants as dye sources. Concern over the collection of native plants, fungi, and lichens for dye purposes threatens these organisms. Cultivation of dye plants can also cause problems as is seen with Woad (Istais tinctoria L) in the western U.S. Using invasive plant species reduces the impact of plant collection and limits the spread of unwanted plants. Methods: Herbaceous or woody invasive plants found in Greenville County, South Carolina were collected, ground, weighed and boiled in distilled water for one hour to extract possible dyes. Multifiber Fabric #43 (MFF 43) (Testfrabrics Inc., West Pittston, Pennsylvania) mordanted with
alum (hydrated potassium aluminum sulfate) was used to test each of the dye preparations. **Results:** Results showed that most of the plants screened could be used for weak to moderate pink, tan, to yellow dyes. Several plants, including Mahonia (Mahonia trifoliolata (Moric.) Fedde), European Barberry stems (Berberis vulgaris L.), Orange daylily (Hemerocallis fulva (L.) L.), and Dogfennel (Eupatorium capillifolium Lam.) gave exceptionally strong hues of yellow. Strong pinks and lavenders were obtained from European Barberry leaves, and Stilt Grass (Microstegium vimineum).

**Conclusion:** Screening of invasive plants for their ability to be used in the production of natural dyes revealed several useful individuals. These plants will be incorporated into several teaching courses where students spend time identifying and collecting plant material for use in dyeing projects. **Keywords:** teaching, sustainability, fibers

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**Understanding the future by learning from the past**

**Introduction:** Students are typically disconnected from the environment and their knowledge of historical and modern plant-based industries is lacking. Furthermore, many students do not wish to know anything about these industries or plants in general and how plants affect our lives. Applied Plant Science, a biology course with an emphasis on sustainability was thus developed to inform students about and to provide appreciation for plant-based industries.

**Objectives:** This course, created eight years ago, examines the role of plant food, fiber, and pharmaceuticals in today’s society. Though I have a traditional lecture component, what makes it unique are my laboratory exercises. Instead of a customary laboratory approach, I chose to look at the traditional methods of plant use from which modern industries have developed. My goal is to give students an appreciation of how plants shaped societies in the past and how those same plants and methods have been used and changed by modern industry.

**Methods:** The course is divided into sections centered on plant usage as (1) food, (2) spices and herbs, (3) medical and psychoactive drugs, (4) oils and waxes, (5) hydrogels, latex, and resins, (6) fibers and dyes, (7) beverages, and (8) parks, gardens, and ornamentals. The laboratory sessions highlight an aspect from each of these divisions.

**Results:** Examples of the laboratory exercises include making plant soaps (plant oil industry), fiber processing, spinning and weaving (fiber industries of cotton and flax), making paper (wood pulp industry), producing natural plant dyes (now part of the petrochemical industry), and making bread and preserving food (food industry). With an underlying emphasis on sustainable practices we look at how these processes were done in the past, how the processes have changed over time, and the ability of modern industries to remain viable and sustainable in the future.

**Conclusion:** This course enables students to see modern plant usage in a different light. By understanding past practices of food preparation and preservation, cloth manufacturing, medicinal practices, and paper and soap production, for example, students can better understand the impact of modern plant usage on society and the environment.

**Keywords:** teaching, sustainability

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**Indigenous medicinal interviews, Vhembe District, Limpopo province, South Africa**
Introduction: More than 80% of the world’s population still depends upon traditional medicines for various skin diseases (Priya et al. 2002). In order to continue to produce livestock in a sustainable fashion, it is suggested that what was used in the past will continue to form the mainstay of future control (Peter et al. 2005). Poor animal health especially in poorly resourced areas of Vhembe District, Limpopo province, South Africa is an important limiting factor on animal productivity as the case in most developing countries. Diseases of livestock potentially have severe economic impacts in terms of production losses following mortality and morbidity, particularly in the case of cultures where animals are equated to wealth (McGaw and Eloff. 2008). In tropical and sub-tropical regions of Africa, ticks and tick-borne or associated microorganisms constitute a pathological complex responsible for impairing the efficiency of the livestock industry (Jongejan and Uilenberg. 1994). Objectives: This study aims to test the hypothesis that medicinal plants used in treatment of tick infected wounds may have an effect in tick eradication. The following objectives will be looked at: (1) to document the information on traditional way of treating tick-infected wounds. (2) to identify and collect plant species material used in treatment of tick-infected wounds. (3) to test some of the extracts (water extracts) against wounds causing microorganisms. Methods: The information on indigenous medicinal use was collected from all five Vhembe District municipalities through interviews. The informants were asked about the importance of Ticks and repercussion that they cause, they were then asked on how they treat their cattle regarding the after effects of tick’s manifestation. After data gathering mentioned plant species were collect dried at room temperature then exposed to extractions process using water, ethanol and acetone as extraction mediums. Out of more than 25 plant species mentioned only 9 of them were exposed to anti-microbial and ant-tick bio assays. Results: The results showed that most plants frequently used were the ones that were more active than those that were seldomly used or mention during data gathering process. Conclusion: The plants tested showed some degree of effectiveness, therefore the knowledge and the experimental findings will contribute towards the establishment of acaricides that are environmental friendly and easily accessible to resource-poor or developing world. Keywords: Informants, extraction, acaricides, and livestock industry.

Patterns and dynamic processes in crop domestication: a historical review and quantitative analysis of global food crops

Introduction: Crop domestication is accompanied by a suite of morphological, phytochemical, and genetic changes collectively referred to as the domestication syndrome. In addition to providing insights into both plant evolution and human history, knowledge of this process can help optimize crop utilization and inform biodiversity conservation efforts. However, analyses of trends in crop domestication are usually limited to small sample sizes and/or species of major economic importance. Much of our understanding of the processes driving domestication comes from a subset of well-studied crops, particularly crops of major economic importance and model crops. In order to explore global trends and historical patterns in domestication, large datasets are required that consider non-model crops, local subsistence crops and crops of minor economic importance, as well as food plants that are not fully domesticated or are still undergoing selection and improvement. Objectives: The threefold
objectives of this paper are to identify and interpret patterns and correlations across crop domestication categories, as well as current and former uses and conservation status; to provide quantitative support or testing of current and classic theories in crop domestication; and to identify promising areas for further research based on both trends identified by the dataset and gaps in the information available. **Methods:** In this review, 203 major and minor crop plants have been classified across 36 categories relevant to the plant’s region of origin, domestication syndrome, uses, exploited organs and conservation status. Using this data set, we tested classic and contemporary theories in crop domestication using Logic Forest regression analyses and other statistical approaches. **Results:** Variations in the frequency and nature of domestication over time and across regions highlight the impacts of a wide range of historical, cultural and technological factors and illustrate the dynamic and ongoing nature of domestication. **Conclusion:** The patterns illuminated from this review have both supported and contradicted established models and theories, and highlighted recent trends in crop domestication. To fully understand patterns associated with the domestication of food crops, and to help ensure their conservation, more research is needed to identify when, where, and from what food crops were domesticated. **Keywords:** center of origin, conservation, domestication, domestication syndrome, ethnobotanical uses, food crops, life history, selection

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**Digital Ethnobotanical Herbarium**

**Introduction:** The concept of biodiversity has become an important topic of concern among biological scientists around the world and Frostburg State University has also become involved. Among the different programs offered by the University dealing in some way with education about and conservation of biodiversity is the University Herbarium. Herbaria are an efficient way to categorize and store many different species of plants in order to preserve and study them. The FSU Herbarium contains over nine thousand plant specimens collected from western Maryland and beyond. Unfortunately, the Herbarium is tucked away in a corner of the Compton Science Center. **Objectives:** The FSU Herbarium will become more accessible through a newly designed and built website with about two hundred specimens available for study. The online Herbarium will include scanned specimens with common ethnobotanical uses and any conservation issues the species is facing. Maps that display the specimens’ native ranges, information on collecting and making herbarium specimens, and links to other well-known herbaria and information will be featured. There will also be collections from a few renowned botanists as well as the results from a recent survey study on students’ perceptions of plants as weeds. **Methods:** The Herbarium is in the process of being cleaned and organized according to the guidelines of Angiosperm Phylogeny Grouping III. Specimen preparation videos and study site photographs will be collected this summer. The specimens to be featured on the website have been selected and are ready to be scanned. The website is currently in a prototype state and will be edited and completed by the end of this year. **Results:** This project is still in-process. The progress made in the reorganization of the herbarium is promising as it has become more convenient and efficient to locate specimens and the instructional aspects of the website are greatly anticipated by students of biology at FSU. **Conclusion:** This is the first ever ethnobotanically based online herbarium and will showcase our University to others. This online
Herbarium will create a learning environment for students with disabilities by allowing for the incorporation of students that may be incapable of visiting the different outside sites. 

Keywords: website, APGIII