

Joint Conference of the Society of Ethnobiology  
&  
Society for Economic Botany

FOOD SECURITY, SOVEREIGNTY, & TRADITIONAL KNOWLEDGE  
JUNE 3--7, 2018  
Memorial Union on the UW-Madison campus  
Madison, Wisconsin (USA)



## Distinguished Economic Botanist

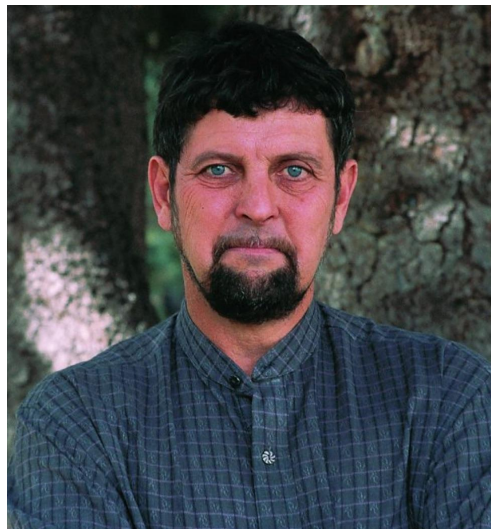
The award of "**Distinguished Economic Botanist**" (DEB) is bestowed annually by the Society for Economic Botany upon an individual on the basis of outstanding accomplishments pertinent to the goals of the Society.

### 2018 - Dr. Gary Nabhan

Over the past 30 years, **Dr. Nabhan** has made major contributions to economic botany and ethnobotany and embodies the spirit of the Distinguished Economic Botanist.

Gary Paul Nabhan is an internationally-celebrated nature writer, agrarian activist and ethnobiologist who tangibly works on conserving the links between biodiversity and cultural diversity. For such work, Nabhan has been honored as a pioneer and creative force in the "local food movement" and seed saving community by Utne Reader, Mother Earth News, New York Times, Bioneers, and Time magazine. He has been involved in bringing together farmers, ranchers, urban food activists and indigenous communities for the collaborative conservation of food-producing landscapes during the last quarter century.

As the W.K. Kellogg Endowed Chair in Sustainable Food Systems at the University of Arizona Southwest Center, he serves as founding Director of the Center for Regional Food Systems. Nabhan is currently engaged in a National Science Foundation grant involving five universities and colleges in integrating Western science with Native American traditional ecological knowledge in indigenous and American Indian studies programs.



## Distinguished Ethnobiologist Award

The Society of Ethnobiology's **Distinguished Ethnobiologist Award** is an annual award that honors an ethnobiologist for outstanding contributions to the field of ethnobiology and in advancing the goals of the Society.

### 2018 - Dr. Gail E. Wagner

The Awards Committee is proud to present the 2018 Distinguished Ethnobiologist Award to **Gail Wagner** of the University of South Carolina.

Dr. Wagner's work has made broad contributions to the fields of archaeology and ethnoecology, including her extensive paleobotanical research on the Mississippian period, her experimental garden work to revive traditional crops, and her large body of research surrounding human foodways in times of cultural change. Gail's substantial career embodies the mission of the Society of Ethnobiology: to promote the understanding of the past and present relationships between humans and their biological worlds. In addition to her research, Dr. Wagner has developed an extensive series of online resources for teaching and sharing ethnobotany, archaeology, and anthropology study materials, including dozens of videos and open-source guides. Her nominees for this year's award were a mix of academic and non-academic colleagues – a true testament to her work's wide influence and reach. As a past president and board member for the Society for Economic Botany and past board member for the Society of Ethnobiology, Gail's multi-disciplinary work is very timely to celebrate and honor at this year's joint conference.



We welcome you to the 2018 Joint Conference of the Society of Ethnobiology and Society of Economic Botany! The conference is taking place from June 3 – 7, 2018, in Madison, Wisconsin, with most conference events held in Memorial Union at the University of Wisconsin-Madison. The theme of this year's conference is *Food Security, Sovereignty, & Traditional Knowledge*.

Our joint conference provides a wonderful opportunity to meet colleagues in your field, connect with potential research partners, and develop greater cross-cultural, cross-discipline knowledge and awareness. Conference presenters and attendees come from a variety of fields and backgrounds, including academic faculty and students, Native/Indigenous community members, government personnel, museum staff, and individuals from private consulting and nonprofit agencies.

This year, we are pleased to include multiple days of oral presentations, breakout sessions, active/applied demonstrations, and cultural field trips. The conference culminates in a joint banquet on Wednesday evening, and will include awards and talks from this year's Distinguished Ethnobiologist and Distinguished Economic Botanist on Tuesday and Wednesday mornings.

### **Conference Organizing Committee Members**

#### On-site Team

Eve Emshwiller, UW-Madison Botany Dept.; SEB past president

David Spooner, USDA and UW-Madison Horticulture Dept.

Daniel Cornelius, Great Lakes Indigenous Law Center/Law & Entrepreneurship Clinic  
UW-Madison Law

Julie Dawson, UW-Madison Horticulture Dept.

Alex McAlvay, alumnus, (2018 PhD), UW-Madison Botany Dept.; SoE Board Member

#### Society of Ethnobiology

Cissy Fowler, President

Denise Glover, Treasurer

Liz Olson, Conference Coordinator

Ashley Blazina, Awards Coordinator

#### Society for Economic Botany

Gayle Fritz, President

Sunshine Brosi, President-Elect

Heather Cacanindin, Executive Director

Johanne Stogran, Botanical Society of America (BSA) Director of Conferences

*Some funding support for this conference is provided by  
the National Science Foundation and The United States Department of Agriculture.*

## Plenary Speakers



**Valerie Segrest**, Muckleshoot Tribe, Traditional Foods and Medicines Program Manager

**Plenary Talk Title:** Muckleshoot Food Sovereignty in the Pacific Northwest

Valerie Segrest is a native nutrition educator who specializes in local and traditional foods. As an enrolled member of the Muckleshoot Indian Tribe, she serves her community as the coordinator of the Muckleshoot Food Sovereignty Project and also works as the Traditional Foods and Medicines Program Manager. In 2010, she co-authored the book *Feeding the People, Feeding the Spirit: Revitalizing Northwest Coastal Indian Food Culture* and in 2017 she co-authored the recipe book "*Feeding Seven Generations*". She was a Food and Community Kellogg Fellow at the Institute of Agriculture and Trade Policy. Valerie inspires and enlightens others about the importance of a nutrient-dense diet through a simple, common sense approach to eating. <http://www.tedxrainier.com/speakers/valerie-segrest/>

**Plenary Talk Description:** A health revolution is happening in Coast Salish territory. For nearly a decade, we have witnessed tribal communities rise up to reclaim a culture of health that is culturally

appropriate and relevant. Tribal gardens are growing, sustainable food systems are being strategized, trauma-informed food policy is being upheld, and counter-marketing health promotion curriculum is rippling throughout the region. While colonization has disrupted traditional food and health systems, modern-day tribal communities are taking necessary and calculated actions with one clear message, "Our food is our medicine. Our traditional food culture matters." Ms. Segrest will discuss these efforts and some of the work she has developed with the intention to catalyze change as health educator, a plant worshiper and a community driven activist representing the Pacific Northwest Region.

**Katlyn Scholl**, Foreign Affairs Officer, U.S. Department of State

**Plenary Talk Title:** International Frameworks for Germplasm Exchange: An Introduction to the International Treaty on Plant Genetic Resources for Food and Agriculture.

Katlyn Scholl is a Foreign Affairs Officer in the U.S. Department of State's Office of Conservation and Water. Her portfolio includes issues related to the conservation of genetic resources for food and agriculture, and she serves as the U.S. National Focal Point for the FAO International Treaty on Plant Genetic Resources for Food and Agriculture. Ms. Scholl has a Masters in international science and technology policy from the George Washington University's Elliott School of International Affairs. She completed her undergraduate studies at the University of Florida, earning degrees in anthropology and art history.

**Plenary Talk Description:** In March 2017, the United States became the 143rd country to join the International Treaty on Plant Genetic Resources for Food and Agriculture. This talk will provide an overview of the Treaty, U.S. engagement, and how international agreements may affect germplasm collection, exchange, and research.







**Jessika Greendeer**, Ho-Chunk Nation

Jessika Greendeer is the agricultural division manager for the Ho-Chunk Nation. She is responsible for managing agricultural lands, protecting her traditional foods and carrying out her vision of feeding her people. Jessika is a US Army veteran, who completed a Veteran-to-Farmer training program in Pennsylvania with Delaware Valley University and the Rodale Institute. She has brought her knowledge of organic farming back to her community by growing out ancestral landrace varieties and market vegetables within the Ho-Chunk Nation community gardens during the 2017 growing season.

**Sean Sherman**, Oglala Lakota  
The Sioux Chef / [NATIFS.org](http://NATIFS.org): Founder

**Plenary Talk Title:** Understanding Indigenous Foodways to Rebuild Health and Integrity within Indigenous Communities

Sean Sherman speaks about his research, work, and philosophy surrounding Indigenous Food-Ways Knowledge and the impact that can be done by centering a focus around food. He also shares his replicable vision for rebuilding community health, and cultural integrity within indigenous communities and bringing back an understanding of Native Agriculture, Wild Plant Knowledge, Cooking Technique, Food Preservation, and History. In October 2017, Sean was able to perform the first decolonized dinner at the James Beard House in Manhattan along with his team. His first book, *The Sioux Chef's Indigenous Kitchen* was recently published and was recently nominated for the James Beard Award and chosen as one of the top ten cookbooks of 2017 by NPR, The LA Times, Smithsonian Magazine and more. The Sioux Chef team continues with their mission to help educate and make indigenous foods more accessible to as many indigenous communities as possible.



**Plenary Talk Description:** Chef Sean Sherman, Oglala Lakota, born in Pine Ridge, SD, has been cooking across the US and Mexico over the past 30 years, and has become renowned nationally and internationally in the culinary movement of indigenous foods. His main focus has been on the revitalization and evolution of indigenous foods systems throughout North America. Chef Sean has studied on his own extensively to determine the foundations of these food systems to gain a full understanding of bringing back a sense of Native American cuisine to today's world. In 2014, he opened the business titled, The Sioux Chef as a caterer and food educator in the Minneapolis/Saint Paul area. He and his business partner Dana Thompson also designed and opened the Tatanka Truck, which featured pre-contact foods of the Dakota and Minnesota territories.



**Candice Gardner**

Research Leader, North Central Regional Plant Introduction Station, Ames Iowa

**Plenary Talk Title:** The US National Plant Germplasm System Maize Collection — Status, Utilization and Possibilities

Candice Gardner is the Research Leader with the USDA-ARS Plant Introduction Research Unit in Ames, IA. The genebank is known as the North Central Regional Plant Introduction Station. Her research concerns primarily maize and the use of exotic, unadapted maize genetic resources to improve temperate-adapted maize, and methods to better conserve plant genetic resources and maintain their viability long term. Dr. Gardner has a Ph.D. in Corn Breeding and a M.S. in Plant Pathology from the University of Missouri, and completed her undergraduate studies at Iowa State University, earning a degree in

Bacteriology. She spent 17 years in the private sector prior to joining USDA-ARS in 1999.

**Plenary Talk Description:** Maize is now considered the world's number one crop in terms of production, calories consumed in human and animal diets, and farm gate value. This talk will provide an overview of the development of the U.S. National Plant Germplasm System's collection of maize genetic resources, some benefits derived from its utilization, both past and present, and the possibilities offered by newer technologies to realize the potential offered by the collection.

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## Society of Ethnobiology Undergraduate Ethnobiologist Award



***Chloe Fackler, Environmental Biology, Botany and Anthropology; McGill University***

Chl e Fackler is a junior at McGill University. Her research interests include Texas ethnobotany, connections between folk taxonomies and phylogeny, North American orchids, and the relationships between folklore and ecology. She hopes to attend graduate school and explore the changing dynamics of the US-Mexico border, urbanization, and fossil fuel extractive industries in Texas, and study their effects on the peoples and ecology of the region.



# Society of Ethnobiology 2018 Graduate Research Fellows



## Ecological Knowledge Research Fellow

*Jorge Garcia Polo, Environmental Science, State University of New York (SUNY)*

Jorge is a PhD student in the SUNY College of Environmental Science and Forestry. His research centers on wetland restoration informed by both traditional ecological knowledge and restoration ecology in Lake Atitlan, Guatemala. His overall interests are with freshwater ecosystems, ecological and biocultural restoration and climate change in Mesoamerica.

## Indigenous Ethnobiologist Fellow

*Kaya DeerInWater, Environmental Science and Bio-Cultural Restoration; State University of New York (SUNY)*

Kaya DeerInWater is an enrolled member of the Citizen Potawatomi Nation (CPN) in Oklahoma. He is currently a first-year graduate student studying Bio-Cultural Restoration in the SUNY College of Environmental Science and Forestry. Kaya's research focuses on the traditional plant knowledge (TPK) of the Potawatomi. He is specifically interested in understanding the current and historic TPK of CPN members and how CPN member knowledge relates to the plants present on CPN tribal lands.



## Urban Ethnobiology Fellow

*Amanda Thiel, Cultural Anthropology, Washington State University*

Amanda is a first-year PhD student at Washington State University. She conducts research with Guatemalan Q'eqchi' Maya communities of various sizes—from rural village to semi-urban. Her research seeks to understand how acculturation and cultural values affect ethnobotanical medical knowledge and practice in these communities. Amanda's previous fieldwork in one Q'eqchi' Maya village centered around utilitarian aspects of local ethnobotany and the variation in the cultivation of medicinal plants in village homegardens.

# 2018 National Science Foundation Winners

The following are this year's conference participants selected for financial support to help defray travel expenses, as part of grant BCS-1822297 from the National Science Foundation of the USA

Annie Estelle Ambani  
John de la Para  
Filippo Guzzon  
Karen J. Heeter

Tracie Locklear  
Araceli Aguilar Melendez  
Christian Norton  
Megan O'Sullivan

Sofia Penabaz-Wiley  
Fabien Schultz  
Anna Saskia Wolsak  
Tusha Yakovleva

SoE Student Conference Travel Awardees: Samuel Bosco, Andrew Gillreath-Brown  
SoE Indigenous Peoples Travel Awardee: Christopher Luna  
SoE International Travel Awardee: Anju Batta Sehgal

## Society for Economic Botany Travel Awards

We are excited to announce the winners of travel grants for student and/or post-doctoral scholar members as well as Developing Nations members to attend the 59th Annual Meeting of the Society for Economic Botany!

Student/Postdoc Awards:  
Georgia Fredeluces  
Jason Irving  
Rossana Paredes  
Grady Zuiderveen

Developing Nations Awards:  
Catherine Lukhoba  
Zia-ur-Rehman Mashwani  
Olubunmi Sharaibi  
Olubunmi Wintola

## Sunday, June 3, 2018

9:00am-4:00pm	Society for Economic Botany Council Meeting	<i>Inn Wisconsin</i>
9:00am-12:00pm	Society of Ethnobiology Committee and Editorial Board Meetings	<i>Profile</i>
8:00am-1:00pm	<i>Optional Pre-Conference Field Trip: Late Woodland and Mississippian Archaeology at Aztalan</i>	Buses Depart promptly at <b>8am</b> from Ogg Hall dorm.
1:00pm-5:00pm	Society of Ethnobiology Board Meeting	Profile
5:00pm-8:00pm	Registration Table	Lounge between <i>Profile</i> and <i>Inn Wisconsin</i> rooms, 2nd floor
6:00pm-9:00pm	Welcome Reception with Ho-Chunk Cultural Event	<i>Tripp Commons</i>



# **Registration Desk**

Foyer near *Great Hall*, 4<sup>th</sup> floor Memorial Union

Monday, 7:30 am- 5:00 pm  
Tuesday, 7:30 am – 5:00 pm  
Wednesday, 8:15 am - 4:15 pm

## **Monday, June 4**

### **Plenary Session: Indigenous Food Sovereignty**

**Monday, 8:30 am-12:00 pm**

Room: *Great Hall*

8:30-9:00	Valerie Segrest, Muckleshoot Tribe	Muckleshoot Food Sovereignty in the Pacific Northwest
9:00-9:30	Katlyn Scholl	International Frameworks for Germplasm Exchange: An Introduction to the International Treaty on Plant Genetic Resources for Food and Agriculture
9:30-10:00	Jessika Greendeer, Ho-Chunk	Seed Keepers and Indigenous Seed Sovereignty
<b>10:00-10:25</b>	<b>Coffee Break</b>	<b>All coffee breaks will be in the “Class of 1924 Reception Room” attached to the <i>Great Hall</i></b>
10:30-11:00	Sean Sherman, Oglala Lakota	Understanding Indigenous Foodways to Rebuild Health and Integrity within Indigenous Communities
11:00-11:30	Candice Gardner	The US National Plant Germplasm System Maize Collection – Status, Utilization and Possibilities
11:30-12:00	DISCUSSION	

**Lunch (on your own)**  
**Monday, 12:00-1:00 pm**

## Concurrent Sessions - Block A

### Monday, 1:00-2:30 pm

**Session 1:** Quality of Life, Wellbeing, & Food Security: Theories, Methods, & Practical Approaches (1)  
**Session Chair:** Theresa Miller **Room:** *Great Hall*

1:00-1:15	Alaka Wali	Cultivating Well-being, Securing Place: Refugee and Immigrant Gardeners in Chicago
1:15-1:30	Araceli Aguilar-Melendez	Mexican chiles ( <i>Capsicum annuum</i> L.) as Identity Markers and Possible Strategies for Conservation
1:30-1:45	Erin Mae Smith <sup>^</sup>	The Shifting Place of Wild Foods for Food Security and Cultural Identity in Rural and Tribal Communities of Montana in the Context of Global Environmental Change
1:45-2:00	Theresa Miller	The Invisibility of Food Insecurity: Uncovering Hunger and Pathways to Food Security through Quality of Life Planning and Ethnobiological Research
2:00-2:15	Laura Monti	Participatory Ethnobotany for Land, Medicine, and Food Sovereignty with indigenous Communities in Arid and Tropical Environments of Sonora, Mexico
2:15-2:30	DISCUSSION	

**Session 2:** Biocultural Diversity: Past, Present and for Future Conservation

**Session Chair:** Robert Bye

**Room:** *State Room*

1:00-1:15	Edelmira Linares	“Quelites: sabores y saberes” – the Contribution of Traditional Knowledge to Food Security and Sovereignty of Spontaneous Vegetables in the southeastern State of Mexico
1:15-1:30	Anne Frances	Conservation Status of North American Crop Wild Relatives
1:30-1:45	Nathaniel James	Labor Organization and Taphonomy at Harappa
1:45-2:00	Georgia Fredeluces <sup>^</sup>	Biocultural Conservation of a Wild Harvested Herb, <i>Xerophyllum tenax</i> (Melanthiaceae) in the Pacific Northwest, U.S.A
2:00-2:15	Leslie Main Johnson	Milkst/Molks Pacific Crabapple, an Indigenous Orchard Tree
2:15-2:30	Lyn M. Tackett	Tracing Ancient Healing Practices In China and Egypt Through The Hibiscus

### Key

+ = Morton Award Applicant

^ = Fulling Award Applicant

\*= Barbara Lawrence Award Applicant

**Session 3: Traditional Knowledge & Food (1)****Session Chair:** Ashley Blazina**Room:** *Old Madison*

1:00-1:15	Ratemo Michieka	The Economic Importance of Weed Species as Nutritious Indigenous Vegetables
1:15-1:30	Diana Quiroz	What does the Absence of Informant Agreement Tell Us about Medicinal Plant Knowledge?
1:30-1:45	Ashley J. Blazina	Flipping the Script: Experiences in Developing a Research Methodology that Questions the “Other” Narrative
1:45-2:00	Ann Biddle <sup>^</sup>	We've Been Studied to Death: Addressing Research Fatigue among the Ahtna in Alaska
2:00-2:15	Annie Evans	Only Pick as Much as You Need: Harvesting Traditions and Customary Law in Makkovik
2:15-2:30	Carlos E.A. Coimbra Jr	Ora-pro-nóbis or “pray for us”: Ethnobiology of Leafy <i>Pereskia</i> cacti, a Neglected Food Source in Brazil

**Concurrent Sessions - Block B**  
**Monday, 3:00-4:45 pm**

**Session 1: Hunting, Fishing, & Harvesting****Session Chair:** Darcy Matthews**Room:** *Great Hall*

3:00-3:15	Al Keali'i Chock	Hawai'i: From the Ocean towards the Mountain: Self-Sufficiency through Fish Ponds & Taro Patches
3:15-3:30	Darcy Mathews	Stone Fishtrap Archaeology: People, Stone, and Salmon at the Heiltsuk Village of Hauyat, Central Coast of British Columbia
3:30-3:45	Ebba Olofsson	“Man the Hunter” and “Woman the Invisible”- Changing Gender roles in Indigenous Economies
3:45-4:00	Molly Carney	Re-Visiting Bulb Size as a Proxy for Camas ( <i>Camassia</i> ssp.) Management in the Pacific Northwest
4:00-4:15	Richard S. Tan	Report on Ongoing Research on Plants Used as Condiments in Mexico
4:15-4:30	DISCUSSION	

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**Session 2: Ethnobotany (1)****Session Chair:** Alex McAlvay**Room:** State

3:00-3:15	Alex McAlvay	Out of Turnips: Reconstructing the Domestication History of <i>Brassica rapa</i> crops in Eurasia
3:15-3:30	Anna Dixon	Making Your Mark: Tattooing Plants and Identity
3:30-3:45	Donald Hazlett	<del>Honduran Plants You Must Talk to or Else...</del>
3:45-4:00	Folorunso Abayomi Ezekiel	Effect of Brewery Effluent on the Anatomical and Morphological Structure of <i>Talinum triangulare</i> (Jacq) Willd
4:00-4:15	Gail E. Wagner	Conflicted Understanding of Vegetable
4:15-4:30	Christopher Luna	Reclaiming the Indigenous Self through Ethnobotany
4:30-4:45	Rob Brandt	Food Security, Sovereignty and Traditional Knowledge in a Small Village in Morobe Province, Papua New Guinea

**Session 3: African Ethnobiology (1)****Session Chair:** Jen Shaffer**Room:** Old Madison

3:00-3:15	Joyce Manoti Ondicho	Antimicrobial Activity of Some Plants Used in Kenya for Management of Infectious Diseases
3:15-3:30	L. Jen Shaffer	Safe Passage: Conservation and the Role of Culture in the African Vulture Trade
3:30-3:45	Lloyd Mhlongo <sup>^</sup>	The Ethnobotany of the Amandawe, KwaZulu-Natal, South Africa
3:45-4:00	C.W. Lukhoba	Traditional Medicinal Weed Plants Used for the Management of HIV/AIDS Associated Fungal Infections in the Lake Victoria Region
4:00-4:15	Ruth Kagai Adeka	Role of Traditional Food Recipes in Improving the Utilization of Spider Plant ( <i>Cleome gynandra</i> ) in Kenya
4:15-4:30	Wilfred Otang Mbeng	Indigenous Cosmetic Plants in the Eastern Cape Province of South Africa: A case of Skin Care
4:30-4:45	Olubunmi Josephine Sharaibi <sup>^</sup>	Ethno-Gynaecological Knowledge and Preliminary Phytochemical Screenings of Medicinal Plants Used in Lagos State, Nigeria

<p><b><u>SoE General Membership Meeting</u></b>  <b>Monday, 5:00-6:00 pm</b></p> <p><b>Room: Great Hall</b></p>	<p><b><u>Forage! Blog Open House</u></b>  <b>Monday, 6:30 pm</b>  for Co-Editors &amp; Authors with Editor Natalie Mueller</p> <p><b>Room: Inn Wisconsin</b></p>	<p><b><u>Student Social &amp; Networking Event</u></b>  <b>Monday, 7:30 pm</b>  All students, post-docs, and students-to-be invited</p> <p><b>Room: Lakeside Terrace of Memorial Union</b></p>
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# Tuesday, June 5

## Distinguished Economic Botanist Awardee

**Gary Paul Nabhan**  
**Tuesday, 8:15-9:15 am**  
*Great Hall*

## Concurrent Sessions - Block C: **Tuesday, 9:15-10:00 am**

### **Session 1: African Ethnobiology**

**Session Chair:** Fabien Schultz

**Room:** *Great Hall*

9:15-9:30	Ben-Erik Van Wyk	Review of Ethnobotanical Studies in Southern Africa (1685-2017)
9:30-9:45	Fabien Schultz <sup>^</sup>	East and Central African Medicinal Plants as Inflammatory Inhibitors in the 15-LOX / 15-Hydroxyeicosatetraenoic acid and COX / PGH2 Pathways
9:45-10:00	Isabel Margaret Hulley	An Inventory and Analysis of Medicinal Plant Use in the Little Karoo, South Africa

### **Session 2: Ethnobotany**

**Session Chair:** Mark Nesbitt

**Room:** *Inn Wisconsin*

9:15-9:30	Esther Katz	Food, Biodiversity and Traditional Knowledge in the Middle Rio Negro (Brazilian Amazon). The Fragile Balance of Food Sovereignty
9:30-9:45	Mark Nesbitt	Theory and Practice in the Field Work of Richard Spruce, Pioneer Ethnobotanist of the Amazon Rainforest
9:45-10:00	Robert Veeks	<del>Caruru: The Enigmatic Origin of Brazil's Signature Afro-Brazilian Dish</del>

### **Session 3: Traditional Knowledge & Food**

**Session Chair:** Kelly Kindscher

**Room:** *Beefeater*

9:15-9:30	Robbie Hart	Dynamic Ecological Knowledge Systems Amid Changing Place and Climate: Mt. Yulong Rhododendrons
9:30-9:45	John Richard Stepp	Getting Into the Weeds: Discovering Where Medicinal Plants Grow
9:45-10:00	Kelly Kindscher	Sahnish (Arikara) Ethnobotany

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## Concurrent Sessions - Block D Tuesday, 10:30 am-12:00 pm

### Session 1: How to Teach Ethnobotany Painlessly

**Session Chair:** Al Keali'i Chock

**Room:** *Great Hall*

10:30-10:45	Sunshine L. Brosi	Sharing of Teaching Resources: The Open Science Network and Beyond
10:45-11:00	Cassandra Quave	Innovative Strategies for Teaching in the Plant Sciences
11:00-11:15	Kim Bridges	The Flipped Classroom
11:15-11:30	Gail E. Wagner	Teaching Ethnobotanical Ethnography
11:30-11:45	Al Keali'i Chock	"My Plant Family" & Those Botanical Terms
11:45-12:00	DISCUSSION	

### Session 2: Global Change/Global Health: Integrating Traditional Knowledges with Science in Response to Changing Human-Environment Relationships

**Session Chairs:** Liz Olson & Cissy Fowler

**Room:** *Inn Wisconsin*

10:30-10:45	Andrew Flachs	Ethnobiology and the Hope for Sustainable Cotton Agriculture in Telangana, India
10:45-11:00	Binsheng Luo <sup>^</sup>	The Rebirth of Traditional Bamboo Weaving in Sansui, Southwest China
11:00-11:15	Ian Tietjen	A Traditional Medicinal Plant Regimen from Southern Africa that Targets HIV
11:15-11:30	Kristina Baines	Embodying Ecologies: Considering Healthy Lives through Persistence and Change
11:30-11:45	Junko Kitagawa	Introduced Vegetables Overwhelm Traditional Mountain Herbs in Japan today
11:45-12:00	Sofia Penabaz-Wiley	Ethnobotanicals and Psychological Ownership of the Landscape: A Case Study in Suburban Matsudo, Japan

### Session 3: Quality of Life, Wellbeing, & Food Security: Theories, Methods, & Practical Approaches (2)

**Session Chair:** Theresa Miller

**Room:** *Beefeaters*

10:30-10:45	Maia Dedrick	Food Security among Colonial Maya Migrants
10:45-11:00	Marilyn Faulkner & Erica Oberndorfer <sup>^</sup>	Gardens of Labrador: Tending Plants in the "Land God Gave to Cain"
11:00-11:15	Mark D. Merlin	Peppers and People in Micronesia: Spice, Medicine and Food Security
11:15-11:30	Robert Bye	Food Security and Sovereignty in the Sierra Tarahumara, Chihuahua, Mexico – Historical Perspective and Immediate Challenges
11:30-11:45	Eugene Anderson	Sixty Years of Ethnobiology
11:45-12:00	DISCUSSION	

**“Teaching Tuesday” Afternoon Workshops**  
**Tuesday, 1:00-4:30 pm**

1:00-4:30	Jan Salick, David Spooner	XV <sup>th</sup> Biocultural Collections Workshop	Room: 158 in Birge Hall
1:00-4:30	Araceli Aguilar-Melendez	Cooking Oaxacan Chilli Peppers to ‘taste’ the Biocultural Gastronomic Diversity of Mexico	Room: 124 in Birge Hall
1:00-4:30	Michael Thomas, Jonathan Amith	Got Ethnobiology Data? An Introduction to an Ethnobiological Data Management/Publishing Tool and Emerging Data Standard.	Room: TBA
1:00-2:30	Betsabe Castro Escobar	Caribbean Plants that Heal at Touch: Preparing Traditional Rubbing Alcohols and Salves	Room: <i>State Room</i>
1:00-2:30	Jennifer Helmer	Wild and Wonderful Weeds	Room: <i>Old Madison West</i>
3:00-4:30	Sharon Bladholm	Interfacing Nature, Science and Conservation through Art	Room: <i>State Room</i>
3:00-4:30	Laurent Jean-Pierre	Calabash Art	Room: <i>Old Madison West</i>

**Concurrent Sessions - Block E**  
**Tuesday, 3:00-4:30 pm**

**Session 1: Biodiversity**

**Session Chair:** James Welch

**Room:** *Old Madison East*

3:00-3:15	Anne Lucy Stilger Virnig	Food Security: A Local Catalyst for Accelerating Biodiversity Conservation and Sustainable Development
3:15-3:30	Pauline Rameau	Relation Between the Persistence of the Agrobiodiversity and Rural Alimentation in the Mexican Occident (Chiquilistlan, Jalisco)
3:30-3:45	Bernadette Montanari	Endangering Food Security, Sovereignty and Culture: The Case of Local Communities in Mizoram, North East India
3:45-4:00	Jennifer Dearnaley	Re-Planting the Seeds of Indigenous Science in Australia: Directions in Australian Ethnobotany and Traditional Knowledge
4:00-4:15	James R. Welch	Social, Cultural, and Economic Determinants of Household Food Diversity Among the Indigenous Xavante People, Central Brazil
4:15-4:30	Mohammed Ater	The Oasis Agroecosystem, Agrodiversity, Optimization of Resources and Local Knowledge

## Concurrent Sessions - Block E (con't)

### Tuesday, 3:00-4:30 pm

#### Session 2: Applied Ethnobiology

**Session Chair:** Bob Gosford

**Room:** *Great Hall*

3:00-3:15	Richard K. Korir	Bacterial and Fungal Contaminants Isolated from Herbal Medicinal Products Sold in Nairobi Kenya
3:15-3:30	Annie Estelle Ambani	Explaining Patterns of Medicinal Plant Selection in Southern Africa: Medicinal Alien Plants are Redundant in the Regional Pharmacopoeia
3:30-3:45	Bob Gosford	Fire-spreading Behavior of Raptors in Northern Australia
3:45-4:00	Jan Salick	Phenological Changes After 150 Years Around Buzzards Bay, MA
4:00-4:15	Lisa Castle	Modeling Harvest in Fluctuating Populations: Examination of a Slow Root and a Fast Fruit
4:15-4:30	DISCUSSION	

#### Session 3: Land Use

**Session Chair:** Andrew Miller

**Room:** *Inn Wisconsin*

3:00-3:15	Andrew M. Miller	Reconnecting Land, Language, & People in Posaganchik Aski [Touchwood Hills, SK]: An Indigenous Cultural Landscape
3:15-3:30	Carrie Calisay Cannon	Reclaiming Ancestral Land Ties Through Saguaro Cactus Harvesting Traditions
3:30-3:45	Anju Batta Sehgal	Role of Ethnic Tribes in Conservation of Biodiversity of "Great Himalayan National Park"
3:45-4:00	Maureece Jacqueline Levin <sup>^</sup>	Past Landscape Management and the Construction of Modern Pingelap (Pohnpei State, Federated States of Micronesia)
4:00-4:15	Nellie Winters (presented by Erica Oberndorfer)	The Land is Full of Beauty and Good Things to Eat
4:15-4:30	DISCUSSION	

#### Session 4: Traditional Knowledge & Food (2)

**Session Chair:** Cassandra Quave

**Room:** *Beefeater*

3:00-3:15	Traci Pantuso	Immunomodulating Effects of <i>Oplopanax horridus</i>
3:15-3:30	Janelle Marie Baker*	The Fern that Makes You Fat: Food Security & Extreme Extraction in Bigstone Cree Nation Territory (Northern Alberta, Canada)
3:30-3:45	Cassandra Quave	Ethnobotanical Uses of Wild Flora & Fungi on the Aegadian Islands of Sicily, Italy
3:45-4:00	Christian H. Norton	Ethnobotany in Nunatsiavut (Labrador, Canada): Understanding Inuit & Local Plant Usage Through Biological & Cultural Perspectives
4:00-4:15	Chunlin Long	Food Plants Traded on Local Markets in Southwest China
4:15-4:30	M. Carney & S. Hanson	The Harvest of Action: Arguing the Importance of Paleoethnobotany in Cultural Resource Management Archaeology
4:30-4:45	Jorge Garcia Polo*	Mayan Traditional Ecological Knowledge & Wetland Restoration in Lake Atitlan, Guatemala



**SEB General Membership Meeting**

**Tuesday, 5:00-6:00 pm**

**Room: *Great Hall***

**Film Session ~ Movie Night!**

**Tuesday, 7:30-9:15 pm**

**Room: *Great Hall***

7:30-7:50	Damon Swain^	<i>lakwe Majol: Untold Stories of Marshallese Immigrants</i>
7:50-8:15	Robert Bye & Edelmira Linares	<i>La calabaza y su aprovechamiento en la Sierra Tarahumara (Squash and Its Use in the Sierra Tarahumara of Chihuahua, Mexico)</i>
8:15-9:15	Meg Hanrahan	A Force for Nature: Lucy Braun

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**Wednesday, June 6**

**Distinguished Ethnobiologist Awardee**

**Dr. Gail E. Wagner, “Lessons Learned from Plants”**

**Wednesday, 8:15-9:15 am**

***Great Hall***

**Concurrent Sessions - Block F**

**Wednesday, 9:15-10:00 am**

**Session 1: African Ethnobiology (2)**

**Session Chair: Ashton Welcome**

**Room: *State Room***

9:15-9:30	Alex Asase	Evaluation of Availability, Cost, and Patronage of African Indigenous Leafy Vegetables in Ghanaian Urban Markets
9:30-9:45	Alexandra M. Towns	African indigenous vegetables for food security: an international NGO perspective
9:45-10:00	Ashton Welcome	The taxonomic diversity and spatial patterns of indigenous and naturalized food plants of southern Africa

**Session 2: Ethnobotany (2)****Session Chair:** Letitia McCune**Room:** *Old Wisconsin*

9:15-9:30	Letitia McCune	The Methods and Manners of Food Sovereignty
9:30-9:45	Matthew Bond	Disentangling Biocultural Roots of Medicinal Plant Knowledge
9:45-10:00	Gugulethu Khumalo	A Study of South African Medicinal Barks

**Concurrent Sessions - Block G**  
**Wednesday, 10:30 am-12:00 noon**

**Session 1: Conserving Crop Diversity****Session Chair:** Natalie Mueller**Room:** *Old Wisconsin*

10:30-10:45	Saskia Wolsak <sup>+</sup>	Of Fishpots, Bonnets, and Wine: The Cultural History of the Bermuda Palmetto
10:45-11:00	Filippo Guzzon	Rediscover Traditional Food Crops in an Intensive Cropping System; Ethnobotany in Northern Italy
11:00-11:15	Grace Ward	Tracing Landraces of Maize in the Central Mississippi Valley
11:15-11:30	Mana Hayashi Tang <sup>+</sup>	Roots and Tubers: Experimental Archaeobotany and Preliminary Case Studies in Late Pleistocene to Early Holocene China
11:30-11:45	Natalie G. Mueller	Survey for Lost Crops: The Historical Ecology of Eastern North American Crop Progenitors
11:45-12:00	Paul Patton <sup>+</sup>	Prehistoric Seed Saving and Agrobiodiversity in the Middle Woodland Period

**Session 2: Who's Counting? Reflexive Innovations for Quantitative Methods & Analysis in Ethnobiology****Session Chair:** Raymond Pierotti**Room:** *State*

10:30-10:45	<del>Daniel Block</del>	<del>GIS, Public Participation, and Food Justice: Lessons and Examples from Chicago</del>
10:45-11:00	Magwede Khathutshelo	Ethnobotany of the Venda people (Vhavenda), a Cultural Group Found in the Limpopo Province of South Africa
11:00-11:15	Orou Gaoue <sup>+</sup>	A New Call for a Paradigm Shift and Theory Driven Ethnobotany
11:15-11:30	Raymond Pierotti	Static and Dynamic World Views and the Concept of Traditional
11:30-12:00	DISCUSSION	

**Key**

+ = Morton Award Applicant

^ = Fulling Award Applicant

\* = Barbara Lawrence Award Applicant

**Session 3: Agricultural Practices****Session Chair:** Andrew Gillreath-Brown**Room:** *Great Hall*

10:30-10:45	Andrew Gillreath-Brown <sup>^</sup>	Barley ( <i>Hordeum vulgare</i> ) Grain Size in the Indus Valley, Pakistan: Development of Local Varieties
10:45-11:00	Daniela J. Shebitz	Evaluating Effects of Historic Cranberry Agricultural Practices and Current Restoration Techniques on Wetland Restoration in the New Jersey Pine Barrens
11:00-11:15	David Lewis Lentz	Lowland Maya Agriculture, Arboriculture and Other Production Systems: Applications of Paleoethnobotanical, Isotopic and Molecular Techniques
11:15-11:30	Jade d'Alpoim Guedes	The Wet and the Dry, the Wild and the Cultivated: Subsistence and Risk Management in Ancient Central Thailand
11:30-11:45	Jane Mt.Pleasant	Ridges and Hills in North American Indigenous Agriculture: An Agronomist Weighs In
11:45-12:00	DISCUSSION	

**Session 4: Ethnobotanical Knowledge Systems****Session Chair:** Michelle Baumflek**Room:** *Beefeaters*

10:30-10:45	Michelle Baumflek	Co-creating Knowledge to support Native American Plant Gathering Agreements in National Parks: A Call to Action
10:45-11:00	Zachary Joseph Hudson	Printmaking with <i>Dirca</i> Bark Paper
11:00-11:15	Mahlatse Mogale	A Quantitative Ethnobotanical Study of the Bapedi People of Central Sekhukhuneland, South Africa
11:15-11:30	Ayako Kawai	Contrasting Mother Plant Selection Practice and Criteria Between Traditional, Organic, and Lifestyle farmers in Japan
11:30-11:45	Andrew Salywon	Hohokam Lost Crop Found: A New Agave (Agavaceae) Species Only Known from Large-scale pre-Columbian Agricultural Fields in Southern Arizona
11:45-12:00	Saowalak Bunma	Traditional Food from <i>Sesbania</i> (Fabaceae)

**Lunch on Your Own**  
**Wednesday, 12:00-1:00 pm**

**Networking session for non-academic job paths**  
**Wednesday, 12:20-1:20 pm**  
**Room: *Inn Wisconsin***

## Poster Session

Wednesday, 1:00-2:00 pm

Room: *Great Hall*

## Key

+ = Morton Award Applicant

^ = Fulling Award Applicant

\*= Barbara Lawrence Award Applicant

### POSTER INSTRUCTIONS:

Please do not attach your poster to the walls. There will be supports provided for the posters, arranged along both sides of this large room. You may keep your poster up for all of Tuesday, but should be removed by Wednesday at 5pm. We request you to be present beside your poster during the poster session to talk about it and answer questions. Judging for the Morton Award will take place during the poster session.

Rossana Paredes+*	Dynamism in Traditional Ecological Knowledge: Continuity & Change in the Use of Totora ( <i>Schoenoplectus californicus</i> ) for Subsistence in Huanchaco, Peru
Grady Zuiderveen	“Stocking the Hunting Ground:” Insights into the Source of “Wild” Ginseng ( <i>Panax quinquefolius</i> L.) in Pennsylvania
John de la Parra+	Ethnobotanically-Informed Phenotypes: A Path to Treating the Prediabetic Condition
John Marston	A Microbotanical Study of Landscape Use by Enslaved Communities at James Madison’s Montpelier
Alex Asase	Ethnopharmacological Study of Some Medicinal Plants from Ghana
Sun Ick Kim	Occurrence and Damage by <i>Thrips tabaci</i> Lindeman in Ginseng Crops
Shana Boyer+	Before Big Sugar Came to Town: Raising Cane on Florida’s Frontier
Do Yeun Won	Eco-friendly Method to Decrease Injury of Ginseng Rhizome Rot
Sangyoung SEO	Effect of Chitosan Basic Fertilization on Cultivation of Korean Ginseng ( <i>Panax ginseng</i> C. A. Meyer) in Plastic House
Jeong A Han	Changes of Berry Characteristics and Ginsenoside Content on Harvesting time of Ginseng Berry in Korean Ginseng
Elizabeth Green	Seasonal Rounds of the Lakota at Wind Cave National Park
Yeji Yoon	Proper Shading Material in Rain Shelter House for Direct Seedling of 4-years-old Ginseng ( <i>Panax ginseng</i> C.A. Meyer)
Daniel R. Williams+	The Role of Polymorphism in <i>Chenopodium</i> Domestication
Rebecca Dean	Euclidian Distance, the Faunal Troika, and Diversity Analysis in the Desert Border Regions
Brooke Mariah Hayes+	That’s Amari: Italian Heritage Bitter Botanical Liqueurs
Alexia Decaix+	Agricultural practices between the 3 <sup>rd</sup> and 2 <sup>nd</sup> millennium BC in the Indus Valley: Archaeobotanical Results from Harappa
Carrie Calisay Cannon	A Native Food Symposium in Indian Country
Lukas Desjardins*	Sumaq Kausay: Cultivating Quechua Identity through the Potato
Lisa Castle	Scoring a Genus vs. Scoring all the Species: Analysis of Threats to Wild-Harvested <i>Echinacea</i> Species

Kate Utech	Calculating Oshá; Root Yield for Stands Using Average Percent Coverby
Brooke Mariah Hayes	Reign of Terroir: Fermenting Rebellion in Florida's Winemaking Industry
Lisa Castle	Eaten to Endangerment: an Analysis of Applicability of the United Plant Savers At-Risk Assessment Tool to Wild-harvested Edible Plants
Kayla Boultinghouse	Jackrabbit Fauna from the Marana Platform Mound
Kathryn Matthews+	Restoration Strategies for <i>Camassia quamash</i> on the Weippe Prairie
Mohammed Ater	A Traditional Practice Little Known in Oasis Agroecosystems, Flood Recession Agriculture
Autumn Arvidson+	Promising Medicinal Uses for Non-Native Invasive and Noxious Weeds
Sunshine L. Brosi	Ethnobotany Alumni: Where Are They Now? Careers and Graduate School Opportunities
Diana Peterson+	Manoomin (wild-rice or <i>Zizania</i> spp.) Among Menominee and Ojibwe in Wisconsin -- a Study Integrating TEK and GIS
Kate Sammons+	Effects of Ploidy Level on Chemotype and Antimicrobial Activity in the <i>Achillea millefolium</i> Complex
Alec H Colarusso*	The Mysterious Black Drink and its Influences on the Indigenous People of North America
Sunshine L. Brosi	Connecting People with Park Trees and Cultural Events with Climate Change: Dendroecology near Washington, DC, USA
Rachel Jones+	Colorful Quinoa: Shifting Autonomy in Diversity of a Miracle Cereal Put to Market
Fabien Schultz+	Investigation of Antimalarial and Genotoxic Properties of African Medicinal Plants Traditionally Used in Western and Central Uganda
Jeffrey R. Boutain+	A Snapshot of Trending Beer and Fermentation Education in Southeastern Michigan
Megan O'Sullivan	Prehistoric Plate: The Ethnobotany of Southern Utah's Indigenous People
Karen Heeter+ Michelle Audie+	Connecting People with Park Trees and Cultural Events with Climate Change: Dendroecology near Washington, DC, USA
Florencia Pech-Cardenas+	Linking Heritage Tourism, Livelihoods, and Natural Resources Management in Mayan Communities
Jason TW Irving	A Global Survey of Medicinal Plants, their Names, and Presence in Medicines and Conservation Regulation
Jeffrey R. Boutain+	Update on Homegrown Hops in the Hawaiian Islands for Spring 2018

## Concurrent Sessions - Block H

### Wednesday, 2:30-5:00 pm

#### Session 1: Effective Approaches to Human Ecology Education

Session Chair: Steven Wolverton & Daniela Shebitz

Room: *Great Hall*

2:30-2:45	Lisa Nagaoka	Using the Management of Urban Species to Teach Conservation Biogeography
2:45-3:00	Daniela J. Shebitz	Training Environmental Professionals Through an Experiential Learning Capstone
3:00-3:15	Denise M. Glover	Caw Connections: Observing & Writing About Crows in College
3:15-3:30	Steve Wolverton	The Mandala Exercise for Increasing Ecological Understanding
3:30-3:45	Fidji Gendron	Working with Indigenous Elders in Biology & Chemistry University Courses
3:45-4:00	DISCUSSION	
4:00-4:15	Elizabeth A Olson	Jumpstart, Our National Parks: Using Local Resources to Teach Integrated General Education
4:15-4:30	Carrie Calisay Cannon	Ethnobotanical Collaborations Among the Pai Tribes of the Southwest
4:30-4:45	Linda S. Black Elk	Plant Stories: Encouraging Environmental Activism and Relation Building through Storytelling
4:45-5:00	DISCUSSION	

#### Session 2: Ethnobotany: Knowledges about Forests and their Contributions to Food Security

Session Chair: Cissy Fowler

Room: *State Room*

2:30-2:45	Sarah Walshaw	Trade, Tools, Transport, and Timber: Potential Contributions from Wood Analysis on the Swahili Coast
2:45-3:00	Cynthia Fowler	Hemba: the Forest Islands of Kodi as Space-Time Footprints in Support of Food Security
3:00-3:15	Aida Cuni Sanchez	Same Forest but Different People Means Different Use: Insights From Cameroun
3:15-3:30	Grady Zuiderveen	Effects of Harvest Time and Forest Site Conditions on Alkaloid Content in Goldenseal ( <i>Hydrastis canadensis</i> L.)
3:30-3:45	Gul Jan	Ethnobotanical Analysis of Medicinal Flora of Kohimoor BAB-A Bajaur Agency, Pakistan
3:45-4:00	Maria Fadiman	Ethnobotany and Conservation in Abaco: Connecting Locals to Their Own Plants and Knowledge
4:00-4:15	S. H. Sohmer	Food Security, Sovereignty and Traditional Knowledge in a Small Village in Morobe Province, Papua New Guinea
4:15-4:30	Samuel Bosco	Seeing the Forest for the Trees: Historic and Contemporary Significance of Nut Trees in Haudenosaunee Communities
4:30-4:45	Demetrio Luis Guadagnin	Survivorship and Regeneration of <i>Fosteronia glabrescens</i> in Experimental Harvesting in South Brazil
4:45-5:00	DISCUSSION	

**Panel Discussion: Ginseng Economic Botany in Northern Wisconsin****Session Chair:** Trish Flaster**Room:** *Beefeaters*

Note: This session is organized as a moderated panel discussion rather than individual talks and will run from 2:30-3:30pm.

**Panel Participants:**

- *Walter Cox, Director Conservation for the Menominee tribe*
- *Jackie Fett, Executive/Marketing Director Ginseng Board of Wisconsin*
- *Paul and Will Hsu, Hsu's Ginseng Enterprises, Inc.*
- *Charmaine Robaidek, Wild Ginseng Program Coordinator, Bureau of Law Enforcement Wisconsin Department of Natural Resources TBD*

**Session 3: Ethnomedicine****Session Chair:** Richard Tate**Room:** *Old Wisconsin*

2:30-2:45	Abolade Oluremi Bolaji	Proximate Analysis, Phytochemical Screening and Cytotoxic Investigation of Leaf and Root Extracts of Euphorbia Graminae
2:45-3:00	Charlotte Gyllenhaal	Roles of Plants in the Treatment of Colorectal Cancer: A Brief Review
3:00-3:15	Esther Ngendo Matu	Antimicrobial Activities of Skincare Preparations from Kenyan <i>Plectranthus barbatus</i> Total Extracts: Towards Improvement of Healthcare and Livelihoods
3:15-3:30	Idayat Titilayo Gbadamosi	Assessment of the Nutritional Qualities of Ten Botanicals Used in Pregnancy and Child Delivery in Ibadan, Nigeria
3:30-3:45	John de la Parra <sup>^</sup>	Optimizing Chemotypic Variation in Indigenous Ethnobotanical Treatments for Prediabetes
3:45-4:00	Methee Phumthum <sup>^</sup>	Phylogenetic Signal in Traditional Thai Medicinal Plant Uses
4:00-4:15	Olubunmi Abosede Wintola	The Prevalence and Perceived Efficacy of Medicinal Plants Used for Stomach Ailments in the Amathole District Municipality, Eastern Cape, South Africa
4:15-4:30	Zia-ur-Rehman Mashwani	Use-based Knowledge of Medicinal Plants: A Quantitative Ethnobotanical Inventory from Fairy Meadow National Park, Diamir, Gilgit Baltistan
4:30-4:45	Jason TW Irving	A Summary of the Understanding and Selection of Plants with a Bitter Action in Western Herbal Medicine and a Review of Recent Research into Bitter Taste Receptors
4:45-5:00	Richard W. Tate	Washing Away the Evil Eye: Herbal Healing of Childhood Rickets in Adjara, Georgia (Caucasus)

**Banquet & Awards Ceremony****Wednesday, 5:30-10:00 pm**

Room: *Lake Mendota Room of DeJope Residence Hall*

**Thursday, June 7, 2018:** 8:00 am-6:00 pm

*Optional Post-Conference Field Trips:*  
Ginseng Cultivation and Use

OR

Native Peoples & the Making of the South Central Wisconsin Landscape

Buses Depart promptly at 8 am from *Ogg Hall* dorm.

## ABSTRACTS

### **Ruth Kagai Adeka** - *Role of Traditional Food Recipes in Improving the Utilization of Spider Plant in Kenya (M 4:00)*

Spider plant (*Cleome gynandra*) is an important vegetable in the rural and urban diets in Kenya. The vegetable is a rich source of nutrients, especially vitamins (A and C) and minerals (calcium and iron) and therefore, plays a significant role in household food security. Spider plant exhibits considerable variation in bitterness as reported by various communities in Kenya. Extremely bitter wild types yet vigorous in their growth have been documented in Kitui and parts of Kilifi. Bitterness hampers the utilization of this hardy, nutritious vegetable especially by the young people. Research was carried out in 2015 to find out the variation in *Cleome gynandra* in Kenya and how the different communities deal with bitterness. Germplasm was collected in the Coast, Eastern, Central, Rift Valley, Nyanza and Western regions of the country. Preferred traits and local recipes of *Cleome gynandra* were also documented using a structured questionnaire. Altogether, 52 accessions were collected. Taste and drought tolerance were among the most important traits. Adding milk to the vegetable was the most common way of dealing with bitterness. This was common among farmers in the Rift Valley and Western Kenya regions. Another common way was to mix *Cleome gynandra* with other non-bitter vegetables such as *Amaranthus* spp. Types from Kisii area of Nyanza region were found to be the least bitter. This paper summarizes the variation of spider plant recipes in the regions visited and how the different groups in Kenya deal with the problem of bitterness in *Cleome gynandra*.

### **O.O. Agboola, C. M. Dada, & Abayomi Ezekiel Folorunso** - *Effect of Brewery Effluent on the Anatomical and Morphological Structure of *Talinum triangulare* (Jacq) Willd (P)*

The study was carried out to determine effect of brewery effluent on the anatomical and morphological characters of *Talinum triangulare*. Seeds from matured *Talinum triangulare* were germinated and transplanted into plastic containers. The seeds were irrigated with 10%, 20%, 30% and 40% effluent concentrations respectively. A control experiment irrigated with normal water was also set aside. Data were collected on weekly basis until after the thirteenth week when the experiment was terminated. The plant showed significant reduction in the leaf area, seed number, shoot height, this morphological response is also associated with a reduction in various anatomical structure that were studied. The significant reduction was more obvious on plants irrigated with the 30% and 40% effluent concentrations. Stem tissue such as epidermis, cortical cell distance and vessel diameter showed significant reduction. The reduction in the morphological and anatomical character might be an adaptive mechanisms employed by the plant in order to cope with the heavy concentration of the effluent. This study showed that brewery effluents have toxic effect on the *Talinum triangulare* and the effects were more pronounced on those irrigated with 30% and 40% effluent concentrations. The physical and morphological characters observed in plants are the repercussion of the various endogenous characters among which are the anatomical characters.

### **Araceli Aguilar-Melendez** - *Mexican Chiles as Identity Markers and Possible Strategies for Conservation (M 1:15)*

Mexico is the center of origin and diversity of *Capsicum annum* L. The long and continuum use of chiles by different and unique native cultures within this territory gave rise to the current diversity of chiles. My hypothesis is that landraces of Mexican chiles are identity markers due to their plasticity as fruits so each culture can putatively select their unique morphotype of chile that will be expressed in their local food. When each Chile-culture binomial is added then this multiethnic country becomes the territory with the highest diversity of chiles and therefore one of the most richest culinary cultural worldwide. Data coming from different disciplines like botany, geography, history and ethnography confirm this idea. Nowadays, the system chiles-cultures are facing new challenges. The biodiversity of chiles started to disappear. Landraces of chiles under traditional cultivation are both cash and non-cash crop. Therefore there are multifactorial selection practices exerted over the local seeds to end up with fruits with "gourmet qualities". As a theoretical proposal, indigenous cultures might be able to use chiles as a currency in the modern world. If proper conservation and marketing strategies are implemented chiles may also help preserve the food security, sovereignty and traditional knowledge of indigenous societies in México.

### **Annie Estelle Ambani, Orou Gaoue, Gijsbert Hoogendoorn, & Kowiyou Yessoufou** - *Explaining Patterns of Medicinal Plant Selection in Southern Africa: Medicinal Alien Plants are Redundant in the Regional Pharmacopoeia (T 3:15)*

In the ongoing Anthropocene era characterised by conflictual human-biodiversity interactions, recent studies have called for more emphasis on elucidating the selection and use patterns of plant diversity. Here, we tested the predictions of several hypotheses formulated to explain human-plant interactions aimed for medicinal purpose. We found that the size of a plant family predicts the number of medicinal plants in that family, a support for the non-random hypothesis of medicinal plant selection. Our surprising finding that the alkaloid-poor family Poaceae is overutilized points perhaps to a unique medicinal knowledge in the region, and the fact that the highly threatened cycad family Zamiaceae is also over-utilized is indicative of negative consequences of over-utilization on plant diversity. However, we did not find strong support for our expectation that species origin matters in plant selection for disease treatments in the region. This casts doubt on the availability, versatility and diversification hypotheses formulated to explain the integration of alien plants into a pharmacopoeia. Collectively, our results show not only that the selection of medicinal plant in southern Africa is a non-random behaviour, but also that alien woody plants may have poor contribution to regional pharmacopoeia potentially due differences in cultures and use preferences across different environments in the region.

### **Eugene Anderson** - *Sixty Years of Ethnobiology (T 11:30)*

It is now just over 60 years since Harold Conklin's classic *Hanoo Agriculture* put ethnobiology on the map. I have grown up with the field, and offer some personal observations. Ethnobiology grew from a very fertile interface between the cognitive psychology that developed in the 1950s and the "new natural history" that appeared around the same time and focused on animal behavior, ecological relationships, people-in-nature, and landscapes. The theories that emerged in the 1950s and early 1960s are still valuable and valid. New approaches such as the "ontological turn" in ethnology and the new, people-centered conservation philosophy had roots in those mid-century theories. We may build on the older theories again in the coming years. To my personal mind, ethnobiology and its close relative cognitive anthropology supplied the most exciting ideas in the 1950s and early 1960s, and I think we could take back a leading position in theorizing about human interactions with all the nonhuman persons out there.



**+ Autumn Arvidson & Kelly Kindscher - Promising Medicinal Uses for Non-Native Invasive and Noxious Weeds (P)**

There are numerous invasive and non-native noxious weeds with medicinal properties present in nearly all U.S. ecosystems, which have been treated and controlled almost always using toxic herbicides with relatively little success. We chose to focus our research on the following plants; purple loosestrife- *Lythrum salicaria*, kudzu- *Pueraria montana* var. *lobata*, and creeping charlie- *Glechoma hederacea*. The medicinal/chemical components were evaluated as well as the impact of current/traditional treatment methods for controlling populations of these plants while offering alternatives for controlling and removing the plant populations. Historical and ethnopharmacological literature was surveyed using the following literature research services: ScienceDirect, Springer, BioOne, JSTOR, Open Access Journals, Blackwell Science Ltd, American Association for the Advancement of Science (AAAS), and ProQuest Dissertations Publishing. Our results showed unequivocally that these plants are viable resources for improving the treatment methods of numerous medical conditions. While there would need to be an investment made in harvesting these plants, it is feasible that the money used for current control methods could be reinvested into harvesting these plants, establishing a return on investment for controlling weed populations. Harvesting these plants should be considered as a viable option for improving the health of citizens and ecosystems alike in the United States. Overall, this research demonstrated that there are economic alternatives to our current noxious weed paradigm of eradicating them with environmentally problematic herbicides.

**Alex Asase - Evaluation of Availability, Cost, & Patronage of African Indigenous Leafy Vegetables in Ghanaian Urban Markets (W 9:15)**

Consumption of African indigenous leafy vegetables can have a positive effect on nutrition, health, and economic wellbeing of both rural and urban populations. In this study, we undertook a detailed evaluation of African indigenous leafy vegetables in selected urban markets in southern Ghana. Data were collected from 50 sellers from four markets within Accra and its environs using standard ethnobotanical methods. A total of 6 species of indigenous leafy vegetables belonging to 5 families were identified. Average cost of the vegetables was about 0.25 USD per bundle (weight of bundles ranges between 0.2kg and 0.6kg), and prices were influenced by plant species, and market location. Patronage of the vegetables was high as reported by 88% of the respondents. Our findings showed that only a few of the documented indigenous leafy vegetables were available in the markets although patronage of these vegetables was high. Promoting consumption and markets for African indigenous leafy vegetables, particularly those that are currently not marketed, should be encouraged.

**Alex Asase - Ethnopharmacological Study of Some Medicinal Plants from Ghana (P)**

Medicinal uses of plants by the communities living around Apra Hills Sacred Grove in southern Ghana was investigated. Data collection was achieved after obtaining prior-informed consent using semi-structured questionnaire. A total of 31 species of plants belonging to 16 families were reported used in the management and treatment of diseases. The study confirmed importance of degraded areas as sources of medicinal plants for indigenous communities, and that a high proportion of non-cultivated plants were used as medicines. Plants in need of further studies based on survey of available literature on their ethnobotanical use, and biological and toxicological have been highlighted.

**Mohammed Ater - The Oasis Agroecosystem, Agrodiversity, Optimization of Resources and Local Knowledge (T 4:15)**

The oasis agroecosystem is characterized by its structure in three strata: i) the upper stratum formed by the keystone species of the agroecosystem, the date palm, ii) the median stratum formed by fruit trees and iii) the stratum low in herbaceous crops (legumes, cereals and market gardening). Although this production system is very intensive, it is based on exploiting a great wealth of agrodiversity. Indeed, although the first stratum is formed by a single species, the date palm, it contains an impressive varietal diversity with at least 453 recognized cultivars. The fruit and vegetable layer (olive, fig, vine, pomegranate, apricot, almond) has a great diversity of local varieties. The herbaceous layer is devoted to food crops that meet the requirements of food security (cereals and vegetable crops). Fodder crops -- mainly alfalfa -- are also important in the oasis production system where livestock is an essential component. Local traditional knowledge plays an important role in the resilience of this type of man-made agroecosystems in very hostile environments. Indeed, in addition to the knowledge developed for the maintenance and creation of diversity, there are also ingenious knowledge developed for the optimization of water and soil resources. Traditional practices have enabled generations to accumulate a rich heritage of traditional know-how. Recognition, enhancement and conservation of this heritage are discussed.

**+ Michelle Audie, Sunshine L. Brosi, Karen Heeter, Elizabeth Green, & Erica Duda - Connecting People with Park Trees and Cultural Events with Climate Change: Dendroecology near Washington, DC, USA (P)**

Large trees are the charismatic megafloora of several National Parks. Within the Washington, DC region, USA due to restrictions on building heights, and in battlefields where trees are surrounded by open grasslands trees are iconic images for park visitors. However, little is often known about these trees including their species and ages. For National Park interpretive materials, visitors may interested in knowing if a particular tree was present when Washington, DC became our National Capital or during Civil War Battles. In addition, tree-rings are a tangible way to expose Park visitors to information about climate change and connections between cultural and environmental events. Tree-rings were sampled from long-term vegetation monitoring plots. Non-destructive core samples were taken from four trees at each plot in Parks such as the CO Canal (n=544), Harpers Ferry (n=168), and three National Battlefields: Antietam (n=96), Monocacy (n=120), and Manassas (n=152). The oldest trees sampled at each park were white oaks (*Quercus alba*) established in 1809 at the CO Canal and in 1863 at Manassas, chestnut oaks (*Quercus montana*) established in 1860 at Harpers Ferry and 1880 at Monocacy, and a chinquapin oak (*Quercus muehlenbergii*) established in 1896 at Antietam. Sensitivity values for oak were highest for Antietam (0.260) and lowest at Monocacy (0.221). Higher sensitivity values indicate a stronger relationship between annual tree growth and annually variable environmental factors such as climate. Tree cores from charismatic trees will form the basis of interpretive materials relating environmental changes to important cultural changes throughout the past 200 years.

**Kristina Baines - Embodying Ecologies: Considering Healthy Lives through Persistence and Change (T 11:15)**

Maintaining health through everyday practices is an ideal across many cultures, both explicitly and implicitly. This paper examines the role of traditional ecological practices in the development and maintenance of health and wellness through the lens of the lived experience of Maya and Garifuna indigenous communities in Belize and New York City. It focuses on how these practices, particularly those related to the use of wild and cultivated plants, persist and are modified in changing environments, and how this

impacts the health of individuals and communities. Dimensions of change explored include temporal, spatial and those associated with the climate.

\* **Janelle Marie Baker** - *The Fern That Makes you Fat: Food Security and Extreme Extraction in Bigstone Cree Nation Territory (Northern Alberta, Canada) (11:15)*

This paper situates ethnobotanical knowledge with place, history, and food security through a sakaw nehiyawak (Northern Bush Cree) Elder, Virginia Stewart's, teaching about eating fern rhizome (*Dryopteris expansa*) to "make her fat". Stewart first shared the story with me at an abandoned settlement on the Athabasca River, just south and upriver from the Athabasca Oil Sands mines, where she lived when she was young and witnessed the first abandoned natural gas well in Alberta. Stewart was resettled to the Sandy Lake reserve, where she transplants and tends a few *dryopteris* plants in her yard. However, Sandy Lake, like the rest of Bigstone Cree Nation territory, is located on top of the westernmost edge of the Athabasca Oil Sands deposit, where logging companies are rapidly deforesting the area to make way for oil companies who use in situ technologies through which they are draining aquifers to steam, heat, and wash bitumen from sand. In this time of extreme extraction in northern Alberta and Treaty No. 8 region, Bigstone Cree Nation members are faced with a sudden threat to food security in the boreal forest where the majority of people are accustomed to an abundance of traditional foods, which they prefer to consume regularly, with fat from animals being a highly valued food and medicine. The fern that makes you fat is becoming a food item that people rarely need now, but the loss of places that it grows can be seen as a harbinger of loss of abundance in traditional foods.

**Michelle Baumflek & Suzanne Greenlaw** – *Co-creating Knowledge to Support Native American Plant Gathering Agreements in National Parks: A Call to Action (W 10:30)*

Native American communities in the United States are actively engaged in reestablishing plant gathering rights on federal landscapes, including those of the National Park Service. However, such efforts may be hindered by a lack of biological data for many culturally significant plant species, which are needed to inform required Environmental Assessments. Specifically, research regarding harvesting effects is currently absent for many species of interest, or may fail to work in partnership with Native communities to take traditional knowledge, gathering practices, and values into account. We build on three years of collaborative work with Wabanaki communities of Maine, USA and Acadia National Park to highlight a broader need for careful, respectful and rigorous co-created knowledge focused on harvest effects of culturally significant plants. Using sweetgrass (*Anthoxanthum nitens*) as an example, this presentation will describe our participatory research design to facilitate plant gathering in Acadia National Park that incorporates both Wabanaki gatherer knowledge and scientific knowledge into the monitoring and management of a culturally-important species. We introduce current regulatory conditions, and report on gatherer-led harvest studies, preliminary findings, and emerging lessons from our study design and methodology. We include a discussion of why ethnobiologists are well-positioned to contribute to similar research efforts.

^ **Ann Biddle** – *We've Been Studied to Death: Addressing Research Fatigue Among the Ahtna in Alaska (M 1:45)*

Preserving traditional knowledge of plant use is important to the Ahtna of Alaska. Plant collection and use demonstrations are typically a part of annual youth culture camps in the Copper River Valley. Until now, consistent documentation of traditional plant use knowledge has been sparse and not homeland-region-wide. Research fatigue has been noted by the Ahtna leadership as reasons not to approve projects and partnerships. Rather than duplicate areas and people who have already told their plant stories, an extensive literature search will expose those regions of the Ahtna Traditional Homelands for which there is little plant use documentation. The available resources include audiotapes, interview notes, prior documentation specific to plant use, ethnographies, stories, and government documents. The information gleaned and organized from these resources will paint a picture showing where there may be gaps in the knowledge: regionally and botanically. Diverse resources provide distinctive viewpoints and offer a different context for plant knowledge. Both indigenous and academic knowledge systems of science have been used to document the plant information. The resulting data set will provide a starting point from which to develop a project plan to record and document traditional plant use solely in areas where documentation is lacking. Closing those knowledge gaps, with the least amount of research fatigue, will offer the most comprehensive picture of the Ahtna traditional plant use knowledge. The compilation of these efforts will be offered for use and storage by the AHF to use as educational resources or for whatever purposes they desire.

**Linda S. Black Elk** - *Plant Stories: Encouraging Environmental Activism and Relation Building through Storytelling (W 4:30)*

Indigenous peoples often use stories to disseminate vital information about our relationships with the natural world. These stories tell us about our place in the universe; they guide us in understanding our roles and responsibilities, and they hold us accountable in maintaining these relationships with all beings, especially the plant nations. But what happens when we stop telling these stories? What happens when we forget our obligations to our plant relatives? Join us as we tell plant stories from many tribes across Turtle Island, and learn about the ways in which these stories can guide us in protecting the plant nations.

**Ashley J. Blazina** - *Flipping the Script: Experiences in Developing a Research Methodology that Questions the "Other" Narrative (M 1:30)*

This paper chronicles my experiences flipping the narrative of the typical subject group in ethnoecological research. By looking at the relationships of non-Native American settlers with Western Washington oak/prairie environments, I placed these individuals, cultures, and communities as the other in my study design. By identifying how these highly-managed environments changed due to non-Native American disturbances and use, I began to examine how ethnoecological research design and methodology can prompt certain assumptions about best management practices today. This paper centers around the question of: Who is the true audience of ethnoecological research? Who should it be? How can it be improved and expanded?

**Abolade Oluremi Bolaji & Isaac Oluremi Adeniran** - *Proximate Analysis, Phytochemical Screening & Cytotoxic Investigation of Leaf and Root Extracts of Euphorbia Graminae (W 2:30)*

The nutritional components, phytochemical constituents and cytotoxic status of *Euphorbia graminea* were investigated in order to provide useful information on its potential nutritive value and the possibility of generating alternative source of novel phytochemicals from it. The proximate analysis revealed the presence of an average of  $15.36 \pm 0.04$  % protein,  $65.36 \pm 0.04$  % moisture,  $0.32 \pm 0.05$  % fat,  $0.83 \pm 0.01$  % ash,  $0.27 \pm 0.02$  % crude fibre and  $17.86 \pm 0.08$  % carbohydrate. The phytochemical screening revealed the presence of saponins, steroids, cardiac glycosides and triterpenes in both the leaf and root extract. Flavonoid was only present

in the leaf extract. The cytological studies revealed that both the leaf and root extracts of *E. graminea* studied did not show any mutagenic, cytotoxic or genotoxic effect, nor inhibit or suppress the mitotic divisions of the cells of the *A. cepa* used in the assay. From the results obtained, it was concluded that *E. graminea* contains vital nutritional and bioactive components that could be beneficial as food and useful in the management of oxidative and inflammatory related conditions. However, further toxicity studies need to be carried out to ensure its safety for human consumption.

**Matthew Bond & Orou Gaoue - *Disentangling Biocultural Roots of Medicinal Plant Knowledge* (W 9:30)**

Medicinal plants play a critical role in ecosystems, economies, and societies around the world. However, there is currently limited understanding of why people use some plants medicinally and not others. Traditionally, ethnobotanical research has been limited to testing how individual variables, such as age, correlate with medicinal plant knowledge. This research uses structural equation modeling to simultaneously test how medicinal plant knowledge is affected by the following variables: community-level plant availability, disease profile, illness risk, and historical legacies; and individual-level market economy participation and socio-demographic characteristics. Biocultural data were collected from four villages in Solomon Islands using interviews with every adult (315 participants), group interviews, plant diversity plots, and bioassays. Structural equation modeling was used to calculate path coefficients and test the causal links (both direct and indirect) between each variable and medicinal plant knowledge. Results show that community and individual-level variables have different effects on medicinal plant knowledge. This project (1) pinpoints generalizable principles of how people think about, categorize, and interact with their environment; (2) explores how societies make, maintain, and share knowledge; (3) advances the discipline of ethnobotany by assessing poorly-tested ethnobotanical theories and their interactions; (4) identifies characteristics of plants, ecological systems, humans, and cultural systems that are associated with different kinds and amounts of medicinal plant knowledge.

**Sam Bosco, Jane Mt.Pleasant, & Mia McKie - *Seeing the Forest for the Trees: Historic & Contemporary Significance of Nut Trees in Haudenosaunee* (W 4:15)**

As one of the most nutritionally dense plant-based foods, nut trees have had widespread effects on ecological communities for several millennia. Nuts were also important in food economies among Indigenous peoples that inhabited the Eastern deciduous woodlands, notably the Haudenosaunee (People of the Longhouse, also known as "Iroquois"). Archaeological and historical evidence indicates that the Haudenosaunee may have managed forests to favor such nut trees. However, contemporary efforts to realign their food systems with cultural values, an aspect of food sovereignty, has mostly focused on corn. Building on these initiatives, nuts can play an important role in contemporary food systems within Haudenosaunee communities. The purpose of this presentation is two-fold: (1) it surveys and analyzes the historic record, elucidating the role of temperate nuts in pre- and proto-colonial Haudenosaunee territories; and (2) reports on ongoing community-engaged research investigating how nuts contribute to the development of food sovereignty and community health efforts in contemporary Haudenosaunee communities.

**Kayla Boultinghouse - *Jackrabbit Fauna from the Marana Platform Mound* (P)**

The Marana site is a Hohokam mound platform located in southwest Arizona. The site is ancestral to the Hohokam peoples of that region who occupied the site from around 300-1350 A.D. This occupation is during the central period of the classical period (1150-1350 AD). The Hohokam people were irrigation horticulturalists who populated the extensive reaches of the deserts in southern Arizona. The Hohokam people hunted and ate from a variety of different animal sources, with the jackrabbit or *Lepus* species being the most highly ate animal. This is evident by the representation of the animal bones found within the various compounds of the site. Examining these faunal remains allows for insight of cultural practices such as feasting practices. By looking at the faunal assemblages of jackrabbits, ritual practices of faunal remains are apparent. Knowledge of this ceremonial ritual gives insight to past human activities as well as the process of social evolution as a species.

**+ Jeffrey R. Boutain - *Update on Homegrown Hops in the Hawaiian Islands for Spring 2018* (P)**

Introduction: Hops are the female flowers of the common hop plant (*Humulus lupulus*, *cannabaceae*). From a perennial root crown, vegetative shoots emerge from the soil in the spring and are trained to grow on a trellis. After long summer days, the vegetative growth transitions to the production of terminal and axillary hops. Once mature, the hops are processed and stored as a raw ingredient. Thus, the common hop is a short day plant adapted to periods of cold stress over the winter, and vernalization is thought to be a key factor to the production of hops. Objectives: To update and report since 2012, Cascade and Chinook hops were produced under natural climate conditions, when grown in Kaimuki, Manoa, Kailua, and Kaneohe on the Island of Oahu, Hawaii. Results and Conclusion: Hops production in the State of Hawaii is possible. Chemical analysis of the hops grown on Oahu shows similar results to the major growing regions; however, overall yield is significantly lower. Furthermore, results from local networking as well as searching the world wide web indicate hop growing has recently moved to other islands in 2017, notably Kauai, Maui, and Hawaii. At present, the future of hop growing in the Hawaiian Islands resides with a few individuals that are passionate to pursue further research into aroma and taste.

**+ Shana Boyer - *Before Big Sugar Came to Town: Raising Cane on Florida's Frontier* (P)**

Since the early years of the 20th century, sugar cane (*Saccharum officinarum* L.) has been a multimillion-dollar crop plant in the state of Florida. Less well-known are the first attempts to grow sugar cane during Florida's early "pioneer years," after the U.S. took control from Great Britain in 1821. Inspired by successes in the Caribbean and elsewhere, would-be planters built plantations in central Florida and brought in slaves to do the backbreaking labor cultivating sugar required. Using historic sources and data from archaeological excavations at several plantations, I will explore cultivation and processing techniques, the relationship between the crop and those who cultivated it and possible impacts on the environment. My research aims to use the sugar plantations of Florida's past to better understand people-plant relationships as well as interactions between Europeans, African-Americans, and indigenous peoples in early Florida.

**Rob Brandt - *Food Security, Sovereignty and Traditional Knowledge in a Small Village in Morobe Province, Papua New Guinea* (M 4:30)**

It was a privilege to be able to spend a month in Papua New Guinea thanks to a National Geographic Society grant. My colleague and I spent two weeks botanizing in the Morobe Forests using as our base the village of Wagau. We were mainly collecting taxa in the genus *Psychotria* (Rubiaceae) but observed the practices in this small mostly self-sustaining village. The study area is located about 40km southwest of Lae City, Morobe Province, PNG. Wagau forest area (6°52'09.1"S 146°43'45.5"E) presents a tropical

rainforest system that perhaps has all the major forest types (Lowland Rainforest, Lower Montane Rain Forest, Mid-Montane Rain Forest) along a single mountain range known as the Herzog Range. An ultra-prominent summit to the west of Lae is the Mt Shungol. It has an elevation of 2,752 metres. The Buang people claim ownership to the top of Mount Shungol. The mountain range is covered by a continuous belt of pristine tropical rainforest that commences at about 100m altitude and rises sharply to the peak at above 2000m above sea level. The villagers are nearly self-sustainable, raising yams, pit-pit (*Saccharum robustum*), banana and utilize free range chickens and pigs. Slaughtering of pigs takes place regularly as does the slaughter of chickens, but the villagers are mainly dependent on plants from their gardens.

**Kim Bridges - *The Flipped Classroom (T 11:00)***

Modern pedagogy promotes moving presentation materials, such as lectures, out of the classroom and into self-study modules. Students use these on-line materials at home. This frees classroom time for active learning. There is a strategy that guides the efficient conversion of lecture materials into effective online modules. This talk describes this strategy and explores the benefits of this approach.

**Sunshine L. Brosi - *Sharing of Teaching Resources: The Open Science Network and Beyond (T 10:30)***

As a new instructor, the Society for Economic Botany community allowed access to instructional materials that greatly benefitted my own knowledge and my confidence in the classroom. For example, I was lucky enough to have Mike Balick's syllabus, Gail Wagner's PowerPoint presentations, and Will McClatchy's videos as a starting place for building ethnobotanical curriculum. The open nature and sharing of resources, similar to the sharing of big data and R-codes, aided greatly in my ability to juggle teaching and professional development. This hands-on presentation will focus on repositories where you can find and share teaching resources. These include National Science Foundation-funded educational resource portals of the Open Science Network ([opensciencenetwork.org](http://opensciencenetwork.org)) and Life Discovery ([lifediscovered.org](http://lifediscovered.org)). In addition we will discuss incorporating the Partnership for Undergraduate Life Sciences Education (PULSE) rubric in the classroom ([pulsecommunity.org](http://pulsecommunity.org)) and external evaluation of course through the Research in the Integrated Science Curriculum Survey ([grinnell.edu/academics/areas/psychology/assessments/risc-survey](http://grinnell.edu/academics/areas/psychology/assessments/risc-survey)). The presentation will focus on the benefits of sharing and peer-reviewing teaching resources to increase the quality of teaching materials presented. Participants are encouraged to bring their own laptops.

**Sunshine L. Brosi - *Ethnobotany Alumni: Where are They Now? Careers and Graduate School Opportunities (P)***

Ten years after the Bachelors of Science program in Ethnobotany began we will see where the graduates of this program begin their careers. The poster will explore the elements of the program that have led to the varied careers and graduate programs of alumni.

**Saowalak Bunma & Henrik Balslev - *Traditional Food from Sesbania (Fabaceae) (W 11:45)***

The use of wild and cultivated local plants as food supply helps feeding, especially for poor people. *Sesbania* is a genus of approximately 60 species and widespread in tropical and subtropical areas. *Sesbania* species have been used for several purposes such as ornamentals, medicinal plants, soil improvers, food, etc. In the literature, we have found evidence of the use of ten species of *Sesbania* as human food. They were eaten fresh or scalded or used as ingredients. Because most *Sesbania* species are common in rural areas with poor human populations, consumption of *Sesbania* can contribute the enhancement of food security.

**Robert Bye & Edelmira Linares - *Food Security & Sovereignty in the Sierra Tarahumara, Chihuahua, Mexico:***

*Historical perspective & Immediate Challenges (T 11:15)*

Recent studies in the Sierra Tarahumara have suggested that indigenous peoples (such as the Rarámuri) along with others living in rural communities in Mexico suffer from severe food insecurity due to the low Household Dietary Diversity Score (50%). None the less, our studies indicate that a strong biocultural heritage has sustained Tarahumara food security and sovereignty (FSS), although contemporary acculturation threatens their future. The dispersion of their settlements, food production systems (basically the milpa), storage strategies, and social network of sharing (kórima) have developed in response to prior catastrophes. Due to the extreme seasonality of food production, the Rarámuri have established responses to anticipate sustenance shortages by migration, genetic selection and dehydration (or "pasandos") of maize (chacales), beans (ejote pasado), squash (wichikori, flor pasada), edible greens (quelites pasados). Certain edible plants have maintained continuity in their diets while others have been abandoned. Over the centuries, Tarahumara have selectively adapted exotic elements into their food systems such as plows, livestock, as well as domesticated and weedy plants. Land use, climatic, social and cultural changes continue to challenge the Tarahumara's FSS while at the same time governmental, non-governmental, and academic organizations intervene (sometimes in contradictory manners) to assist indigenous communities resolve their food and nutritional security.

**Carrie Calisay Cannon - *Reclaiming Ancestral Land Ties Through Saguaro Cactus Harvesting Traditions (T 3:15)***

The Hualapai, like many tribes, lost a significant amount of their traditional homelands, and lifeways through the colonization efforts of the last two centuries. The one million acre Hualapai Indian Reservation is located along 108 miles of the South Rim of the Grand Canyon. The ancestral land base encompasses seven million acres of northwestern Arizona. Here is a landscape rich in edible, nutritious, life giving foods. Over the last decade I have had the honor and pleasure to work with the Hualapai Tribe where we have established an ongoing "Hualapai Ethnobotany Youth Project." Our project is funded through charitable grant donations, and we offer harvesting activities throughout the year. Hualapai tribal elders teach twenty of the tribal youth traditional plant knowledge. The ancestral land base encompasses both Mojave and Sonoran desert types, although the present reservation lands no longer include the southern Sonoran desert region where tribal members once harvested saguaro cactus fruit. Only one tribal elder remains who remembers harvesting the fruit as a child with her family. Raised in this southern region of ancestral lands, Malinda Powskey remembers harvesting the sweet ripe fruit of the Saguaro cactus in June. Long wooden poles were lashed together to make an "i:isiquab" or a Saguaro knocking pole used to tap the fruit down from the tall cacti. This talk will highlight efforts to revive this Hualapai tradition, reclaiming ancestral ties to land and traditional foodways.

**Carrie Calisay Cannon - *Ethnobotanical Collaborations Among the Pai Tribes of the Southwest (W 4:15)***

The Hualapai Tribe of Arizona lies within the eastern extent of the Mojave desert and has 108 miles of the Grand Canyon as its northern Reservation boundary. The ancestrally affiliated Paipai Tribe of northern Baja California, Mexico live in a markedly different

landscape, with coastal influence from the Pacific Ocean on the west, high desert and mountains in the main part of the territory, and Sonoran Desert on the east. These two tribes are the geographic “book ends” for the Pai Tribal groups. Yet, in spite of the geographic distance between the communities and the existence of less closely related language groups in between, many plants in Paipai Tribal territory have names that are nearly identical to Hualapai plant names. This presentation will share about a potential new project underway that aims to conduct a study of comparative ethnobotany to extend the linguistic documentation across the Pai languages of Arizona, and Baja California, Mexico by creating a “Pai-wide” ethnobotanical database. The purpose of the database will be to document and archive valuable linguistic and ethnobotanical knowledge of the Pai affiliated Tribes of the Yuman Language Family before it is lost. The Pai Languages represent a subset of the Yuman Language Family that are more closely affiliated through language, a common origin story, and related song, dance, and customs than the other Tribes of the Yuman Language Family. Geographically and historically, these languages spanned the Colorado River, all the way from Mexico to the high plateaus of northern Arizona.

**Carrie Calisay Cannon - *A Native Food Symposium in Indian Country (P)***

This poster will share information about a collaborative Native Food Symposium that took place on the Hualapai Indian Reservation of Northwestern Arizona in the Fall of 2017. For over a decade our Hualapai Ethnobotany Youth Project has been successful in teaching the plant and harvesting knowledge. However, this past fall, we sought to take our project a step further by making efforts to reintegrate the traditional foodways back into the everyday life of the tribal community. Currently much of the traditional foods that are shared occurs at cultural events that take place in the community. However, beyond such cultural gatherings, many of the wild harvested foods are not integrated into the daily lives of tribal members on a regular basis. This Native Food Symposium intended to showcase the multitude of projects happening in Indian country surrounding traditional harvesting and Native foods, as a means to share, and inspire the continuation of the work taking place at Hualapai. In addition, the Symposium was intended to share and discuss ways to reintegrate traditional foods back into more regular everyday use. Presenters that attended came from the Santa Clara Pueblo, Tohono O’odham Nation, Navajo Nation, and Inuit communities from Labrador Canada. This poster will share information on the value of cross cultural sharing that took place and can serve as a model for other future collaborative efforts that serve to reinvigorate traditional foodways amongst tribal communities.

**Molly Carney - *Re-Visiting Bulb Size as a Proxy for Camas Management in the Pacific Northwest (M 3:25)***

In the Northwest Coast literature intensifying food production (often in the form of salmon, *Oncorhynchus spp.*) is frequently cited as a central process to increasing hunter-gatherer social complexity. Only recently have archaeologists and anthropologists recognized that Northwest peoples in the ethnographic past and present used and managed a variety of plant foods, many of which likely contributed a substantial number of calories to the diet. Establishing the time depth associated with these ethnographic behaviors, however, has been less clear. This paper addresses the antiquity of plant management practices in the Pacific Northwest through the re-analysis of paleobotanical assemblages from earth oven sites in the Willamette Valley, OR and the Calispell Valley, WA. We specifically focus on camas (*Camassia spp.*) life cycles to show that selective harvesting and tending is visible in bulb size. In the Willamette Valley, we suggest that these management practices extend as far back as 8,000 years.

**Molly Carney & Sydney Hanson - *The Harvest of Action: Arguing the Importance of Paleoethnobotany in Cultural Resource Management Archaeology (T 4:15)***

The importance of paleoethnobotany to archaeologists cannot be overstated: It allows us to reconstruct food systems and environments impacted or erased by colonialism. However, we argue that paleoethnobotany is not employed to its full potential in North American cultural resource management (CRM) archaeology. We present the results of a national survey of cultural resource managers and paleoethnobotanists, and offer suggestions on how (and why) to better integrate paleoethnobotany into government funded archaeological research.

**Lisa Castle - *Modeling Harvest in Fluctuating Populations: Examination of a Slow Root and a Fast Fruit (T 4:00)***

The prairie turnip (*Pediomelum esculentum* Fabaceae) is a species of slow-growing, long-lived herbaceous plants that are destructively harvested for consumption of the root. Cut-leaf cyclanthera (*Cyclanthera naudiniana* Cucurbitaceae) is a species of disturbance-tolerant annual vines with fruits that can be harvested without destroying the parent plant. These two species with very different life histories, both native to central North America, are used as case studies to explore the potential applications of different models in making harvest and conservation decisions for plant species with fluctuating population sizes. Data about location, size, and status of individual plants of both species has been collected for over five years and used to inform the United Plant Savers At-Risk Tool, a seemingly simply assessment tool, as well as more complicated geospatial and mathematical matrix models.

**Lisa Castle, Brenda Vang, Alina Shrestha, Allison Statton, Brandon Matter, Gustavo Martinez, Joel Kliever, & David Castellanos - *Scoring a Genus vs. Scoring all the Species: Analysis of Threats to Wild-Harvested Echinacea Species (P)***

Students in the Plant Taxonomy class at Southwestern Oklahoma State University scored species of *Echinacea* (purple cone flower) using the United Plant Savers At-Risk Assessment Tool. Based on questions about plant life history traits, population size and distribution, the effects of harvest on populations and individual plants, and demand, the tool highlights species vulnerable to over-harvest and points out areas of vulnerability. The United Plant Savers, a conservation organization, had previously published scores for *Echinacea* as a genus. However, there are many species of *Echinacea* and we sought to determine if the scores for congeneric species are different enough to warrant separate rankings. While species scores can be dramatically different from each other, ranging from 24 for *Echinacea paradoxa* to 55 for *Echinacea sanguinea*, we encountered issues scoring the species separately because both users and harvesters do not always distinguish among species.

**Lisa Castle - *Eaten to Endangerment: An Analysis of Applicability of the United Plant Savers At-Risk Assessment Tool to Wild-harvested Edible Plants (P)***

Wild-harvested edible plants were scored using the United Plant Savers At-Risk Assessment Tool by students in the Southwestern Oklahoma State University Plant Taxonomy class. The goals of scoring these plants were three-fold. First, we sought to learn if the same questions that were originally designed to rank and categorize wild-harvest medicinal plants according to their vulnerability to over-harvest could be usefully applied to edible plants. Second, we hoped to compare wild-harvested edible plants to wild-harvested

medicinal plants to determine if edible plants are appropriately prioritized with regards to conservation. Finally, we hoped to expand students knowledge of botanical terminology and increase their skills in sorting and synthesizing scientific information from disparate sources.

#### **Al Keali'i Chock - "My Plant Family" & Those Botanical Terms (T 11:30)**

Most Introductory Ethnobotany (Botany 105) students do not have a scientific background, and are enrolled in the class since it is one of the General Education Foundation courses (skills and perspectives fundamental for higher education) required for graduation. Attempting to have students memorize the botanical terminology is not a pleasant chore. Student research is an effective learning tool. Each student selects a plant family from the Spices List, and makes a short (2-5 minute) PowerPoint presentation to include the family's outstanding characteristics and one or more plants used as spices. Nearly all of the students are computer savvy, and have been cautioned about fake news and inaccurate blogs. The student's research, using a search engine, involves not only botanical sources, but other disciplinary ones, as they try to connect uses of different cultures. Slide citations include all of their resources/references, both name and URL. Subsequent assignments have been for a medicinal, invasive, and endangered species of the students' family. This year the category of ritual or religion was added in place of invasives. The presentation includes family characteristics; plant distribution (natural and/or through the agency of people); plant interactions and diversity; the influence of plants on culture; patterns of plant selection; and the effects on the environment. This teaching tool teaches the students the interaction of peoples with their environment, culture, and history; biological diversity; centers of origin of crops, culture, knowledge, and people; development of horticultural varieties; and the organization of an oral-visual presentation, and public speaking.

#### **Al Keali'i Chock - Hawai'i: From the Ocean towards the Mountain: Self-Sufficiency through Fish Ponds & Taro Patches (M 3:00)**

The Polynesians, a sea-faring peoples, arrived in Hawai'i, the most isolated place in the world, more than a millennium ago. The first settlers came from Marquesas, and later from Tahiti. Eventually the islands were divided into districts, land further subdivided into ahupua'a, usually a valley, from the mountain to the sea. In the valleys, terraces were built to grow taro (*Colocasia esculenta*) with elaborate irrigation systems, and developed more than 150 varieties. Miscellaneous crops were planted on the terrace banks. On the coast and at the mouth of the stream, fish ponds were built to raise fish. The population totaled 300,000 or more, and the archipelago was self-sufficient. The food supplies with more than adequate, since there was time to develop elaborate artistic and decorative objects. Today, with a million people, 90% of the food and supplies are imported.

#### **Carlos E.A. Coimbra, Jr & James Welch - Ora-pro-nobis or "Pray for Us": Ethnobiology of Leafy Pereskia Cacti, A Neglected Food Source in Brazil (M 2:15)**

Few people would imagine a cactus shaped like a large shrub or tree and covered with dark green leaves resembling spinach. These characteristics have attracted botanists' attention to the 16 species in the curious *Pereskia* genus, although they go mostly unnoticed in the ethnobotanical literature. Brazil has several widely-distributed species, which are also forgotten by much of its urban population. The nutritional value of *Pereskia* leaves is better recognized in some of the country's rural regions, where they are used as ingredients in preparing meats, pastas, omelets, and salads. In southeast Brazil, *Pereskia grandifolia* Haworth and *P. aculeata* Miller are commonly called ora-pro-nobis. According to seventeenth and eighteenth-century folklore from the state of Minas Gerais, Catholic churches were surrounded by living fences planted with these two species, considered desirable for this purpose due to their broad leaves and sharp spines. The Portuguese priests chased away underprivileged locals who would denude the fences by collecting the leaves, except when they were busy performing the Litany of the Saints. When the priests repeated the Latin phrase Ora-pro-nobis or "Pray for us," people came to harvest *Pereskia* leaves without fear of being interrupted. Ora-pro-nobis cacti are now considered unconventional food plants because they are becoming scarce in markets and gardens due to urbanization, green area reduction, and food transition. Yet, recent research indicates the leaves have very high protein content (25-30%), including essential amino acids, and high levels of mineral salts recommended for daily human consumption.

#### **\* Alec H. Colarusso - The Mysterious Black Drink and its Influences on the Indigenous People of North America (P)**

The most documented and used member of the Aquifoliaceae (Holly Family) in North America is *Ilex vomitoria* (yaupon holly), also known as black drink, white drink, yaupon, or cassina. *Ilex vomitoria* was used extensively throughout Eastern North America in both ceremonial and leisure practices; prior to the Europeans' arrival, Native Americans used the plant to brew a purportedly emetic tea that was used to caffeinate as well as cleanse. Archaeological analyses have found traces of its use at the urban center of Cahokia. While its natural habitat is along the southeastern Coastal Plain, human activities extended *I. vomitorias* range to the west and north, an indicator of its cultural importance. The drink could contain other plants, including *Iris versicolor* (blue flag), *Ceanothus americanus* (red root), *Lobelia inflata* (Indian tobacco), and *Eryngium* spp. (rattlesnake master). This poster explores the traditional uses and ethnobotany of *I. vomitoria* and black drink admixture plants in order to understand their cultural significance in the past and today.

#### **Aida Cuni Sanchez, Alain S.K. Ngute, Bonaventure Sonke, Julia Klein, & Rob Marchant - Same Forest but Different People Means Different Use: Insights from Cameroun (W 3:00)**

Plant use for food or medicine depends on several factors, such as abundance, availability of alternatives, local taste/texture preferences, tradition and culture, among others. Ethnicity is known to play an important role in plant use, with different ethnic groups using different plant products, even when living in the same environment. We investigated the effects of all these factors on plant use in the Cameroun highlands, a biodiversity rich and culturally complex area. We combined focus-groups with village elders (20 villages) and field observations in two montane forests known to have similar vegetation types. All plant species mentioned were collected and taken to the Herbarium of Limbe for identification. Plant use significantly varied between ethnic groups. In both mountains, farmers of Oku and Bansa ethnicity (known to be good hunters) had greater knowledge of montane forest species compared with Fulani pastoralists, which historically came from the lowlands. Plant use for medicine was more different than plant use for food. Montane forests are known to have fewer larger fruits than lowland forests; as there are fewer options, there were fewer differences between ethnic groups. Knowledge on plants used for fodder and honey also differed. Oku people, who have bees as their totem animal, had greater knowledge on the plants bees use to produce different types of honey, including white honey made from *Nuxia congesta*. Our results highlight that ethnicity should be taken into account when restricting forest access or when promoting alternative livelihood strategies for forest edge communities.

**+ John de la Parra, Fred Jackson, Jared Auclair, & William Hancock - *Ethnobotanically-Informed Phenotypes: A Path to Treating the Prediabetic Condition (P)***

A vast majority of the developing world relies on indigenous botanical drug products to treat prediabetic symptoms. We seek to address challenges of drug product complexity and variability by optimizing the analytical standardization and consistency of ethnobotanical treatments for prediabetes that can be easily grown by healers in developing countries. Our methodology is encouraged by emerging Western standards such as those outlined in the FDA's recent Botanical Drug Development guidelines, which have resulted in the approval of two complex botanical drugs, Fulyzaq (the sap of *Croton lechleri*) and Veregen (the leaves of *Camellia sinensis*). Towards those ends, we describe the following: 1. An efficient, accurate, and reproducible LC-UV-MS/MS method that facilitates the analysis of metabolic variability, 2. The discovery of significant correlations of environmental/phenotypic variation to biochemical fingerprint, and 3. A proposed optimized method for indigenous people to easily grow and extract high quality drug products in the field. Our first proof-of-concept work has produced a simple ethanol/water extraction of a particular genetic and phenotypic variety of *Ocimum sanctum* with the identification of specific environmental elicitors that lead to optimized active-component production.

**^ John de la Parra, Fred Jackson, Jared Auclair, & William Hancock - *Optimizing Chemotypic Variation in Indigenous Ethnobotanical Treatments for Prediabetes (W 3:30)***

The disease cascade associated with prediabetes has constituted a global health crisis with the worldwide proportion of diabetic adults increasing from 4.7% to almost 9% in the past 30 years. In developing countries, this rate has risen even faster over the past 10 years.\* As such, this massive epidemic is ravaging remote and impoverished populations in places often inaccessible to the large-scale delivery of Western pharmaceuticals. However, many of these developing regions rely heavily on the use of long-standing indigenous plant treatments to remedy early stages of prediabetes, thus positioning local health professionals and their remedies on the front lines of global diabetes prevention and treatment. These ethnobotanical treatments are often complex, unanalyzed, and unvalidated extracts with widely varying evidence that they effectively regulate blood sugar levels. In this project, we propose addressing these challenges of complexity and dire need by improving the analytical standardization and reproducibility of these frontline treatment efforts. Here we rigorously define a chemical fingerprint, catalog phenotypic variability, and refine proper agricultural and collection practices for the most promising plant-based treatments for diabetes—focusing on those that can be grown in developing countries. Our first proof-of-concept is with the plant *Ocimum basilicum*, itself a purported anti-diabetic plant that demonstrates significant phenotypic variety. Herein we describe a method to quickly and easily collect samples in the field with a novel sample preparation method, an efficient and accurate analytical method, and the correlation of phenotypic variation to biochemical fingerprints. \*WHO. 2016. Global report on diabetes. Geneva, Switzerland.

**Rebecca Dean & Joseph Beaver - *Euclidian Distance, the Faunal Troika, and Diversity Analysis in the Desert Border Regions (P)***

Faunal assemblages from the deserts of the U.S. Southwest/Mexican Northwest are dominated from the Late Archaic until European Contact by the "faunal troika": species from the Orders Lagomorpha (cottontail rabbits and jackrabbits), Rodentia (all rodents, but particularly ground squirrels and kangaroo rats), and Artiodactyla (deer, bighorn sheep, and pronghorns). The preponderance of lagomorphs, which frequently make up 90% or more of faunal assemblages, makes it difficult to graphically or mathematically express the diversity of meat diets in the past, or the varying decisions made by hunters within different regions, communities, or families. This paper describes and demonstrates the usefulness of calculating Euclidian distance on a ternary graph to determine both baseline hunting behavior on the site or regional level, and as a way of determining and presenting variation from that baseline. The reliance on the faunal troika makes the desert border regions a particularly useful area in which to use ternary graphs, and Euclidian distance analysis provides an opportunity for visual representation and mathematical manipulations that are more difficult with an evenness or diversity index.

**Jennifer Dearnaley & David Jones - *Re-Planting the Seeds of Indigenous Science in Australia: Directions in Australian Ethnobotany and Traditional Knowledge (T 3:45)***

Australian Aboriginal Peoples have long been typified as sedentary peoples lacking permanency of residence, any cultural laws and rules, any technological expertise, and lacking an agricultural industry or a botanical science knowledge. The last 25 years of ethnobotanical research in Australia has challenged this assumption, as well as the very nature of the 65,000 years of continuous landscape management and design activities by Australian Aboriginals that many authors and 'explorers' characterised to be disorganised, fragmented, and lacking any science. World Heritage Listings of Kakadu and Uluru-Kata Tjuta national parks in the last 30 years have included evidence of long-practiced Aboriginal botanical cultivation and harvesting to substantiate their nominations. Additionally, the pending Budj Bim tentative World Heritage nomination will highlight the longest continuous aquaculture harvesting infrastructure in the world and its strong inter-relationship with Gunditjmarra botanical cultivation and harvesting. This paper surveys ethnobotanical research in Australia over the last 25 years, including the key researchers and their publications, considers recent debates about Aboriginal Country custodianship and management, and summarises the increasing validation of Aboriginal Country-specific seasonal calendars in ethnobotanical research. In particular, recent research from south-eastern Australia drawing upon the Wadawurrung Country is profiled including the long-forgotten research by anthropologist and archaeologist Louis Lane.

**Maia Dedrick & Patricia A. McAnany - *Food Security among Colonial Maya Migrants (T 10:30)***

Migration was a common strategy for survival in Yucatán before and after Spanish conquest. During the 16th century, Spaniards forcefully gathered Maya peoples in Yucatán into designated communities (congregación), often burning the houses, gardens, and orchards they had left behind to discourage their return, and then demanded that those communities pay excessive taxes in the form of maize, poultry, honey, beeswax, cotton, and cloth. As a result, people migrated to escape the tax burden by moving to areas beyond the Spanish frontier, or more commonly by leaving for another town or to a city, where their debts would be forgotten. Additionally, as soon as Spaniards had gathered people into communities, they began to disperse again across the countryside. Amidst these dynamic population movements, how did people achieve food security? What tools did they have to provide for themselves as they moved across the landscape? This presentation will explore how Colonial migration and Spanish violence impacted the foods that Maya peoples of Yucatán consumed, including the plants they grew and the animals that they raised and

hunted. It also explains how indigenous knowledge of the landscape facilitated mobility, and in particular made possible the continual place making and unmaking that migration entailed amidst ongoing challenges that included disease, drought, and population loss until the end of the 18th century.

**\* Lukas Desjardins - *Sumaq Kausay: Cultivating Quechua Identity through the Potato (P)***

Sumaq Kausay, or “good life”, is a Quechua concept which articulates the importance of community relationships, duality, and reciprocity. Sumaq Kausay is found when one lives in reciprocal balance with people, spirits, and landscapes around them. A living example of this concept is found in the Parque de la Papa, near Pisac, Peru. Founded by the Asociación ANDES, the Potato Park is a project dedicated to preserving the diversity of native potato varieties ecological devastation from climate change. The potato, *Solanum tuberosum*, is native to the Andes and has been a staple of the Quechua diet for centuries. The Potato Park has become a central case in the study of Indigenous Biocultural Heritage, which views the preservation of indigenous heritage not only through the lens of practices and beliefs, but of entire ecosystems which stretch beyond the human. With the symbolic centerpiece of the potato, the Potato Park seeks to preserve the cultural realities of life in the Andes. The Potato Park reconfigures indigenous modes of social organization as a cooperative project of food sovereignty. When you cultivate a potato, you cultivate an entire set of relations between the self, the community, the landscape, and the spiritual world.

**Anna Dixon - *Making Your Mark: Tattooing Plants and Identity (M 3:15)***

The resurgence of interest in traditional tattooing, as well as concern about the safety of commercial inks, has led to a search for natural, traditional products for tattoos. Scientific techniques for visualizing and analyzing ancient tattoos preserved on mummified human remains have been able to identify minerals and “pyrolyzed plant particles” (soot) in ancient tattoos, but not the plant taxa themselves. Ethnographic studies of traditional tattooing have focused largely on tattoo motifs, meaning and tool technology, with less emphasis on the botanical materials involved. While it is true that soot from burned plant material is a common tattoo pigment, a variety of other plant products were traditionally used to produce tattoos by either injecting colors under the skin or via the activity of irritant chemicals that produced tattoo-like marks. The indigenous peoples of Polynesia, particularly in the Hawaiian Islands, used a variety of plant substances to produce tattoos for therapeutic, decorative, commemorative or ritual reasons; the rarity of the tattooing plant itself sometimes also lent extra meaning and significance to the tattoo. Around the world, peoples of Africa, Asia, Europe and the Americas also used materials other than charcoal to produce tattoos that were (and are) an integral part of cultural identity and heritage. Indeed, in Māori and Hawaiian culture, traditional tattoos have become a potent and visible part of the fight for cultural sovereignty. This preliminary research pulls together distributional, taxonomic, chemical and cultural information for plants used cross-culturally to produce these potent symbols of identity.

**Molly Doane & Alaka Wali - *Cultivating Well-being, Securing Place: Refugee and Immigrant Gardeners in Chicago (M 1:00)***

In this paper, the co-authors describe research underway in Chicago on the diverse ways that immigrants and refugees are participating in community garden efforts to both create a sense of well-being and secure a place in the new environs in which they find themselves. The research has been on-going over the past 3 summers and we have begun to identify the strategies that immigrants and refugees are using, the impact of gardening on their social life, and how access to garden sites contributes to local empowerment. The paper draws on theories from political ecology and place-making to contextualize the gardeners’ practices and the challenges they confront. At a time when immigrants and refugees are highly vulnerable to Federal policies that threaten their security, the act of gardening may be a way to entrench themselves not only in safe places, but also among support networks essential to long-term stability.

**Mohamed El Mahroussi, Mhanned Houssni, Younes Hmimsa, & Mohammed Ater - *A Traditional Practice Little Known in Oasis Agroecosystems, Flood Recession Agriculture (P)***

In general, we tend to consider that in Saharan areas, agricultural activities are concentrated exclusively in the oases where agriculture is irrigated. However, we must recognize that there is another type of agriculture outside the oases, it is the culture of flood recession. This type of traditional agricultural practice is well known beyond southern Morocco over a large area of the West African Sahel. It is a good illustration of the response of local traditional knowledge to the scarcity of water resources. It is a form of opportunistic and random cultivation practiced only in years when rainfall is sufficient to generate floods in the Saharan rivers. To characterize this type of crop (acreage, land, agrobiodiversity, yield, financial product) we conducted a field study based on surveys with a large sample of 120 farmers, as well as the collection and analysis of documents and local government statistics. The study area corresponds to the alluvial plains of Oued Draa and the watershed of Wadi Seyad-None (Province of Guelmim). In our paper, we will use the results obtained to highlight the main characteristics of this type of culture and to discuss the importance and the incidences, as well, direct (financial contribution, food safety), as indirect (dynamics of biodiversity). It is a contribution to the recognition and valorization of traditional local knowledge important for oasis agroecosystems.

**Annie Evans - *Only Pick as Much as You Need: Harvesting Traditions and Customary Law in Makkovik (M 2:00)***

Annie Evans is an Elder from Adlavik Bay living in the Inuit Community of Makkovik, Nunatsiavut (Labrador). She was raised at her winter home in Adlavik Bay, and spent summers at family fishing places in October Harbour and Strawberry Harbour. At seven years old, Annie Evans went to mandatory boarding school in Makkovik. Her family moved permanently to Makkovik when she was ten. In Makkovik, Annie Evans has raised a family, worked at the fish plant and Air Labrador, served six years on the Board of the Labrador Inuit Association (now Nunatsiavut Government), served as a chapel servant and lay minister, and furthered her education as a community health worker. In her Elder counsellor role, she now supports Nunatsiavummiut at Elders gatherings, at the National Inquiry into Missing and Murdered Indigenous Women and Girls, and supports residential school survivors. In her presentation, Annie Evans will discuss her knowledge of the plants and animals that are part of healthy diets in Makkovik, and the way that customary law helps people care for the land and each other.

**Maria Fadiman & Kenneth Broad - *Ethnobotany & Conservation in Abaco: Connecting Locals to Their Own Plants & Knowledge (W 3:45)***

Conservation relies on local populations understanding their own environments. Although the Bahamas attracts large numbers of tourists, The Bahamas Blue Holes National Park on the Big Island of Abaco is working to create a connection and environmental awareness with their own residents. Working with the Blue Holes National Geographic Mapping and Exploration Team, we conducted outreach with local schools in the capacities of GIS, Virtual Reality, Cave Diving, Paleontology, Forestry and Ethnobotany. This paper focuses on the



ethnobotanical aspect. The goals were: 1) To have children learn local plant use and to identify specimens, 2) To foster inter-generational connections between youth and local elders, 3) To conduct a cross cultural study of plant use. For the educational outreach we used teaching techniques within the framework of Self-Directed Learning (SDL) Experiential Learning (EL), and Place-Based Learning (PBL). Each pedagogical method is an active learning strategy focusing on student participation and self-guidance. Studies show that these methods promote an in depth understanding of natural landscapes and ecosystems. Students physically interacted with all aspects of the lessons. They rubbed, ate and drank plants, while learning through touch, smell and vision how to identify and collect their own specimens. Ethnic backgrounds of the individuals on the island are diverse. The children and adults gained a deeper understanding of their own ecosystem and of each other. This human connection to the land and knowledge can foster preservation of the forest and underground waterways.

^ **Erica Oberndorfer & Marilyn Faulkner** - *Gardens of Labrador: Tending Plants in the "Land God Gave to Cain" (T 10:45)*  
Labrador (Canada) is more often recognised for its animals—including polar and black bears, caribou, seals, and wolves—than for its plants. Jacques Cartier famously referred to Labrador as “The Land God Gave to Cain”, and would-be European settlers lamented the region’s poor soils, short summers, and harsh early frosts as impediments to cultivation. Labrador nonetheless has a long history of ingenious cultivation: Indigenous berry gardens in the interior, Moravian missionary gardens of the Labrador North Coast, the self-tending gardens of Nunatsiavummiut winter homes, and the feral rhubarbs of family places. These examples all demonstrate adaptive cultivation and harvesting techniques that are appropriate for their ecological context. Gardens are today a central component of food security for many families in the Inuit Community of Makkovik (Nunatsiavut). With examples from Marilyn Faulkner’s family garden in Makkovik, we present how Makkovimiut gardeners have developed cultivation, harvesting and storage practices that succeed in a sub-Arctic environment.

**Andrew Flachs** - *Ethnobiology and the Hope for Sustainable Cotton Agriculture in Telangana, India (T 10:30)*  
The case of cotton and crisis in Telangana, India illuminates the stakes of global changes in agriculture: the slow, persistent dangers of pesticides, the inequalities of rural life, the place of ecological knowledge in modern agriculture, and the complex danger of suicide for agricultural workers. As potential solutions to India’s agrarian distress, genetically modified (GM) seeds and organic agricultural programs offer farmers different visions for the future of agriculture, incentivizing some kinds of socioecological practices while constraining others. An ethnobiological lens asks researchers to attend to the knowledge and practices of everyday life as part of a larger ecology, considering how something as small as a seed connects to pesticide sprays, agrobiodiversity, and the prospects for living a meaningful life in rural South Asia. Drawing on data collected 2012-2016, I discuss how on-farm biodiversity and human wellbeing are being shaped by contemporary trends in cotton agriculture including next generation GM traits, stagnating global cotton prices, new agricultural chemicals, international regulation, and the plants themselves.

**Cynthia Fowler** - *Hemba: the Forest Islands of Kodi as Space-Time Footprints in Support of Food Security (W 2:45)*  
Hemba draws on ethnographic research and geospatial analyses to explain relationships between social processes and landscape patterns. On Sumba Island in Eastern Indonesia, the subsistence practices of the Kodi culture manifest in a distinctive space-time footprint that is visible from the landscape scale to the agroforest scale and from both an aerial and a grounded point of view. The special type of agroforests called “hemba” that encircle Kodi’s small hamlets are multistoried, anthropogenic forests that people construct within a broader mosaic, biosocial landscape. Geospatial mapping applications that demarcate categories such as savannas, woodlands, shrublands, deciduous forests, and evergreen forests do not readily account for or distinguish hemba, with their fine scale, as a particular kind of land cover. Yet, hemba are a key component in a diversified subsistence system where adequate food production is challenged by a semi-arid tropical monsoonal climate. Kodi people have constructed hemba over time and they currently maintain these agroforests for multiple purposes. Local knowledge is necessary to recognize the importance of hemba and to describe their constituent species. Ethnobotany demonstrates the multitude of security- and safety-related services that hemba provide, their role in food security, and their spiritual and genealogical meanings. The study of hemba is a platform for the intensive exploration of the value of local knowledge about forests and a justification for the argument that ethnographic data enhances interpretations of satellite imagery.

**Anne Frances, Colin Khoury, & Adam Smith** - *Conservation Status of North American Crop Wild Relatives (M 1:15)*  
This session introduces the roles of conservation status assessments in informing conservation priorities for crop wild relatives in North America, and provides an overview of current information for U.S. taxa. Conservation status assessments evaluate species relative risks of extinction globally, regionally, nationally, or locally, and estimate the degree to which populations of species are already safeguarded in existing conservation systems, with the aim of exposing the critical gaps in current conservation. Results of the assessments can therefore aid in directing limited conservation resources to the species and populations that are most at-risk. Methods to assess conservation status for North American crop wild relatives are well developed via NatureServe and the International Union for Conservation of Nature (IUCN) Red List, and the essential infrastructure to perform these analyses is present, at least in Canada and the U.S. Current conservation assessments for North American wild relatives need updating, but already reveal a landscape of multiple complex threats, and major gaps in the ex situ and in situ conservation of prioritized species. Further resources and concerted efforts are needed to update conservation assessments and then to use the results to inform efforts to fill the critical gaps in conservation.

^ **Georgia Fredeluces & Tamara Ticktin** - *Biocultural Conservation of a Wild Harvested Herb, *Xerophyllum tenax* (Melanthiaceae) in the Pacific Northwest, U.S.A (M 1:45)*  
Local and Indigenous Peoples have utilized fire and other management approaches over millennia to care for and maintain ecosystems that support community needs. This type of traditional knowledge and practice is highly valuable today, but the best practices to restore socio-ecological connections are not always clear. In order to contribute to this effort, I gathered and synthesized ecological, ethnographic, and educational data related to the biocultural conservation of beargrass (*Xerophyllum tenax*). Beargrass is an understory herb harvested culturally for basketry. Its abundance and quality are threatened by fire suppression and commercial harvest. Here we ask: 1.) How do fire suppression, harvest and climate influence population growth and leaf qualities important for weaving?, and 2.) What are the recommendations of tribal weavers and youth for the restoration of beargrass plants and traditions? We surveyed >2000 plants from 2015-2017. Field data were used to build Integral Projection Models to explore the influence of fire, harvest and abiotic factors on beargrass persistence and leaf quality. To gather

recommendations, I attended basketry gatherings, learned to weave, interviewed tribal weavers, and co-designed educational programs for tribal youth. We found that the long-term persistence of beargrass was highest under low-severity fire. Recommendations included restricting commercial harvest and increasing access. Tribal youth indicated a high level of interest in their cultural traditions, including basketry, with limited learning opportunities. Taken together, this suggests that beargrass has a high potential for biocultural revitalization with application of low-severity fire, improved access, limited commercial harvest, and greater support for cultural programming.

**Idayat Titilayo Gbadamosi** - *Assessment of the Nutritional Qualities of Ten Botanicals Used in Pregnancy and Child Delivery in Ibadan, Nigeria (W 3:15)*

Ten botanicals used pregnancy and child delivery by traditional maternity experts in Ibadan were analyzed for their nutrient and phytochemical constituents to provide scientific insight into their therapeutic use. The nutrient and phytochemical analyses of powdered plant samples were done using standard methods. The plant samples contained phosphorus, calcium, iron, manganese, magnesium and zinc in varied quantity. *Eleusine indica* (165.0 mg/100g) was highest in calcium content and *Croton zambesicus* (40.0mg/100g) had the least. Iron was highest (9.7 mg/100g) in *E. indica* and *Uraria picta* had 2.7 mg/100g. The protein content of plant samples varied between 13.95% and 18.30%, the highest (18.30%) being in *Phyllanthus niruri* and *Clerodendrum volubile* (13.95%) the least. The carbohydrate value ranged between 45.75% (*U. picta*) and 52.60 % (*C. volubile*). Crude fibre was highest (17.80%) in *Xylopiya aethiopica* and *Clerodendrum volubile* contained 13.50%. All plants contained alkaloids, carotenoids, flavonoids, saponins and steroids. The plants have significant nutritional properties in addition to phytochemical constituents. The nutrients could support the increased energy and nutritional requirements in pregnancy, prevent malnutrition and supplement the phytochemicals in therapeutic activities. Toxicological studies of the plants would confirm their safety in administration.

\* **Jorge Garcia Polo** - *Mayan Traditional Ecological Knowledge & Wetland Restoration in Lake Atitlan, Guatemala (T 4:30)*

Lake Atitlan, Guatemala, a formerly pristine volcanic lake with a long history of Mayan traditional use, is now heavily impacted by land management that results in cultural and environmental degradation. Littoral wetlands are important areas for fish spawning, waterfowl nesting, and for erosion control and nutrient cycling. Wetland losses have diminished livelihoods of local peoples of the Lake Atitlan region. Mayan traditional ecological knowledge (TEK) influences fishing, crabs and snail collection, and harvesting wetland plants *Typha domingensis* (cattail) and *Schenoplectus californicus* (sedge). These plants, together called tul, are traditionally used to weave crafts, such as sleeping mats. Interviews and focus groups with harvesters, fishers and artisans were conducted in three Tzutujil-speaking communities: Santiago Atitlan, San Juan La Laguna and San Pablo La Laguna. Interview results were categorized into uses, environmental impacts, and restoration of tul. Findings will inform a more holistic vision for Lake Atitlan restoration. A framework that links TEK with science, management, and policy is vital for Mesoamerica and elsewhere where indigenous and local groups have a history of environmental management.

^ **Orou Gaoue** - *A New Call for a Paradigm Shift and Theory Driven Ethnobotany (W 11:00)*

Recent progress in ethnobotany has been in response to a repeated call for hypothesis-driven research to improve the rigor of the discipline. Despite improvements, there has been an emphasis on the use of ethnobotanical indices and statistical methods borrowed from ecology. To advance the field of ethnobotany as a hypothesis-driven, theoretically-inspired discipline, it is critical for emerging ethnobotanists to be exposed to ethnobotanical theories in a systematic way. I developed an advanced undergraduate course on theory and methods in ethnobotany that attracted the interest of students. This course taught students how to critically read published papers, identify major scholarly trends and theories, and use it as a starting point for their hypotheses. Such effort led to students-authored publications in peer reviewed journals, suggesting that a large-scale implementation of this instructional approach can yield tangible results. For this effort to expand beyond this case study, I postulate that providing a clear synthesis of existing theoretical lines of research in ethnobotany is a first step. To achieve this, with graduate students, we reviewed seventeen major theories in ethnobotany. Here, I report on these main theories, major hypotheses, their primary predictions and the degree to which these predictions have been tested. Developing research projects to test these predictions will make significant contributions to the field of ethnobotany and create the critical mass of primary literature necessary to develop meta-analyses and to advance new theories in ethnobotany.

**Fidji Gendron & Vincent Ziffle** - *Working with Indigenous Elders in Biology and Chemistry University Courses (W 3:30)*

This presentation will describe the participation of Elders in Biology and Chemistry courses and examine students' perception of the role of Elders in these courses. In Canada, the percentage of Aboriginal people with high school or postsecondary education is lower than the rest of the population. Aboriginal students often feel a disconnection between Indigenous science and Western science and the inclusion of Elders in the classroom can bridge these two ways of learning. Hands-on laboratory activities (hide tanning, hand lotion with native plants, and porcupine quills) were developed under the guidance of an Elder. Students (n=258) were asked to complete a survey after they performed these traditional activities in the Biology laboratory and participated in discussions about medicinal plants in their Chemistry classroom with Elders. Students agreed or strongly agreed that Elders helped them understand the natural world better, are effective communicators, expand their scientific knowledge, create a more inviting classroom, are culturally relevant scientific role models, make them appreciate their course more because of the activity, and add meaning to what they are learning in their Biology or Chemistry course. Thematic analysis revealed that students appreciated the presence of Elders, the traditional ways of performing the activities and the hands-on approach. They suggested to increase the time spent with Elders and to have more hands-on activities. The activities presented in this article should be seen as a starting point for educators who are interested in working with Elders to weave local knowledge and stories in university science courses.

^ **Andrew Gillreath-Brown & Jade d'Alpoim Guedes** - *Barley (Hordeum vulgare) Grain Size in the Indus Valley, Pakistan: Development of Local Varieties (W 10:30)*

Barley (*Hordeum vulgare*) spread across Asia as part of the Neolithic package. Researchers have focused on individual items, such as barley, in the package to understand how variability in size relates to local environment, climate, and labor-intensification. The size and shape of a seed may be an indicator of local scale speciation. Since speciation is gradual, changes among barley may be present in the archaeological record. We evaluate the size of barley in Pakistan around 3300-1700 BC and compare to seed size

data from the Near East. Morphometric data is used to capture the effects that the cultural and physical environments had on the shape and size of barley on a local scale.

**Denise M. Glover** - *Caw Connections: Observing & Writing About Crows in College (W 3:00)*

As part of a freshman seminar course on people, plants, and animals, I designed a segment centered around learning about a common resident on many college campuses across the country: the American crow (*Corvus brachyrhynchos*). Students read selections from Marzluff and Angells in *The Company of Crows* (2005) and then perform their own observations of crows on campus, recording these observations. After group discussions about these two sources of data, students are assigned to write an article for the campus newspaper drawing people's attention to crows as other than pests. They must incorporate their own observations as well as those from scholars (Marzluff and Angell), and are given the instruction to writing compellingly. The project excites important functions in the development of college students, including skills of observation and recording, awareness of local surroundings and non-human beings living in those surroundings, careful reading, and writing that connects various types of data with their own intellectual and emotional experiences. It is one of the most highly valued projects in the class.

**Bob Gosford & Mark Bonta** - *Fire-spreading Behavior of Raptors in Northern Australia (T 3:30)*

We report on our research into intentional firespreading behaviour by the fire-foraging raptors Black Kite (*Milvus migrans*), Whistling Kite (*Haliastur sphenurus*), and Brown Falcon (*Falco berigora*) in tropical Australian savannas. This behavior, often represented in sacred Aboriginal ceremonies, is known to local people across the Northern Territory, and the states of Queensland and Western Australia where we carried out ethno-ornithological research from 2011 to as recently as May 2018. Using ethno-ornithological workshops and controlled field experiments with land and fire managers, our collaborative research aims to situate fire-spreading as an important factor in fire management and fire ecology. We will also discuss future research priorities and opportunities, including the quest for similar behaviour in raptors or other species in similar savanna or woodland biomes and for a re-evaluation of the role that such behaviour may have had in the evolution of tropical woodlands.

**Demetrio Luis Guadagnin & Paulo Barradas** - *Survivorship & Regeneration of *Forsteronia glabrescens* in Experimental Harvesting in South Brazil (W 4:30)*

In South Brazil, exploitation of liana stems for craftwork represents an important part of the income of Kaingang indigenous artisans. Lianas are harvested from small peri-urban forest patches, a condition that might limit the activity's sustainability. We experimentally evaluated the effects of stem harvest on the survival, growth and sprouting of *Forsteronia glabrescens*, the most exploited species. We monitored plant conditions after six and twelve months of resting, simulating Kaingang strategies. We estimated parameters through multimodel inference. Survival and extractive yield were lower in the groups that undergone stem removal in comparison to control groups, despite radial stem growth being greater. Plants with greater stem diameter presented higher survival chances. Periods of six and 12 months were not sufficient for stem regeneration to equal the extractive yield of non-harvested and previously harvested areas, even when considering the recruitment of new individuals in the latter. Resting periods of more than 12 months are necessary to compensate the effects of harvest on the survival and population structure of lianas. By integrating Kaingang traditional management knowledge and scientific knowledge, it is possible to propose liana management strategies that fit the current scenario of peri-urban forest patches available for exploitation.

**Jade d'Alpoim Guedes, Sydney Hanson, & Thanik Lertcharnrit** - *The Wet and the Dry, The Wild and the Cultivated: Subsistence and Risk Management in Ancient Central Thailand (W 11:15)*

Increasing the productivity and yield of rice in Central Thailand has been a key focus of international and local government policy. Efforts have centered around producing a second winter season of irrigated rice. However, a series of droughts in the region have led to widespread crop failure. We carry out a re-evaluation of weather station and environmental data and combine this with new information from a key archaeological site in Central Thailand, Phromthin Tai, whose occupation covers a long and critical period of Thai prehistory. Based on these data, we argue that farmers in the area employed an adaptive and resilient agricultural and wild plant food based subsistence system that was adapted to the region's high variability in rainfall. This subsistence system bridged the divide between the wild and cultivated and between wet and dry farming. The temporal and spatial diversity inherent in this system makes it vulnerable to destruction by agricultural policies that focus singly on improving yields.

**Filippo Guzzon, Graziano Rossi, & Nicola Ardenghi** - *Rediscover Traditional Food Crops in an Intensive Cropping System; Ethnobotany in Northern Italy (W 10:45)*

In northern Italy, the Green Revolution led to a genetic erosion of higher than 90% and an almost complete shift from mixed subsistence farming units to intensive cereals monocultures. Through ethnobotanical surveys we discovered, collected and conserved endemic plant genetic resources (PGR) that survived genetic erosion, being linked to traditional food products once fundamental for food security. We recorded the cultivation by six elderly farmers of *Bunias erucago* L., a leafy vegetable actively cultivated only in the study area. We discovered 24 landraces of beaked maize (*Zea mays* L. subsp. *mays* 'Rostrata Group'), a cultivar group locally originated and extremely appreciated until the 1930s for the production of polenta that was the staple food of the area. The cultivation range of beaked maize landraces shrank, due to substitution with hybrid cultivars and related introgression. Nevertheless, they are still cultivated in fragmented 'refugia', isolated from hybrids. Similarly, winter squash (*Cucurbita maxima* Duchesne subsp. *maxima*) landraces with a peculiar fruit morphology, locally known as "priest hat squashes", cultivated in northern Italy since at least the XIX century, were maintained in gardens being used for typical receipts. We can safely state that: 1) Several neglected crops and landraces can still be found in northern Italy; 2) the role of custodian farmers was pivotal in their survival; 3) ethnobotanical surveys are powerful tools to detect overlooked genetic resources; 4) some of these PGR are still threatened while others are experiencing spontaneous revival processes due to the rediscover of traditional foods.

**Charlotte Gyllenhaal & Keith Block** - *Roles of Plants in the Treatment of Colorectal Cancer: A Brief Review (W 2:45)*

Colorectal cancer mortality is growing globally, with over 850,000 deaths expected in 2020, and over 1 million annual deaths expected by 2030. Plants impact colorectal cancer as foods, herbal or nutritional supplements and sources of drugs. Proper use of plants and plant products in treatment of this widespread disease could add to the quality and length of life of colorectal cancer patients. Integrative cancer treatment strategically uses plants and plant products in the management of colorectal cancer.

Integrative approaches to cancer can be divided into three spheres: lifestyle, internal biochemistry (terrain) and conventional treatment. The main function of plants in the lifestyle sphere is as food. We will review plant foods, plant products and dietary patterns that have support in the epidemiological literature for prolonging or shortening overall and cancer-specific survival in colorectal cancer health, including whole grains, vegetables, nuts, coffee and sugar, with discussion of their mechanisms of action. Aspects of terrain in cancer patients that are frequently abnormal include inflammation, glycemia, oxidative stress and immunity. We will review herbal/phytochemical supplements and plant derived drugs that support these terrain factors such as resveratrol, green tea and metformin. Finally, we will review plant-derived drugs as chemotherapy for colorectal cancer (irinotecan) and plant products that can support patients during conventional treatment including herbal therapy for side effects and prebiotic plants to support the intestinal microbiome.

**Jeong A. Han, Eun Seob Yi, Yeon Ju Kim, Young Nam An - *Changes of Berry Characteristics and Ginsenoside Content on Harvesting time of Ginseng Berry in Korean Ginseng (P)***

This study was carried out to investigate what time is the best to collect the berry for the use of it as food, medicinal or cosmetic materials, which had been removed at the flowering stage to get bigger ginseng roots. The test variety of this test is Chunpung. The ginseng was collected in a 4 year old ginseng field. Ginseng berry was collected at 7th, 14th, 21st, 28th, 35th, 42nd, 49th and 56th days after flowering and flowering. The number of berry bunches per 43.4~61.4 /1.62m<sup>2</sup> was 43.4 ~ 61.4 while the weight of berry per 43.4~61.4 /1.62m<sup>2</sup> was the heaviest on 49th day after the flowering. The weight of individual ginseng continued to increase while that continued to increase after the time of flowering. There was no significant difference in the collected volume per 1000 m<sup>2</sup> after 35th day of flowering. The total ginsenoside contents were the highest on 7th day of flowering, while the ginsenoside-Re contents were the highest on 14th day after flowering for 4-year ginseng. The best time for picking up the ginseng fruits is 14th - 21st day after flowering, considering the ginsenoside-Re contents and the volume of fruits acquired.

**Robbie Hart & Jan Salick - *Dynamic Ecological Knowledge Systems Amid Changing Place and Climate: Mt. Yulong Rhododendrons (T 9:15)***

How dynamic is place-based traditional ecological knowledge (TEK)? In what ways can its generative and conservative processes allow adaptation to a changed environment? How do different cultures mediate TEK of a shared place? We address these questions with an in depth study of TEK of the diverse and socioecologically salient genus *Rhododendron* among the indigenous Naxi and immigrant Nuosu Yi of Mt. Yulong, NW Yunnan, China. TEK in both cultures is rich and intimately connected to the seasonal and elevational progression of rhododendrons. Naxi and Yi knowledge of trends and drivers of change parallel those in ecological studies. Knowledge richness was connected with place (urban vs. rural dwelling and elevation of village) and the immigrant Yi had a knowledge base as rich as that of the indigenous Naxi. Both Yi and Naxi interviewees credited this knowledge equality to a combination of generative processes (Yi villages were higher in elevation and Yi livelihoods made more use of mountain resources, which enabled them to acquire knowledge of plants quickly) and conservative processes (Yi migrated from an equally diverse mountain region in which *Rhododendron* is also salient; its position was retained in their system of TEK, though its elements were adapted). Among rural Naxi, cultural systems (seasonal festivals and ethnotaxonomy) conserved knowledge, even while their direct use of rhododendrons decreased with changing life-ways.

**^ Mana Hayashi Tang, Xinyu Liu, Gatile Fritz, & Zhi Jun Zhao - *Roots and Tubers: Experimental Archaeobotany and Preliminary Case Studies in Late Pleistocene to Early Holocene China (W 11:15)***

In recent decades, studies on the domestication and early cultivation of seed crops have contributed significantly to how we understand human-plant interactions. It is becoming clear, however, that plants have been critical to the human diet for much longer and in more diverse ways than previously assumed. This paper is a preliminary attempt at identifying and addressing early prehistoric plant food strategies in China. In particular, very little is known about the use of vegetatively propagated plants, despite their significant representation in modern crops. Many ingredients of Chinese medicine are also roots and tubers, or vegetative storage organs (VSOs). Unlike seed crops, however, we lack a systematic criterion for diagnosing VSO taxa in the archaeological record. To address this issue, we characterized commonly consumed and historically significant VSOs in China, by studying experimentally charred modern samples under the environmental scanning electron microscope (SEM). We compared the characteristics of these modern VSO samples against plant remains from Late Pleistocene to early Holocene archaeological sites in China. We found that VSO taxa can be differentiated by using multiple lines of evidence, including the texture and arrangement of parenchymous cells, as well as the shape and arrangements of various organs. Though identification is difficult when fragile cell structures have collapsed or deteriorated, more robust features are often preserved for diagnosis. Our results suggest that the potential for studying the role of vegetatively propagated plants in early human-environmental interactions is overlooked, and can be expanded significantly with further investment in their systematic identification.

**Brooke Mariah Hayes - *Reign of Terroir: Fermenting Rebellion in Florida's Winemaking Industry (P)***

Encompassed within each glass of wine is the identity, culture, and environment of each individual region producing it, a concept that French winemakers call terroir. Today, the wine industry is one of the most dynamic and developing agricultural sectors, but at the same time it is completely segmented between a fast-paced business industry and the cultural, artisanal representation of wine. The latter includes not only the environment, but also the people who live their lives to produce wines. The wine industry has changed as the world has become more globalized, integrated, and industrialized, creating a challenging battle between the aspect of true natural wine and factory-based wines that are anything but natural. Florida, although over-shadowed by well-established wineries in other states like California, represents the epicenter of viticulture and is surprisingly in the midst of battle in the world of wine. With the enactment of the Certified Florida Farm Winery certification, wine in Florida has become more indicative of a natural and cultural heritage. Within our planet, which is succumbing to the idea of profits instead of cultural heritage, Florida has begun to focus on wine in its cultural context and as a natural beverage, unlike many regions. The world of wine is important to observe and research to understand our compliance to big business and human entity cultural wine represents. My research reviews the history of winemaking in Florida, and the important role Florida plays in promoting the indigenous grape, *Vitis labrusca*, and various other native fruits.

**+ Brooke Mariah Hayes - *That's Amari: Italian Heritage Bitter Botanical Liqueurs (P)***

In many parts of the world, no meal is complete without imbibing a small glass of richly colored herbal liqueur to help with digestion. In Italy, you might be served a glass of amaro (meaning "bitter;" plural: amari). Amari evoke a cultural and medicinal heritage of liqueurs that use bittering agents and a dizzying array of botanicals in their formulation. Not all amari taste bitter and not all bitters are amari. Amari surpass all expectations of a simple definition in their complex entanglement of cultural perceptions and botanical ingredients: they are simultaneously traditional and contemporary, food and medicine. Amari consumption and production hold great cultural significance in Italy, but have recently become popular in other parts of the world. Both secretive and infamous, amari are the product of a complex relationship between popular consumption and the generational secrecy surrounding their ingredients and production. My project will explore this relationship through investigating the role of *Gentiana lutea* L., a surprisingly common well-known botanical ingredient of most amari, as well as a few lesser-known botanical ingredients in this drink du jour of the cosmopolitan set.

**Zachary Joseph Hudson, Andrew Zandt, April Katz, & William Graves - *Printmaking with Dirca Bark Paper (W 10:45)***

Washi is paper made by hand in Japan from the bark of shrubs native there. The paper is strong, semi-transparent, and resistant to insects and aging. Washi is a common printmaking medium used for clothing, banknotes, and explosives. Artists who have studied nagashi-zuki, a sheet-forming method unique to washi, often import Japanese fibers because alternatives with similar properties have not been identified. We propose *Dirca* L., a shrub endemic to North America, as a source of fibers with properties similar to those of washi. Preliminary folding-endurance testing indicates that *Dirca* bark paper we made by hand withstands repeated bending, folding, and creasing better than paper made from Japanese fibers, suggesting an alternative as good as or better for use with paper art and crafts that involve folding. We will engage emerging and professional printmakers in creating original prints on handmade *Dirca* bark paper, and evaluate how the bark paper holds an image, and reacts to ink, pressure and chemicals used in printmaking techniques like intaglio, lithography, relief, chine collé, digital, and screen printing. All prints submitted for the project will be displayed in an online exhibition along with reflections by artists regarding their experience using the paper, their design concept, and their chosen printmaking technique. Twenty-four prints will be selected by a jury to be framed and shown at a public exhibition at Iowa State University and the Greater Des Moines Botanical Garden, Des Moines, IA.

**Isabel Margaret Hulley, Ben-Erik Van Wyk, & Anne-Lise Schutte-Vlok - *An Inventory and Analysis of Medicinal Plant Use in the Little Karoo, South Africa (T 9:45)***

The Little Karoo is an arid, species-rich region with an estimated 3764 plants (species and infraspecific taxa) of which 664 have medicine, culinary and other domestic uses. A detailed quantitative ethnobotanical study, using a rigorous survey methodology, revealed a wealth of traditional medicinal plants and their uses, some of which have hitherto remained unrecorded. The results showed a total of 202 medicinal plant species, 6384 medicinal anecdotes and 1141 vernacular names, of which 59 species, 4053 use-records and 268 local names have been recorded for the first time. A summary of 129 ailments, together with the most popular remedy or remedies for each, is provided. We used a new index, the Homogeneity Index (HI), for quantitative comparisons between four villages in the western Little Karoo and six villages in the eastern Little Karoo. The HI values for shared species, shared vernacular names and shared uses were consistently below 0.5, showing that traditional knowledge is not evenly distributed. Because both emic and etic perspectives were considered, the quantitative medicinal ethnobotanical data are of high quality and will not only preserve indigenous plant use knowledge for future generations (in line with the spirit of the Shenzhen Declaration of 2017), but will also allow for future comparative studies. It adds some additional perspectives to an unfolding synthesis of the Khoi-San and Cape Dutch medicinal traditions.

**Sydney A. Hunter, Kali R. Wade, & John Marston - *A Microbotanical Study of Landscape Use by Enslaved Communities at James Madison's Montpelier (P)***

In 2017, a fenceline dating to the late eighteenth or early nineteenth century was excavated at the historic site of James Madison's Montpelier, in Orange County Virginia. Despite Montpelier's status as an historical landmark associated with the Madison Family, over three hundred enslaved peoples lived and died there. This study applies a botanical approach to investigate this fenceline that separated the South Yard, home and workspace of the enslaved community working in the mansion, from the Stable Quarters, home of the enslaved community working in the stable area. The South Yard, on the northern side of the fenceline, was under constant supervision of the mansion, while the Stable Quarter, on the southern side of the fence, was not visible from the mansion, granting its residents more autonomy in growing and cultivating plants. The fenceline served as both a physical and social barrier between two communities. Here we present microbotanical (phytolith) remains from both sides of the fence. Samples were taken from five locations along the fenceline, with paired samples from each side. The goals of this analysis are to identify differential plant access between the two communities, build on prior archaeobotanical (pollen, seed, and wood) studies of the same area at Montpelier, and expand our knowledge of enslaved communities' use of space and daily lives. Preliminary results indicate that there is little differentiation between the botanical assemblages from the north and south sides of the fenceline, suggesting that resources were equally distributed between the two communities.

**Jason TW Irving - *A Summary of the Understanding and Selection of Plants with a Bitter Action in Western Herbal Medicine and a Review of Recent Research into Bitter Taste Receptors (W 4:30)***

This study reviews: the understanding in 'Western Herbal Medicine' (WHM) of the effect plants with a bitter action have on the digestive system; the selection of species; and evaluates this understanding considering recent research into the chemistry of bitter tastants and the physiology of bitter taste receptors (TAS2Rs). 16 herbal texts most relevant to 'WHM' university education in the UK were reviewed, showing strong consensus between the texts that plants with a bitter action stimulate appetite and promote digestive processes in ways beneficial to health. Analysis of plants selected for a bitter action indicated these are more likely to have a relatively stronger bitter taste. Of a total 327 species recorded with a bitter taste, 129 were recorded as having a bitter action. The chemistry of the bitter principle of the 21 species with most use reports is reviewed. *Asteraceae* had the most species recorded as having a bitter action, and 9 of the 21 most used species were members of the *asteraceae*. Other families of interest were *lamiaceae*, *apiaceae*, *gentianaceae* and *rutaceae*. A literature review revealed wide ranging research into bitter taste receptors. It found only one study to support the traditional claim that the bitter action works via a cephalic response, through a novel

mechanism of cardiovascular effect. There was strong evidence for a local action modulating digestion in complex ways and stimulating secretions, which is summarized here. The study highlights areas where materia medica and physiology may be usefully investigated further to better understand the effect of bitter tastants in digestion and possible therapeutic benefits.

**Jason TW Irving & Bob Allkin** - *A Global Survey of Medicinal Plants, Their Names, and Presence in Medicines and Conservation Regulation (P)*

Medicinal Plant Names Services (MPNS) is a project based at the Royal Botanic Gardens, Kew that works to improve communication about plants in health, regulation and research. MPNS has collated more than 530,000 data records containing the scientific, pharmaceutical and common names used to refer to medicinal plants found in 143 sources, including pharmacopoeias, medicinal plant dictionaries, databases, publications and health regulations from around the world. A review of all the data in the MPNS resource found that 28,187 plant species recorded as being used as medicine. This is the most comprehensive review of medicinal plants used globally carried out to date. Twelve of the 20 largest plant families have a significantly higher proportion of medicinal plants than would be anticipated if distribution across families were even. Data is presented from the top seven families. 143 databases and publications cite 415,180 unique names for plant-based medicines - an average of 15 alternative names for each species. This highlights the potential for ambiguity and miscommunication when scientific plant names are used in research and regulation. Of the total 28,187, fewer than 16% (4,478) of the species used in plant-based medicines are cited in a medicines regulatory publication. This reflects the globalization of a narrow range of species used in the most common herbal drugs. Increasing demand for herbal medicines (particularly for species covered by pharmacopoeias) threatens wild populations of many of these plants. Of the 28,187 species recorded in MPNS, c.1,280 are under protection according to CITES.

<https://stateoftheworldsplants.com/2017/useful-plants.html>

**Nathaniel James, Alexia Decaix, Steven Weber, & Jade d'Alpoim Guedes** - *Labor Organization and Taphonomy at Harappa (M 1:30)*

Harappa is a critical site in understanding the plant-human relationships that defined the increasing urbanization and eventual regionalization of the Indus Valley from 3300-1700 cal. BC. The primary paleoethnobotanical methods for investing social organization have been the application of ethnographically based crop processing models. Relying on specific ratios of grain, weeds and chaff these models are vulnerable to social and taphonomic processes such as dung burning that can obscure past activity. This paper presents an evaluation of these methods, and seeks to disentangle both crop processing and dung burning within the macrobotanical assemblages excavated at Harappa from 1990-2000. Further, it attempts to disentangle how the archaeobotanical record reflects changing social organization at the site.

**+ Nathaniel James, Alexia Decaix, Steven Weber, & Jade d'Alpoim Guedes** - *Agricultural Practices Between the 3rd & 2nd Millennium BC in the Indus Valley: Archaeobotanical Results from Harappa (P)*

The urban settlement of Harappa is one of the emblematic sites of the Indus valley. Here we present results of the analysis of more than one thousand samples from the site, covering all the stratigraphic levels. A large number of different crops were cultivated by the inhabitants of the site such as barley, wheats, pulses (lentils, peas) but also fruits, such as date palm or grape, cotton and millets. Wild plants primarily from the Cyperaceae and Fabaceae families which have a complicated taphonomic pathway of arriving at the site were also present. The study of several hundreds of sample gives us the opportunity to discuss the evolution of husbandry practices and to propose a reconstitution of the environment surrounding the site.

**Gul Jan** - *Ethnobotanical Analysis of Medicinal Flora of Kohimoor BAB-A Bajaur Agency, Pakistan (W 3:30)*

The aim of this survey was to collect the informations on medicinal plants from local communities. By using semi-structured interviews, the information was collected, analyzed and compared with quantitative ethno-botanical indices such as Informant Consensus Factor (ICF), Relative Frequency of Citation (RFC), Use Value (UV) and Fidelity Level (FL). The ethno-medicinal information was collected from 157 informants of different age groups. The percentage of taxa used against digestive disorders was (28.57%), respiratory problems (15.58%), Nail, Skin and Hairs diseases (11.68%) and (7.14%) for Ear, Nose and Eye diseases. Herbs was the most dominantly used life form of plants (58%) followed by shrubs (33%) and trees (28%), while most commonly used parts were leaves (32 %) followed by roots (19%). The highest value of ICF (0.8) was recorded for heart problems followed by sexual disorders (0.7). Four medicinal plants (*Berberis lycium*, *Salvia moorcroftiana*, *Skimmia laureola*, *Oryza sativa* and *Juglan regia*) having 100% FL values. The Use Value (UV) and Relative Frequency of Citation (RFC) ranged from 0.01 to 0.13 and 0.04 to 0.50 respectively. The study area is a rich medicinal plants diversity and need more work for research and exploration. This investigation indicated that the area was under heavy biotic interference, deforestation and overgrazing. Valuable economic and medicinal plants were minimized due to worse effects of Talibanization during last 2-3 decades. It could be recommended that proper management is required for sustainable utilization of local flora.

**Karen Johnson, Linda Black Elk, Elizabeth Green, & Sunshine Brosi** - *Seasonal Rounds of the Lakota at Wind Cave National Park (P)*

The Sicangu-Oyate, the Rosebud Tribe, of the ThítÈÿuÁwaÁκ, Lakota people have an extensive ethnobotanical tradition of harvesting North American prairie plants. Traditional seasonal rounds illustrate annual cultural use patterns, presence, and seasonality of noncultivated plants (Hunn, 1991; Bohnee et al. 2011). Additionally, seasonal rounds will serve as an additive tool in facilitating more effective communication between members of the Rosebud tribe, which is a necessary for efficacious cultural regeneration (Alfred, 2005). It can be difficult to efficiently reference species of culturally important plants without a common language (Ruelle & Kassam, 2011), which is why it is critical that a visual representation of existing knowledge be created to draw upon for future research. Seasonal rounds have also been used as an educational tool (Diamond et al., 2010; Bell, 2015) and as a basis for ethnography research (Jochim, 1991). Overall, seasonal rounds accessibly display the interconnectedness between tribes; specifically, the Lakota people with their environment temporally, and is a fundamental step towards understanding their relationship with their environment ethnographically.

**Rachel Jones** - *Colorful Quinoa: Shifting Autonomy in Diversity of a Miracle Cereal Put to Market (P)*

This paper examines the relationship between identity in the agricultural Altiplano of South America and the global quinoa market. Revealed as the mother grain, the crop can be observed in the archaeological record as far back as 2000 B.C.E. with emphasized ritualistic importance. The traditional knowledge regarding the dietary importance and spiritual power of this pseudo-cereal has long been challenged, ridiculed, and disregarded by western peoples. Through centuries of colonization, quinoa consumption has been relegated to the periphery of society, through the twentieth century. Only recently has the public eye turned to quinoa in recognition of its highly nutritive properties. It is touted as a superfood or miracle crop and is assigned a curative role in issues of regional malnutrition which are rooted in systemic inequalities. Commodification of the grain product results in further marginalization of the Altiplano peoples by racializing and exotifying both plant and grower and threatening the regions sovereignty through food security and agricultural autonomy. GMO scientists particularly threaten natural food banks and traditional agriculture techniques by injecting altered crops and western ideals into indigenous spaces. Capitalizing on the intellectual and physical property of agricultural peoples through neocolonial power structures serves only the interests of corporate economies, providing meager returns to the rightful owners. The language used in public discourse surrounding these practices can be challenged and analyzed through anthropological frameworks in order to critique and provide context for claims heard from all interested parties.

**Esther Katz** - *Food, Biodiversity and Traditional Knowledge in the Middle Rio Negro (Brazilian Amazon). The Fragile Balance of Food Sovereignty (T 9:15)*

The Northwest of the Brazilian Amazon, along the Negro River, is a well preserved forested region with a low density of population and a high biodiversity in plants and animals. The different ethnic groups of the Tukano and Arawak linguistic families who live there have been subsisting on agriculture and fishing, as well as hunting and gathering. They have also been involved in extractivism. Over the last 2 or 3 decades, urbanization has tremendously increased in all the Brazilian Amazon. Many people have moved from forest communities to small and big cities. In the middle Rio Negro, the population of the small town of Santa Isabel has tripled in 20 years. Most inhabitants still practice at least agriculture and fishing around the town, but they also rely on salaries and social allowances from the government. This is also the case in surrounding communities. Although their agriculture system is highly complex and the agrobiodiversity quite impressive, they have been consuming more and more industrial food products. The richness of the traditional food system will be described here. The threats to food sovereignty will be analyzed, as well as the actions led to preserve it.

**Ayako Kawai** - *Contrasting Mother Plant Selection Practice and Criteria Between Traditional, Organic and Lifestyle Farmers in Japan (W 11:15)*

In Japan, diverse local radish and turnip varieties have developed through farmers' selection of desirable individuals that are better adapted to local socio-ecological conditions. While traditional farmers' seeds and seed saving skills are no longer transmitted to younger generations in Japan, it is important to understand how new actors practice mother plant selection. In this presentation, I will compare a traditional, an organic, and a lifestyle farmer looking specifically at their intentional or unintentional selection of turnip and/or radish varieties across Japan. I conducted interviews and participant observation— a traditional farmer in her 80s, growing heirloom radishes; an organic farmer in his 30s, saving seeds of more than seven local radish and turnip varieties; and a lifestyle farmer in his 60s who practices natural farming and saves seeds of radish for a self-sufficient way of living. The traditional farmer used to select a local radish based on her preferences on color. However, she started to select a different color radish, as it meets a standard set by a local institution that purchases radishes. The organic farmer tries to maintain the original traits of local varieties. While information on the original traits is limited, he does not intentionally select for the first few years and collect all seeds. Later, he decides which features to maintain. The lifestyle farmer does not intentionally select, but leaves radishes that he did not get to eat and lets them produce seeds.

**+ Edward T. Kelley, Derek A. Reitzel, Jeffrey R. Boutain** - *A Snapshot of Trending Beer and Fermentation Education in Southeastern Michigan (P)*

Fermentation science and education in southeastern Michigan includes: homebrew club meetings, community college certifications, university minor and major degrees, and active learning at pilot and commercial facilities. Objectives: 1) Study and make: Session Ale and Lager, German Hefeweizen, Rye Ale, Porter, Pilsner, and Juicy IPA. 2) Determine the current needs of owners, management, and staff directly involved in ale and lager production at breweries in southeastern Michigan. 3) Relay outcomes into pedagogy at a fermentation lab. Methods: Wort was extracted from malted barley, wheat, and adjunct grains in a single electric vessel, a recirculating infusion mash system (RIMS). Pellet hop flowers were added according to share recipes found online. After controlled fermentation with subsequent bottle conditioning, the ale and lager beverages were tasted and rated by beginners to professional brewers on qualitative and quantitative measures. Results: Hands-on learning of the brewing process is priceless, directly resulting in quality products produced by the brewer. Unless experimentation or sanitary improvement is necessary to ensure quality, pontificating about taste and smell of beverages should be done on leisure time, best managed outside of lecture and lab. Conclusion: The maker of a beverage takes tremendous time, effort, and pride in providing the highest quality and palatable product to the consumers. Sharing the beverage made becomes a personal directive between the brewer to the consumer. As a result, fermentation education must heavily focus on hands-on practical skills, supplemented with real world applications in pilot and commercial breweries.

**Gugulethu Khumalo, Nicholas Sadgrove, Sandy Van Vuuren, & Ben-Erik Van Wyk** - *A Study of South African Medicinal Barks (W 9:45)*

Popular medicinal barks from 70 different plant species were purchased from the South African traditional medicine markets. Ethnobotanical information, including traditional uses, method of preparation, dosage and mode of administration were recorded from the 'muthi' market traders. Crude bark extracts (both methanol and dichloromethane) from 32 species were subjected to antimicrobial screening, with the choice of test microorganism based on the traditional uses. The following bacterial strains associated with the skin, gastrointestinal and respiratory tract were selected; *Pseudomonas aeruginosa* ATCC 743971, *Staphylococcus aureus* ATCC 25923; *Bacillus cereus* ATCC 11175; *Escherichia coli* ATCC 8739; *Enterococcus faecalis* 29121; *Salmonella typhimurium* 14028; *Shigella sonnei* 9290; *Klebsiella pneumoniae* ATCC 13883 and *Moraxella catarrhalis* ATCC 23246.



The lowest minimum inhibitory concentration (MIC) values of 0.004 mg/ml against *S. epidermidis*, 0.06 mg/ml against *B. cereus* and 0.20 mg/ml against *P. aeruginosa* were noted from *Erythrina lysistemon*, *Garcinia livingstonei* and *Pterocelastrus rostratus* bark extracts respectively. The outcome of antimicrobial screening of selected bark extracts influenced further evaluation for cytotoxicity studies, using the brine shrimp assay. A total of 17 pure bioactive compounds were isolated with column chromatography from *Erythrina lysistemon*, *Elaeodendron transvaalense* and *Warburgia salutaris* were identified by their NMR spectra and subjected to antimicrobial screening.

#### **Sun Ick Kim - Occurrence and Damage by Thrips tabaci Lindeman in Ginseng Crops (P)**

Ginseng is mostly grown in Republic of Korea and China, and has been traditionally used as a medicinal plant for treating diseases including hypertension, diabetes mellitus, liver and kidney and dysfunction. Ginseng is a perennial crop, which is damaged mainly by diseases and pests. In particular, damages are caused by new pests as the temperature rises and rainfall time and the amount of rainfall change due to recent meteorological changes, and especially, damage caused by thrips, which had not been reported in the past, was the worst. Thus, this study was conducted to investigate the occurrence and damage characteristics of thrips. The results of identifying thrips occurring in ginseng showed that *Thrips tabaci* Lindeman occurred, and thrips occurred in 19.5% of the field. Thrips caused damage to the fruits and leaves of ginseng, and the damaged fruit showed damage symptoms of rough surface and brown cork-like shape. Leaves were sulphated from the edge in the early stage of development, showed the surface of black soot as the damage increased and wilted like dead leaves as browning. In greenhouse plantations not using pesticides, the damage rate was 6.8%, 67.6% and more than 90% in mid-June, mid-July and mid-August, respectively. In conventional sun shading using pesticides to grow ginseng, the damage rate was 4.6%, 49.2% and 88.9% in mid-July, mid-August and mid-September, respectively. It was found that the quantity of packages containing thrips decreased by 34.5%, and thrips mediates *Botrytis cinerea*, the pathogen of ginseng, to increase gray mold.

#### **Kelly Kindscher, Michael Yellow Bird, Loren Yellow Bird, & Logan Sutton - Sahnish (Arikara) Ethnobotany (T 9:45)**

The Arikara, or Sahnish, are a northern Great Plains tribe currently living on the Ft. Berthold Indian Reservation in central North Dakota, whose traditional use of plants was extensive, but previously undocumented. From historical accounts we have uncovered 100 species from 30 plant families that have specifically been used for food, medicine, craft and other uses. Much of the information we obtained and analyzed was derived from the field notes and manuscripts of ethnobotanist Melvin Gilmore, who studied and recorded Arikara ethnobotany from 1916 to 1935, starting when for the North Dakota Historical Society and through his time as a faculty member at the University of Michigan. He interviewed elders, collected material goods, and wrote a short draft manuscript on Arikara ethnobotany, but was not able to finish his work due to a debilitating illness. His manuscripts, papers and field notes are archived at the Nebraska and North Dakota State Historical Societies, the University of Michigan archives and Anthropology Museum, and the Smithsonian Institution. In addition, Douglas Parks, a linguist at the University of Indiana, carried out extensive linguistic documentation of the tribe's language from 1970—2001. From those interviews and notes more plant information was incorporated into this work. Overall, this work provides a partial recreation of Arikara ethnobotany and highlights the depth of the tribe's traditional uses of plants for food, medicine, crafts, utilitarian purposes, and other uses. Most importantly, it honors the Arikara people who shared their intimate and profoundly insightful traditional ecological knowledge.

#### **Junko Kitagawa - Introduced Vegetables Overwhelm Traditional Mountain Herbs in Japan Today (T 11:30)**

It is said that over 300 kinds of vegetables are sold at stores, while Japanese traditionally consume mountain herbs. Young fern leaves, like *Matteuccia struthiopteris* and *Pteridium aquilinum* have been eaten from over 6000 years ago. Recently, hotels in mountain villages serve mountain herbs at dinner and many tourists are attracted to the dishes. One of hotels in Shiramine, Central Japan has served 13 kinds of mountain herbs on a day. While many Japanese have lost the knowledge about mountain herbs and sometimes people harvest wrong plants to be poisoned. To understand why we are losing our traditional knowledge and what kind of vegetables are common in Japan today, kinds of vegetables at store are preliminary studied. The origin of 218 kinds of vegetables including vegetable at stores and mountain herbs were analyzed. 96 among 218 kinds were the mountain herbs. Over half of vegetables are introduced from abroad. 67 kinds among the vegetables native to Japan can be considered as mountain herbs. Among them, only 15 kinds including *Matteuccia struthiopteris* and *Pteridium aquilinum* can be found at store, while continuously Japanese have introduced vegetables from ancient time and most of them became available at store. Most people do not have to go mountains for harvesting vegetables and we can easily buy more than enough kinds of vegetables. For that reason, eating mountain herbs has become special today.

#### **Richard K. Korir - Bacterial and Fungal Contaminants Isolated from Herbal Medicinal Products Sold in Nairobi Kenya (T 3:00)**

Herbal products are used worldwide for the treatment and prevention of various diseases and currently represent a substantial proportion of the global drug market. Herbal products have been reported to be contaminated with microorganisms indigenous to the soil and plants. This study aimed at evaluating bacterial and fungal contaminants in herbal products marketed to the general population in Nairobi, Kenya. We employed a laboratory based experimental design. We sampled 138 different herbal drug preparations which included liquids, powders, capsules and creams/lotions. Laboratory processing and analysis was done at the Kenya Medical Research Institute. We isolated and identified bacterial and fungal contaminants using standard techniques. Data was entered into statistical package for social scientist and analysed using Pearson chi square. Among the samples, 117(84.8%) were contaminated with bacteria while 61(44.2%) were contaminated with fungi. Fifty six (47.9%) bacterial contaminated samples had  $1.0 \times 10^3$ /cfu. One (2.7%) sample was highly contaminated (500cfu/g) with fungi which were beyond European pharmacopeia recommended limits. Products from street vendors, herbal clinics which were in powder and liquid forms had microbial loads (cfu/g) beyond the European pharmacopeia accepted limits. Most bacteria isolates were gram negative enteric bacteria while fungi were environmental molds. The study has shown that herbal medicinal products sold in Nairobi are contaminated with bacteria and fungi that are potential human pathogens. There is an urgent need to have specific educative programs, policies and regulations addressing herbal medicinal products safety which are specifically focused on prevention of microbial contamination.



**David Lewis Lentz, Trinity Hamilton, Nicholas Dunning, & Vernon Scarborough** - *Lowland Maya Agriculture, Arboriculture and Other Production Systems: Applications of Paleobotanical, Isotopic and Molecular Techniques (W 11:00)*  
In addition to extensive short fallow systems and intensive cultivation of dooryard gardens that probably produced a major portion of the food supply for the ancient Maya, other forms of primary food production were being utilized, as well. Agriculture was intensified using a combination of root crop agriculture, irrigated fields, arboriculture, and bajo margin cultivation. Significantly, the Maya seem to have developed intensive hydraulic agriculture in addition to rainfed cultivation. Stratigraphic profiles,  $\delta^{13}\text{C}$  data, and other forms of archaeological evidence clearly indicate that maize was being cultivated directly below reservoirs. The net product of these diverse production activities undoubtedly helped to underwrite an enormous amassing of economic and political capital throughout the Maya realm during the Late Classic period. Ultimately though in the mid 9th century CE, expansive growth combined with multiple system disturbances led to a collapse of the regions social structure followed by abandonment of most of the major sites in the elevated interior region of the Maya Lowlands. These disturbances, notably a downturn in annual rainfall which lasted for several decades, were largely the result of external forces, but likely were exacerbated by Maya land management activities. Thus, the demise of the Late Classic Maya at Tikal, Yaxnohcah and other major centers may serve as a distant harbinger for our current cultural trajectory.

**Maureece Jacqueline Levin, Aimee Miles, Katherine Seikel** - *Past Landscape Management and the Construction of Modern Pingelap (Pohnpei State, Federated States of Micronesia) (T 3:45)*

The first humans to settle the atolls of central-eastern Micronesia arrived by at least 1600-1700 years ago. The initial inhabitants and their descendants accomplished this in part by introducing western Pacific cultigens to the islands such as banana (*Musa* sp.), taro (*Cyrtosperma merkusii*, *Colocasia esculenta*), breadfruit (*Artocarpus altilis*), and yam (*Dioscorea* sp.). Local farmers on atolls have significantly transformed their landscapes since arrival, in ways that make the islets more inhabitable for humans and increase general biodiversity. In this paper, we examine Pingelap Atoll, Pohnpei State, Federated States of Micronesia as a lens into these processes. We present a preliminary archaeological sequence while examining environmental engineering, farming, and marine fishing in the past and the present. Additionally, through an analysis of ethnoarchaeological interviews, we include a discussion of the ways Pingelapese people continue to engage in environmental construction practices. Our results suggest that ecological engineering has always been a fundamental tool for survival as long as there have been people on Pingelap.

**Edelmira Linares, Robert Bye, Noemi Ortega, Eloy Arce, Amanda Gálvez, & Fabiola Ayala** - "*Quelites: Sabores y Saberres*": *The Contribution of Traditional Knowledge to Food Security & Sovereignty of Spontaneous Vegetables in Southeastern State of Mexico (M 1:00)*

"Quelite" is a category of edible plants based upon the tender leaves and shoots of plants, especially herbs growing spontaneously in agricultural fields. Although edible greens are readily available to local farmers, urban consumers have limited access to them through the markets. As the value chain between the producer and the consumer increases, traditional knowledge (e. g., names, utilized parts, product quality, forms of preparation, connection with cultural values, etc.) often diminishes. Based upon structured interviews, photographic and video recordings, participant observation, consent, and requests of quelite producers and vendors in Ozumba, State of Mexico (temperate region, ca. 70 km southeast of Mexico City), a recipe book was produced to document traditional knowledge of quelite production, preparation and consumption to preserve it for future generations as well as promote their consumption. The recipe book contains 55 dishes based upon 25 different quelites growing in cultivated "milpas". The recipes were contributed by 22 traditional cooks and are organized by classes of dishes. Standardized instructions, photos, nutritional composition and special precautions are provided for each preparation. A product of "Rescue of traditional undervalued species of the Mexican diet and its contribution to the improvement of nutrition in Mexico", a project supported by CONACYT 214286.

**Chunlin Long** - *Food Plants Traded on Local Markets in Southwest China (T 4:00)*

The food plants traded on local markets are very important for indigenous people in Southwest China, but few studies had been conducted. Seven local markets in ethnic communities were selected for market surveys. Ethnobotanical methods including key informant interview, semi-structured interview and voucher specimen collection had been adopted in field investigations. A total of 325 informants and vendors, including 214 females from seven markets, had been visited and interviewed since 2010. The informants are Dai, Hani, Yi, Zhuang, Dong, Miao, Buyi, Tujia, and Han Chinese from local communities. The approaches of phytochemistry and pharmacology had been used to investigate the chemical constituents and to test their biological activities. An inventory with 759 species of food plants had been documented. Wild plants took the majority at species level, with 522 species of wild leafy vegetables, wild fruits and other wild edible plants. Over 20 traditional ways to process local food products had been recorded for the first time. Further studies on fruits of *Garcinia* and leaves of *Piper* and *Gerbera piloselloides* revealed these wild edible plants are potential for food and health. Unfortunately, the number of periodic markets in southwest China is decreasing rapidly, replaced by shops, stores or supermarkets. It is urgent to document the food plants traded in local markets, and to save market-associated traditional knowledge and ethnobotanical culture. Further studies on chemical components or nutrients and their biological activities were recommended for sustainable uses of food plants traded in local markets.

**C.W. Lukhoba & R.W. Michieka** - *Traditional Medicinal Weed Plants Used for the Management of HIV/AIDS Associated Fungal Infections in the Lake Victoria Region (M 3:45)*

Medicinal weeds have been used for the treatment of a wide range of diseases including opportunistic fungal infections afflicting HIV/AIDS compromised individuals. In areas with high HIV prevalence such as the Lake Victoria region, traditional herbal medicines are preferred to manage these fungal infections probably due to the perception that plants have curative potency, are availability and affordability. However medicinal weeds are viewed negatively as intrusive plants on agricultural farms. Medicinal weeds and their associated traditional uses are thus in danger of being lost before we can document and utilize their curative potential. This study therefore aimed at documenting the weeds used in the treatment of fungal infections associated with HIV/AIDS condition in the Lake Victoria region. The traditional medicinal weed data was collected through interviewing of herbal traditional healers during field expeditions to Lake Victoria in 2007 and 2008. Plants identified by the herbalists were collected and pre-screened against two fungi- *Candida albicans* and *Aspergillus niger* using standard procedures. Five weedy plants, namely *Centella asiatica*, *Hibiscus fuscus*, *Phyllanthus saptatis*, *Plectranthus prostratus* and *Ximenia caffra* were shown to exhibit exceptional antifungal activity with inhibition

zones of over 3mm and were therefore selected for further tests. It is possible that common weed plants may have potential curative properties that require further investigation and possible commercialization or value addition.

**^ Binsheng Luo & Chunlin Long** - *The Rebirth of Traditional Bamboo Weaving in Sansui, Southwest China (T 10:45)*  
Sansui is a county in southeast of Guizhou Province in China which is famous for the local bamboo weaving products. The bamboo weaving in Sansui County has a 400-year history that is nationally renowned for its exquisite shape, wide varieties and practicability. By our ethnobotanical survey, we recorded a total of 17 species belonging to 7 genera and one family (Poaceae) of bamboo material for bamboo weaving. Different bamboo materials are used to weave different bamboo products. *Phyllostachys heteroclada* is the most frequently used species due to its excellent properties. Local people also use *Platycarya strobilacea* and *Rubia cordifolia* to color the bamboo splits for black and red respectively. Bamboo weaving in Sansui has experienced the stages from decline to rebirth thanks to the great support by local government and the newly developing mode both on line and off line. The mode of combining of families, company and government is a good way for poverty alleviation and making contribution to local community. Furthermore, developing local bamboo resources can not only provide the material insurance for bamboo weaving, but also help to produce other products, make money and promote the local ecological construction. By all the efforts of different local powers, we believe that traditional culture can develop better and contribute more to the local community in this fast-changing modern society.

**Khathutshelo Magwede & Ben-Erik Van Wyk** - *Ethnobotany of the Venda People (Vhavenda), A Sultural Group Found in the Limpopo Province of South Africa (W 10:45)*

Historically, aspects of Venda ethnobotany have been documented in several studies but no quantitative methods have yet been applied to determine the relative importance of the plant species that are used. In an attempt to address the gaps in our knowledge, detailed ethnobotanical surveys were conducted in four rural villages, using a combination of rapid rural appraisals and a rigorous quantitative methodology. The data collected were analysed to determine the patterns and trends in various use categories. A total of 575 plant species from 121 families were recorded, with the ten most diverse useful plant families being *Fabaceae* (64 spp.), *Asteraceae* (33 spp.), *Malvaceae* (32 spp.), *Apocynaceae* (24 spp.), *Euphorbiaceae* (22 spp.), *Poaceae* (21 spp.), *Rubiaceae* (20 spp.), *Solanaceae* (20 spp.), *Amaranthaceae* (19 spp.) and *Curcubitaceae* (18 spp.). The overwhelming majority of plants species were reported to be used as medicine for humans and animals healthcare (405 spp.), followed by vegetables (160 spp.), then firewood (159 spp.), edible fruits (131 spp.), magic (95 spp.), craftwork (92 spp.), building materials (92 spp.) and beverages (36 spp.). A large number of new uses and new vernacular names were recorded. All the data were incorporated in an inventory of Venda useful plants, not only to preserve the information for future generations but also to allow for future comparative studies and to assess and quantify the perceived or expected loss of indigenous knowledge associated with cultural changes.

**Leslie Main Johnson & Chelsey Geralda Armstrong** - *Milkst/Molks Pacific Crabapple, an Indigenous Orchard Tree (M 2:00)*  
Milkst/Molks, Pacific crabapple (*Malus fusca*) is a native deciduous tree distributed throughout the northwest coast of North America. It often appears in orchard like groves, and may be associated with old village sites on the Coast. There is growing evidence that it was managed and propagated by First Nations and in particular, was transplanted and cultivated near settlements and seasonal camps. Armstrong has recently characterized crabapple as a key indicator species of "forest gardens", anthropogenic forests consisting important medicinal and food plants. In our recent research we sought to explore the ecological and ethnoecological associations of Pacific crabapple within and outside of the Coastal Western Hemlock Zone (CWH) in northwest British Columbia. Our 2017 fieldwork examined a series of crabapple sites in the Skeena and Nass River drainages, to characterize habitats and evidence for anthropogenic distributions in more interior locales of northern British Columbia. We also collected herbarium specimens, took photographs of habitat and trees, and collected samples for genetic analysis (pending) to elucidate trends in historic distribution and in horticultural diversity of crabapple trees. Our interim conclusion is that the distribution of this species within Northwestern British Columbia appears strongly anthropogenic. It is a methodological and conceptual challenge, however, to recognize "natural" distribution in a humanized and long-occupied landscape. Preliminary impressions suggest that CWH localities may be more driven by zonal parameters while upriver localities seem to be explicitly linked to cultural sites and travel corridors.

**Joyce Manoti Ondicho, Charles Mutai, Christine Bii, & Richard Korir** - *Antimicrobial Activity of Some Plants Used in Kenya for Management of Infectious Diseases (M 3:00)*

The Kenyan plants have widely varied applications in Kenyan traditional medicine. The current treatment for opportunistic infections are limited and emerging antimicrobial resistance calls for urgent need for new therapeutic alternatives. The plant samples were collected in Kenya. Selected bacterial strains, fungal strains used and dermatophytes clinical isolates were used. In-vitro antimicrobial activity for both bacteria and fungi were performed using disc diffusion and micro dilution methods. Minimum inhibitory concentration were determined for the extracts with activity. Standards used were Chloramphenicol and fluconazole. Disc impregnated with extraction solvents used as controls. Most extracts tested were inhibitory to *S. aureus* ATCC 25923. Methanoic extracts of all the plants except *Maytenus heterophylla* were active on *Microsporium gypseum* with *Prunus Africana*, *Fangarupsis angliensis* and *Acacia mellifera* having the lowest active concentration of 0.063mg/ml. Cold water stem bark extract of *Acacia mellifera* had activity against the bacterial strains with the highest mean zone inhibition of 14.mm against *S. aureus* ATCC 25923 with MIC of 0.16mg/ml. The high activity demonstrated by the hot water stem bark extracts of both *Prunus Africana* and *Acacia mellifera* and the low MIC of 0.063mg/ml and 0.16mg/ml respectively. The plant extracts demonstrates minimal activity against *S. aureus* ATCC 25923 but no antifungal properties which shows that they have potential for the control of both drug sensitive and drug resistance strains of bacteria. The study demonstrates that plants used in traditional medicine have potential as sources of antimicrobial agents. Further investigation of the plants and isolation of bioactive compounds is recommended.

**Zia-ur-Rehman Mashwani, Rahmat Wali, Naveed Iqbal Raja, & Rainer W. Bussmann** - *Use-based Knowledge of Medicinal Plants: A Quantitative Ethnobotanical Inventory from Fairy Meadow National Park, Diamir, Gilgit Baltistan (W 4:15)*

This study was conducted to investigate the ethnobotanical knowledge of the population of the Fairy Meadow National Park, Diamir, Gilgit Baltistan. The study area was previously ignored due to physical barriers, remoteness and religious extremism. A total of 146 informants were interviewed using semi-structured questionnaires. The data was quantitatively analyzed employing frequency of citation (FC), use value (UV), relative frequency of citation (RFC) and Pearson correlation coefficient (PCC). A total of 90 plants

species belonging to 77 genera and 49 different families have been documented. These medicinal plants were used against 55 diseases, especially stomach problems (23.3%), cough (17.7%) etc. For 31 out of 90 plants species which had been reported either, new uses (28 plants) or new use-report (3 plants) were found. New reported medicinal plants include *Allium gilgitensis*, *Astragalus gilgitensis* and *Pedicularia flava*. Most of the documented plants were wild collected (86%), herbs (60%), and leaves were the most widely used part (27%). The common method of preparation was powder (27%) mainly administered orally (81.7%). The highest use values were found for *Berberis lyceum* (5.47). The Pearson correlation coefficient is 0.836 between RFC and UV showing high positive association. This study was an extension to the ethnobotanical work done in Pakistan. We documented a wealth of traditional knowledge and record the uses of various species for the first time from Pakistan. The new use reports and new plants reported supplement the foundation of pharmacology and new drug development for complex and challenging disease.

**Darcy Mathews, Dana Lepofsky, Julia Jackley, & Jennifer Carpenter - *Stone Fishtrap Archaeology: People, Stone, and Salmon at the Heiltsuk Village of Hauyat, Central Coast of British Columbia (M 3:15)***

This is the story of a stone intertidal fishtrap at the Heiltsuk ancestral village of Hauyat. An almost 200 m long, 7 m wide curvilinear stone wall was part of a sophisticated technology for the mass capture of salmon in a manner that safeguarded the survival of sufficient number of fish. Some of the smaller stone fish traps at Hauyat retain a powerful Heiltsuk community connection to the "smokehouse days" of the last two centuries, but the larger trap is less well understood. Archaeological excavation along lengths of the wall identified preserved wood dating between and 375-270 BP, suggesting the stone wall was the foundation for a higher wooden post and lattice fence-like trap. Excavation also revealed the wall is substantially larger than initially thought, a monumental feature made from approximately 2.2 million pounds of stone. Fish traps such as this convey and reify Heiltsuk oral traditions, connecting people to this place. While the once-visible wooden parts of the trap are gone, with the exception of the remnants buried within the stone and mud, the indelible stone wall still emerges with the ebb of summer tides. This trap, and the place it inhabits, are a tangible and visceral connection to past and present Heiltsuk community and family histories.

**Kathryn Matthews - *Restoration Strategies for Camassia quamash on the Weippe Prairie (P)***

Camas (*Camassia quamash* (Pursh) Greene) is a facultative wetland hydrophyte that is a culturally important species to the Nez Perce and other Native American tribes of the Columbia Plateau. An important, traditional, Nez Perce harvest site for camas is Weippe Prairie, located in north-central Idaho. Like many wetland prairies across the United States, much of Weippe Prairie was converted to agricultural use in the 19th century. A result of this conversion was a change in the hydroperiod associated with the naturally occurring ecosystem. While beneficial for agriculture, the change in hydrology had a negative effect on camas and the associated species of camas prairies. The historically productive ecosystems associated with camas prairies are currently distorted by non-native plants and reduced hydroperiods and are in great need of restoration. Rehabilitation of camas prairies will serve in both repairing the functionality of these ecosystems as well as restoring lands that are culturally significant to the Nez Perce tribe. By identifying the specific habitat criteria required by camas, and through evaluating different restoration techniques such as seeding and outplanting bulbs, this study will aid in the development of a restoration protocol for camas that can be applied to camas prairies across the plants North American habitat.

**Esther Ngendo Matu - *Antimicrobial Activities of Skincare Preparations from Kenyan Plectranthus barbatus Total Extracts: Towards Improvement of Healthcare and Livelihoods (W 3:00)***

Background: Medicinal plants extracts if formulated into proven, appealing products can be exploited to address local healthcare needs and as potential source of livelihoods. This study aimed at establishing the safety profiles of the bioactive extracts of *Plectranthus barbatus*, isolating and identifying the bioactive compound(s) and then formulating user-friendly products such as antimicrobial soaps and body washes. Methods: Organic and water extracts obtained from various dried parts and fresh leaves were evaluated for antimicrobial and cytotoxic effects. The bioactive and safe extracts were used to make herbal bar soaps and a liquid body wash which were then tested for antimicrobial activity. Bioassay-guided fractionation and isolation of bioactive compounds was also carried out. Results: All the organic extracts prepared from dried plant parts (root-bark, stem-bark, leaves) only exhibited activity against *Staphylococcus aureus*. However, both organic and aqueous fresh leaves extracts showed antimicrobial activity against *Staphylococcus aureus*, *Escherichia coli* and *Candida albicans* and minimal cytotoxicity (CC50 values < 20µg/ml). The herbal soap and the liquid body wash demonstrated potency against *Staphylococcus aureus*. A secondary metabolite, stigmasterol was isolated from the leaves. Conclusions: The potential of *Plectranthus barbatus* fresh leaves in the formulation of antimicrobial skin care products was demonstrated. A secondary metabolite which can be used as a marker for standardisation of herbal remedies made from *Plectranthus barbatus* extracts was also identified. It is recommended that this study be scaled up to include other popular Kenyan antimicrobial medicinal plants for production and commercialization of safe and quality assured antimicrobial skin-care products.

**Wilfred Otang Mbeng & Idowu Jonas Sagbo - *Indigenous Cosmetic Plants in the Eastern Cape Province of South Africa: A Case of Skin Care (M 4:15)***

Beauty is an important source of inspiration and it provides pleasure or deep satisfaction to the sensations. In South Africa, the concept of using plants for beautification finds its origin in the traditional medicine literature. Recently, the interest of consumers in herbal cosmetics has been stimulated by the beliefs that herbs contain natural ingredients that are less harmful to the skin and thereby superior to synthetic cosmetics. The present study aims at investigating the indigenous herbs used for cosmetic purposes in the Eastern Cape Province of South Africa. Sixty two indigenous knowledge holders were surveyed for traditional knowledge of plants used for cosmeceutical purposes in the study area. Cited plants were collected with the assistance of the knowledge holders and were identified using floristic works of South Africa and vouchers of the most cited plants were deposited at the Giffen herbarium. In this study, 105 plant species were cited as being used for various cosmetic purposes with a majority of them used for skin care (70 species) and dental care (6 species). These plants are distributed in 59 families with the *Asteraceae* being the most represented (9 species), followed by *Fabaceae* (7 species), *Asphodelaceae* (5 species), *Lamiaceae* (4 species), *Apocynaceae* (3 species), *Hyacinthaceae* (3 species) and other families with two or one species. Out of the 105 plants, only 70 species (66.7%) have been documented scientifically. This suggests the need for a systematic and thorough scientific validation of the claimed efficacy of the herbs as cosmetics.

**Alex McAlvay, Aaron Ragsdale, Kevin Bird, Xinshuai Qi, Pablo Velasco, J. Chris Pires, & Eve Emshwiller - *Out of Turnips: Reconstructing the Domestication History of Brassica rapa Crops in Eurasia* (M 3:00)**

The study of domestication contributes to our knowledge of artificial selection and crop genetic resources. Human selection under domestication has shaped wild field mustard (*Brassica rapa*) into diverse leafy (e.g., pak choi, napa cabbage, rapini), root (turnips), and oilseed (e.g., sarsons, turnip rape) crops. Despite the economic importance of *B. rapa* crops worldwide, the nature of wild forms, center(s) of domestication, and historical spread are unclear, jeopardizing the ongoing resilience of *B. rapa* crop resources. To address this knowledge gap, we used genomic data from genotyping-by-sequencing to investigate genetic diversity, structure, and demography in the largest diversity panel of domesticated and spontaneously occurring *B. rapa* to date. We also constructed a species distribution model for wild *B. rapa* during the mid-Holocene, when domestication is thought to have occurred. Spontaneously occurring samples from the Caucasus had the highest nucleotide diversity and emerged as sister to all other *B. rapa* samples in our tree-based analyses, suggesting that spontaneously occurring *B. rapa* in the Caucasus are truly wild. Weedy samples from Europe and the Americas had lower diversity and were affiliated with European turnip crops suggesting a feral origin. Clustering and tree-based analyses suggested that turnips were the first crop type domesticated, with subsequent parallel selection for leafy and oilseed types in East Asia and Europe. These findings clarify the domestication history of *B. rapa* and the nature of spontaneous populations, which will help conserve crop wild relatives and support future studies of the complex process of domestication.

**Letitia McCune - *The Methods and Manners of Food Sovereignty* (W 9:15)**

Focusing on traditional food systems as a component of food sovereignty, this presentation will illustrate some methods of identifying traditional foods via standard protocols of agreement, use categories, identification, collection and analysis. In addition, international agreements, such as the Nagoya Protocol, will be demonstrated as paramount to the protection of rights to Indigenous Peoples' agriculturally unique and modified species. As documenting the nutrient values of plant species can include information from previously published research, examples will be given of some of the pitfalls of combined data. Additionally, when placing this information into databases for use in computer programs to calculate total diet intake, care must be taken on the methods used across food categories, analysis dates, and species as well as plant and animal part. While recognizing that these food projects are often part of a larger picture of wellness and identity, it should also be noted that traditional foods often have enhanced capabilities towards physical health. Examples of this in the southwestern area of the United States include the glucose lowering properties of mesquite and prickly pear, the advantageous mucilaginous production of cacti and chia, the improved fiber and protein of legumes and native grass seeds, and the benefits of bone broth. Examples of agriculturally important plant species developed by Indigenous Peoples of Arizona include anthocyanin rich blue corn, drought tolerant peaches, disease resistant sunflowers and modified types of agave. Carefully documenting the components of traditional food systems supports the rights to those foods as part of food sovereignty.

**Mark D. Merlin - *Peppers and People in Micronesia: Spice, Medicine and Food Security* (T 11:00)**

The terminology and taxonomy of *Capsicum* is confusing. Various common names such as chili, pepper, capsicum, etc. are used interchangeably when referring to the cultivated peppers, *C. annum* L. and *C. frutescens* L., of which there are many diverse cultivars. Provisionally, chili peppers here refer to either of these two *Capsicum* species, or one not yet fully resolved taxon. Chili peppers dominate the global hot spice trade and are cultivated widely in warmer climes, including some of the remote Micronesian Islands, where non-pungent *Capsicum* fruits and their leaves have also become useful as green vegetable crops. Although the earliest cultivation of chili pepper appears to have occurred in Mexico thousands of years ago, only within the last few hundred years or less were spicy and non-pungent *Capsicum* varieties introduced into Micronesia. Yet, *Capsicum* peppers are now cultivated and much appreciated in several Micronesian islands, mostly as a spice added to fresh, dried or refined food, and as an ingredient in sauces. Moreover, the leaves of *Capsicum* serve as a vegetable in contemporary Micronesian diets that is rich in carotenoids and vitamins as well as a medicinal source in various local remedies. This presentation reviews the origins of chili peppers in Micronesia and the extent of their varied use in the small islands of this remote Pacific Region; examples of use in Palau, Guam, Tinian, Chuuk, Pohnpei, the Marshall Islands and Kiribati are evaluated in light of their culinary, medicinal and food security values.

**Lloyd Mhlongo & Ben-Erik Van Wyk - *The Ethnobotany of the Amandawe, KwaZulu-Natal, South Africa* (M 3:30)**

A rigorous quantitative survey method was used to accurately record and quantify Zulu traditional plant uses in five main categories, namely medicinal, magic, food, craft and spiritual. The inventory for Amandawe includes a total of 485 useful plant species belonging to 110 families, of which exactly 100 species (21%) have no previously recorded uses in the popular and scientific Zulu ethnobotanical literature. Similarly, 2691 new use-records and 566 new Zulu vernacular names were recorded for the first time. The traditional knowledge for the different use-categories were: medicinal plants (352 species, 1228 new use-records); magic and charm plants (276 species, 589 new use-records), food plants (175 species, 111 new use-records); plants with other domestic uses (200 species, 560 new use-records); spiritual and ritual plants (113 species, 208 new use-records). The rich plant use diversity was indicated by at least 72 species having ten or more uses, with *Rauvolfia caffra* (26 uses), *Hypoxis hemerocallidea* (24 uses) and *Erythrina lysistemon* (24 uses) topping the list. Several species also have high Cultural Importance Index (CII) values, such as *Sclerocarya birrea* (3.49), *Cymbopogon excavatus* (3.05) and *Syzygium cordatum* (2.92). High levels of local indigenous knowledge are indicated by the overall average Ethnobotanical Knowledge Index (EKI) of 0.67. The data demonstrate the exceptionally rich oral-traditional plant use knowledge of the Zulu culture and the fact that it has not yet been systematically recorded.

**Ratemo Michieka - *The Economic Importance of Weed Species as Nutritious Indigenous Vegetables* (M 1:00)**

Weeds are considered as plants whose economic value has not been discovered. Weed-crop competition is viewed by farmers as the most destructive crop losses in any given situation. Plant breeding segregates desired yield traits and eliminates the unwanted genes. Plants which do not have any required benefits to man are ignored and no research is conducted on them. Weeds worldwide are considered a nuisance in plant and livestock production. Crop losses due to weed competition ranges from 30% to 50% at any one production season, particularly in developing nations. Other than competition, weeds pose numerous production challenges which contribute to low yields and poor product quality. Developing nations experience crop losses which attribute to untold human

sufferings, malnutrition and famine. In the recent past, however, several plants including weeds have been identified to benefit human kind. Herbal medicines, indigenous vegetables, livestock dewormers are among the benefits of plants which were once considered weeds. Several plants are now being domesticated for consumption and are found to be nutritious. This paper examines the current trends of weed research and the changing beliefs that all plants which grow in association with arable crops are unwanted. Many African countries utilize indigenous vegetables as delicacies and nutritious. Eating lifestyles has changed tremendously due to new discoveries of useful wild plants. They are no longer weeds, but valuable economic plants.

**Andrew M. Miller - *Reconnecting Land, Language and People in Posaganchik Aski [Touchwood Hills, SK] – An Indigenous Cultural Landscape (T 3:00)***

This presentation reports on an ongoing Posaganchik Aski: the Touchwood Hills Cultural Landscape project. This collaboration between four Cree and Saluteaux First Nations, First Nations University of Canada and Saskatchewan Indigenous Cultural Centre is documenting a network of culturally important locations and histories through interviews with elders, a review of archival audio recordings of Indigenous elders, and visits to culturally important places in central Saskatchewan (Treaty Four), Canada. From these sources our team is creating teaching materials in line with Saskatchewan Department of Education curriculum standards and which promotes language revitalization, cultural awareness and a retelling of Indigenous histories. Our work to date has identified over 100 culturally important sites within the four First Nations reserves and as far away as the Saskatchewan border with the United States and Alberta. Our work reveals that under a thin veneer of intensively settler farming and ranching economies lies a vibrant Indigenous cultural landscape of history, meaning and potential.

**Theresa Miller, Tita Alvira, & Ana Lemos - *The Invisibility of Food Insecurity: Uncovering Hunger and Pathways to Food Security through Quality of Life Planning and Ethnobiological Research (M 1:45)***

Identifying and documenting food insecurity among local and Indigenous communities in South America is often difficult, due to particular post-colonial and development narratives that do not leave space to examine hunger and food insecurities in meaningful ways. This can lead to an invisibility of food insecurity, with community members reticent to share their experiences of hunger with outsiders, including researchers, governmental entities, and non-governmental organizations. In this paper, we explore the ways that researchers can work with community members to shed light on and uncover experiences of hunger and food insecurity in local and Indigenous communities in the Peruvian Amazon and the Brazilian savannah. We focus on methodological approaches to uncovering food insecurity through quality of life planning and ethnobiological research, as well as how these methodologies can be utilized to work with and empower community members to find new pathways to food security. We maintain that these methodologies provide space for community members to reflect on and identify patterns of food production, consumption, and exchange, the results of which can be mobilized to develop strategies to improve food security and environmental and socio-cultural wellbeing. Through this comparative analysis of case studies in Peru and Brazil, we argue that a combination of ethnobiological research and developing quality of life plans with the local community can uncover food security or insecurity as well as provide strategies to improve access to food, support environmental sustainability, and support bio-cultural wellbeing as a whole.

**Mahlatse Mogale - *A Quantitative Ethnobotanical Study of the Bapedi people of Central Sekhukhuneland, South Africa (W 11:00)***

The majority of publications on the Bapedi is either centred on anthropology or ethnology, or is biased towards medicinal plant use knowledge resonant amongst traditional healers. Thus, the aim of this research study was to accurately record extant indigenous knowledge on all of the most important useful plants within Central Sekhukhuneland. Three villages were selected as the study area: Vrysgewhagte, Ga-Moresele/Tsehlwaneng and Ga-Sekele. The matrix methodology was used to collect comparative data in a rigorous way. The method comprised three phases: a reconnaissance phase, an interview phase and a feedback phase. A total of 152 useful plant species were identified, of which 56 (37%) were non-indigenous. Photographs were taken of each useful plant species in order to create a research instrument (flip-file) for use during the interviews. A total of 27 willing participants were identified, falling within the age groups children (7-8 years), young adults (19-35 years), adults (36-54 years) and elders (55+ years). The information was used to determine Ethnobotanical Knowledge Index (EKI) for each participant, and also the relative importance or popularity of each useful species, using the Species Popularity Index (SPI). It was discovered that 185 use-records (107 medicinal, 21 food and 57 other) and 98 vernacular names have not yet been recorded in either the popular or the scientific literature. The study showed that the ethnobotany of the Bapedi culture and of Sekhukhuneland is incompletely known and that there is probably still a vast array of indigenous knowledge that remains to be systematically recorded.

**Bernadette Montanari - *Endangering Food Security, Sovereignty and Culture: The Case of Local Communities in Mizoram, North East India (T 3:30)***

Mizoram is situated in the southern tip of the North East region, India. It is a land of exotic beauty, natural wonders and legendary landscape. The region, one of the 25 biodiversity hotspots in the world has a rich flora and fauna and a great diversity of medicinal plants. The indigenous communities, the Mizo people have traditionally practiced Jhum cultivation, a practice that involves slash and burn and a period of land recovery. Although not designed to produce huge quantities of foodstuff, this traditional practice has allowed people to subsist on an abundant supply of fresh and healthy foods, grown in a rain fed pesticide free environment. This practice however is currently changing with the sweeping reforms of the New Land Use Policy (NLUP) which became widespread throughout the region in 2011. Driven by economic incentives, the NLUP encourages the local people to convert to mono culture, to enrol the local communities in economic development dictated by market demands and which necessitates a range of chemical treatments to increase production, to restore the environmental degradation caused by the burning of trees and to eradicate what is perceived as a backward practice. While some claim the economic benefits of the NLUP for the population, the NLUP raises several issues. In this presentation, I seek to challenge the Indian government NLUP and its long term effects on the traditional ecological knowledge associated with Jhum cultivation, the continuity of fresh diverse food for maintaining health, and the pending erosion on Mizo culture.

**Laura Monti & Armando Haro - *Participatory Ethnobotany for Land, Medicine and Food Sovereignty with Indigenous Communities in Arid and Tropical Environments of Sonora, Mexico (M 2:00)***

This participatory ethnobotanical research project engages Guarijio and Comcaac communities in Sonora Mexico in plant

documentation and cultural mapping to advance their sovereignty over land, food and medicinal plants within their homeland territories. Both tribes have suffered loss of parts of their historic homelands and are now politically and legally challenging such intrusions. Using traditional knowledge of plant distributions we compare 15 cultural and ecological keystone species and support indigenous leaders to reaffirm their healing heritage, their land rights and sovereignty over medicinal and comestible plants. By comparing plant usage in two different environments- hyper arid coastal desert and tropical deciduous forests- we highlight common principals of phyto-medicine that are linked to indigenous healing systems and protection of their territory.

**Jane Mt.Pleasant - *Ridges and Hills in North American Indigenous Agriculture: An Agronomist Weighs In (M 11:30)***

Ridges and hills associated with Pre-Columbian and colonial maize-based agriculture have been found from the Great Lakes to the southeast. Hills were used by Haudenosaunee, Huron, and New England coastal farmers, while ridges were found in the Great Lakes region and parts of the southeast. Archaeologists, anthropologists, and geographers have suggested that ridges extended the northern range of corn cultivation by creating warmer conditions on ridge tops, effectively lengthening the growing season. As an agronomist, I have very different explanations for ridges and mounds, unrelated to the length of the growing season. I focus on the botany of maize, the use of growing-degree days (instead of frost-free days) to characterize temperature constraints to maize growth, and the importance of plant spacing and density to explain the role of ridges and hills for maize farmers.

**Natalie G. Mueller - *Survey for Lost Crops: The Historical Ecology of Eastern North American Crop Progenitors (W 11:30)***

At least five native annual plants were cultivated by Indigenous people in eastern North America from ~4,000-500 BP, then fell out of cultivation and were lost to both oral and written history. These lost crops are a botanically diverse group: a quinoa relative (*Chenopodium berlandieri*), an Asteraceae (*Iva annua*), a buckwheat relative (*Polygonum erectum*), and two spring maturing grasses (*Phalaris caroliniana* and *Hordeum pusillum*). Over the course of two field seasons, in spring 2016 and fall 2017, I used herbarium specimens, public biodiversity databases, and local experts to find and record as many extant populations of these lost crops as possible within a study area extending from western Arkansas to eastern Ohio. Each species faces different threats and takes advantage of different opportunities within the industrial and industrial-agricultural landscapes of this region. Their persistence and distributions are affected by both their ancient co-evolutionary relationships with human societies and to their current invisibility and precarity as non-problem weeds. Suggestions are offered for conservation of these populations, which are necessary banks of genetic diversity for experimental and ancient DNA studies, and, potentially, re-domestication. Future iterations of the survey will systematically cover smaller areas to ascertain if extant populations are at all correlated with the presence or abundance of archaeological sites. Molecular methods will be used to investigate which extant populations might be feral descendants of domesticated populations, if any, and to better resolve the phylogeographies of these species.

**Lisa Nagaoka - *Using the Management of Urban Species to Teach Conservation Biogeography (W 2:30)***

Conservation biogeography applies biogeographic principles to conservation and management practices. Courses in conservation typically focus on endangered and threatened species. Instead, I oriented my course around urban ecosystems. The goal of the class is to demonstrate how biogeographic and ecological principles are used to explain how and why species become threatened or invasive in urban environments. By focusing on urban contexts, "nature" is an everyday experience rather than something in a remote wilderness, and issues relating to environmental management become more relevant to students. The class project is designed to demonstrate student proficiency in applying the course content to the management of an urban species. For the first part of the project, students work in groups to create a blog/wiki on an urban species whose distribution is affected by human actions and is in need of management. The blog contains information on the species' life history, describes the factors that have affected its distribution in urban contexts, and discusses examples of how it has been managed. Classmates review the blog, provide feedback and ask questions. These comments are then used to edit the blog into its final draft. For the second part, students take the information developed on their blogs and individually create an informational and persuasive brochure on their species with specific action items aimed at a specific audience such as homeowners, donors, or policy makers. The products of the project indicate that students are on the path to becoming informed citizens who can impact local environmental management practices.

**Mark Nesbitt, Julie Knight, Viviane Stern da Fonseca-Kruel, Luciana Martins, & William Milliken - *Theory and Practice in the Field Work of Richard Spruce, Pioneer Ethnobotanist of the Amazon Rainforest (T 9:30)***

British botanist Richard Spruce (1817-1893) spent 15 years (1849-1864) travelling in the Amazon and the Andes. He is best known for his extensive collections of herbarium specimens, which underpin many of the formal (Latin) names allocated to South American plant species. His c. 300 ethnobotanical specimens, mainly from the Rio Negro region, northwest Amazon basin and now housed at the Royal Botanic Gardens, Kew and the British Museum, are less well known. As part of a larger project reconnecting collections with source communities in this region, we have re-examined the documentation associated with Spruce's collections, initially with the simple aim of improving our understanding of its provenance. Our findings have led us to a much wider reassessment of Spruce's collections and collecting methodology. It is now apparent that Spruce collected voucher herbarium specimens for the majority of artefacts, anticipating current practice by more than a hundred years and enabling some specimens to be named now for the first time. Digitisation of Spruce manuscripts and herbarium specimens has also enabled us to track his recording of ethnobotanical data in very diverse formats and locations. In this presentation we use these sources to examine (a) why Spruce devoted so much effort to ethnobotanical collecting, and how this aligned with Kew's focus on useful plants (b) Spruce's methodology for collection of ethnobotanical data and how it compares to contemporary practice and (c) why Spruce remains a comparatively little-known figure despite his enthusiastic recognition by Amazonian greats such as Richard Evans Schultes.

**Christian H. Norton - *Ethnobotany in Nunatsiavut (Labrador, Canada): Understanding Inuit and Local Plant Usage Through Biological and Cultural Perspectives (T 3:45)***

Nunatsiavut (Canada) is a Subarctic, Inuit territory made up of five coastal communities. We described the ethnobotany among the three most southerly communities: Hopedale, Postville, and Rigolet. The goals of this project were to document Inuit and local plant knowledge to (a) identify important plants and their uses and (b) underline links between plants and culture. We conducted semi-structured interviews in each community for a total of 30 interviews and 32 informants, both sexes, and an average age of 65.4. Informants reported 534 responses and 682 uses across 68 taxa. There were 32 taxa that were common to all three communities,

and these 32 taxa account for 77.9% of all responses and 81.1% of uses. Of the taxa common to all communities, edible taxa accounted for the largest share of responses, followed by taxa used for combustion, cultivation, and medicine. The most reported plants were blueberry (*Vaccinium spp.*), bakeapple (*Rubus chamaemorus*), blackberry (*Empetrum nigrum*), and redberry (*Vaccinium vitis-idaea*). These four berry species were 5.9% of total reported diversity, but 21.7% of all responses. Berry picking is an important annual event, and berries are linked to activities like smoking fish. Berries also support culture by encouraging people to get on the land and share with others. This work shows that (i) plants are an integral part of life in Nunatsiavut, (ii) there is a high degree of taxonomic overlap between communities, and (iii) berries present an important link between biology and culture.

**Ebba Olofsson** - *"Man the Hunter" and "Woman the Invisible"- Changing Gender Roles in Indigenous Economies (M 3:30)*

The focus of the presentation is to understand how the role and the status of Indigenous women in subsistence economy were transformed over time in countries such as Canada and Sweden/Norway. The gender roles in the Indigenous communities are changing and new strategies for surviving and maintaining different Indigenous identities are being formed. Many women in the reindeer herding Sámi communities, Inuit villages, and First Nations communities, are today working as wage-laborers and professionals, bringing in money to the family. Their income often facilitates the continuation of the subsistence practices, leading to changed power relations and changed practice of the subsistence activities. Still they are not always recognized as the breadwinners in the national legislation and not granted the same rights as the men. In the presentation we will look at historical factors, such as the legislation and regulation of Indigenous peoples and anthropologists' ethnographic description of them, for creating this situation.

**Elizabeth A. Olson & William Heyborne** - *Jumpstart, Our National Parks: Using Local Resources to Teach Integrated General Education (W 4:00)*

Southern Utah University, trademarked as the University of the Parks, is a flagship school and partner institution with the National Park Service due to our proximity to, and history of engagement in, our regions parks and protected areas. Through a special general education course offering, known as Jumpstart, first year students at SUU are given the opportunity to earn up to 28 credits in a single year-long integrated course that is co-taught by faculty from a range of disciplines, including biology, geology, political science, writing, photography, the humanities, and anthropology. Ethnobiology emerges at center-stage in this integrated general education course, due to its overlap with each of the other disciplines. The purpose of this presentation is to consider the impact of the course on student attitudes and beliefs relating to conservation in the United States. Using examples of specific course activities, and reflecting on a student pre- and post-text questionnaire, the presentation argues for the potential to have a positive impact on undergraduate students perception of anthropogenic environmental change through this engaged, integrated, general education course design. We give specific suggestions of integrated, lower-level, learning activities that can facilitate understanding the complexity of human-environment interactions.

**Megan O'Sullivan** - *Prehistoric Plate: The Ethnobotany of Southern Utah's Indigenous People (P)*

Southern Utah has been home to different native groups for thousands of years. The first people here used spears to hunt big game, like bison and woolly mammoth. They supplemented their diet with smaller animals and by gathering fruits, nuts, and roots. After the time of the Paleoindians, as the climate began to change, various tribes called the landscape of Southern Utah home. Anasazi, Fremont, Southern Paiute, Hopi, and Navajo people have wandered the Great Basin, Colorado Plateau, and Canyonlands. As the large game became more scarce, native groups focused on smaller animals like deer, mountain sheep, rabbits, and prairie dog. All native groups in Utah also began to utilize some form of agriculture. Although the Anasazi, Fremont, and Southern Paiute had different lifestyles, many of the food items they relied on were the same. All three groups used the three sisters method of agriculture. They gathered amaranth, beeweed, sunflower seeds and roots, cactus fruits and pads, serviceberries, and pine nuts.

**Traci Pantuso, Leigh Joseph, Lisa Meserole, Ryan Drum, Paul Amieux, Alain Cuerrier, & Kaleb Lund** - *Immunomodulating Effects of *Oplopanax horridus* (T 3:00)*

Devil's Club, *Oplopanax horridus* (Sm.) Miq. (Araliaceae) (syn. *Fatsia horrida* (Sm.) Benth. & Hook.; *Echinopanax horridus* (Sm.) Decne. & Planch; *Panax horridum* (Sm.)), is a deciduous shrub of the Araliaceae or Ginseng family native to the Northwestern United States. Native Americans of British Columbia and the Northwestern United States regard Devil's Club as an important medicinal plant. Traditional medicinal uses of *Oplopanax horridus* (OH) include its use as an antibacterial, antifungal, antimycobacterial, antiviral and as an immunomodulator for rheumatism and diabetes. Previously it has been shown that extracts of OH have antibacterial, antifungal, antiviral and anti-mycobacterial properties. The mechanisms of action of OH's effects have not been established and there are few studies that have presented chromatographic profiles of OH extracts, although we are conducting a thorough phytochemical study. Previously we demonstrated a decrease in tumor necrosis factor alpha and nitric oxide (NO) production in a LPS-stimulated RAW264.7 macrophage cell line, which may partially explain the traditional use of OH as an immunomodulator for both rheumatism and diabetes. To further characterize the immunomodulatory effects of OH, LPS-stimulated RAW264.7 macrophage cells were treated with OH extracts and a cytokine array was performed that demonstrated a significant decrease in fifteen cytokine/chemokines, including tumor necrosis factor alpha, Interleukin 1 (IL-1), IL-6, IL-10. Prostaglandin E2 levels were also evaluated after OH treatment and demonstrated a significant decrease. This study demonstrates that OH extract has significant immunomodulatory activity in the RAW264.7 macrophage cell line. Further studies include antidiabetic and antiobesigenic assays.

**+\* Rossana Paredes & Allison L. Hopkins** - *Dynamism in Traditional Ecological Knowledge: Continuity and Change in the Use of Totorá (*Schoenoplectus californicus*) for Subsistence in Huanchaco, Peru (P)*

Along the Peruvian north coast, many towns depend on fishing for subsistence. The adoption of technological innovations has facilitated the extraction of marine resources from the Pacific Ocean by Peruvian fishermen in recent years. However, some artisanal fishermen continue to rely on traditional ecological knowledge (TEK) to create sea vessels using botanical resources. This is the case of the fishing community of Huanchaco, a beachside town, where totora (*Schoenoplectus californicus*) reeds are cultivated and mainly used to construct caballitos de totora, sea craft reed vessels. This reed is also used for other purposes that benefit the fishing community economically. The objective of this research is to highlight the dynamic quality of TEK by describing the continuity and change in use of totora by the fishing community of Huanchaco. Participant observation techniques and individual



interviews were conducted with members of the fishing community. Results show that they use totora to construct sea craft vessels which facilitates the catching of edible marine resources for subsistence and to create reed mats and souvenirs which are sold for additional income. Evidence from the recent past, and the historic and pre-Hispanic periods suggests that some aspects of the technology of reed vessel construction have continued whereas others have been modified. The addition of souvenirs and the reduction in mat production have also been identified. These changes in TEK highlight its dynamic quality, and are likely in response to economic and technological innovations influenced by processes of globalization.

**^ Paul Patton & Daniel R. Williams** - *Prehistoric Seed Saving and Agrobiodiversity in the Middle Woodland Period (W 11:45)*  
Seed saving and the management of crop varieties is an essential component of food production. Today, there is an increasing interest in the preservation of folk and heirloom crop varieties among ethnobiologists and plant sciences specialists in order to promote agrobiodiversity. Although seed saving and crop variety preservation must have occurred in prehistory, archaeological and archaeobotanical evidence of prehistoric farmers maintaining distinct crop varieties or landraces is limited, particularly in eastern North America before the introduction of maize. However, morphological analysis of seeds recovered from storage pits at domestic sites offer opportunities to explore the crop varieties developed and grown by prehistoric farmers. The majority of these seed caches have been recovered from dry rockshelters throughout the region. The objective of this study was to compare *Chenopodium berlandieri* assemblages from storage pits excavated at an open-air Middle Woodland period habitation site, the Greendale Ridgetop site, southeastern Ohio, in order to identify the potential presence of distinct crop varieties. Although a more detailed archaeobotanical assessment of materials from the site is forthcoming, the results of this analysis indicate that prehistoric farmers in the mid-Ohio valley were growing and maintaining discrete varieties of chenopods data further informing our understanding of the Eastern Agricultural Complex and the production practices during the Middle Woodland Period.

**+ Florencia Pech-Cardenas** - *Linking Heritage Tourism, Livelihoods, & Natural Resources Management in Mayan Communities (P)*  
Heritage tourism has opened up opportunities for handicraft production and commerce among local communities adjacent to the Chichen Itza World Heritage Site in Yucatan Mexico. Merchants in and around Chichen Itza sell wood carvings and other handicrafts, and most of this production comes from the labor of Mayan artisans who live in surrounding communities. Scholars have widely explored the impacts of tourism and handicraft production in Pisté, the central tourist town close to Chichen Itza, but few studies have documented the impacts of handicraft production and tourism development on other nearby communities. In order to design policies which improve indigenous people's livelihoods centered around handicraft production within the tourism industry, it is essential to know what challenges Mayan artisans face. This includes but is not limited to how their natural resource management systems are affected by the tourism economy and adapted to climate change without giving up their indigenous culture and autonomy. This research focuses on handicraft production as it is driven by heritage tourism and its tangible effects on rural livelihoods and natural resources management in the Yucatan. The ultimate goal is to contribute to informing future sustainable development practices among indigenous communities at the intersection of World Heritage Sites and sustainability.

**Sofia Penabaz-Wiley & Isami Kinoshita** - *Ethnobotanicals and Psychological Ownership of the Landscape: A Case Study in Suburban Matsudo, Japan (T 11:45)*

With husbandry of biodiverse systems progressively lacking, a decrease of contact with nature has resulted in less reason to retain traditional knowledge associated with nature. This study's objectives were to find the relationships between understanding of ethnobotanicals and psychological ownership of biodiversity and landscape. A mixed methods study, it included 38 interviews, a 200m radius land-use history study, and a questionnaire at a 746-unit housing complex in Matsudo, a suburb of the Tokyo Metropolitan Area. 34 ethnobotanical plants were found within a of the complex center. 112 responses regarding psychological ownership of biodiversity and of ethnobotanical knowledge were analyzed. Results showed a relationship between psychological ownership of the landscape and plants mostly learned through familial experiences, awareness of biodiversity, and negatively with land grading. Ethnobotanical knowledge was related to interest in biodiversity. There was a relationship between knowledge level and age; residents in their 60s and 70s knew more than others about the usages of plants for food and medicine, as well as other ethnobotanical plants, and had a deeper knowledge of other aspects of the landscape. Land use history showed that grading of the native landscape destroyed biodiversity, that original landscape had higher numbers of ethnobotanical plants, as well as demonstrating shelter for rarer birds, and that psychological ownership decreased with decrease in biodiversity, unless plants are actively accessible commercially. Conclusions suggest that increasing psychological ownership of native landscapes as well as intergenerational, social appreciation of the elderly could lead to retaining biodiversity as well as traditional knowledge.

**+ Diana Peterson and Eve Emshwiller** - *Manoomin (wild-rice or Zizania spp.) Among Menominee and Ojibwe in Wisconsin: A Study Integrating TEK and GIS (P)*

Wild-rice, or manoomin, existed throughout Wisconsin extending from Lake Superior in the north, to Lake Michigan in the east, and to the shores of the Mississippi River in the west. This vital resource remains in jeopardy due to increased recreation on lakes, phosphorus run-off from farms, introduced invasive species, and potential mining threats. However, two Indigenous nations in Wisconsin, the Menominee and the Ojibwe, continue to implement indigenous methods of self-governance by securing their rights to hunt, fish and gather on their traditional homelands, by preserving wild-ricing as a life-long tradition. This project integrates traditional ecological knowledge (TEK) with technology such as GIS mapping. The TEK survey included interviews of elders and community members of the Menominee and Ojibwe to identify key management styles and to address important concerns about wild-rice. The elders highlighted the cultural importance of wild-rice, such as in traditional stories, and they expressed their concerns about the disappearance of wild-rice and the potential loss of their cultural identity and traditions. Some have been fighting threats to wild-rice such as mining for decades, and they wonder about whether younger people will step up to continue the fight. There is a glimmer of hope among the Menominee to be able to reestablish wild-rice in traditional areas. Some elders observed that wild-rice beds in locations that have minimal development produced tall stands. The survey results are complemented by a GIS map, based on herbarium samples, to indicate locations of past and present areas of wild-rice.

**^ Methee Phumthum & Henrik Balslev** - *Phylogenetic Signal in Traditional Thai Medicinal Plant Uses (W 3:45)*

It is well known that medicinal plants are unevenly distributed among plant families and genera in a particular region. In the search for medicinal plants to be used in the development of modern drugs, both phylogenetic relationships of the plants and knowledge of

their ethnobotany are useful tools. Here we combine the two approaches in an analysis of the Thai ethnomedicinal flora. We extracted information from 64 previous publications which produced 16,789 use records for 2187 plant species in 206 plant families. We divided the use records following the Economic Botany Data Collection Standard, and plotted them on a phylogeny of the 206 plant families. This showed a strong overweight of medicinal plant use records in the Lamiids. All families of non-flowering plants accounted for very small proportions of the ethnomedicinal used plant families in the Thai flora. We then focused on the Lamiid families and produced a phylogeny of all their 130 genera with ethnomedicinal uses, again with indication of the number of use records for each genus in each category. We found a very uneven pattern of the distribution of use records over the genera and use categories. Some genera, such as *Clerodendrum*, *Rothea*, *Ocimum*, *Plantago*, *Solanum*, *Paederia* and *Morinda* had high numbers of use records well distributed over the use categories, whereas other genera had very few use records. Our results suggest that the combination of phylogenetic and ethnobotanical analysis is a strong potential tool for drug discovery.

#### **Raymond Pierotti - *Static and Dynamic World Views and the Concept of Traditional* (W 11:15)**

Whether individuals hold static or dynamic worldviews underlie a number of contemporary controversies, including evolution/creationist debates, the reality of climate change, and application of treaty rights by Indigenous cultures. In this last case the debate is often framed in terms of whether or not Indigenous cultures are still using traditional methods when engaged in hunting, fishing, or harvesting. My purpose is to evaluate these issues by arguing that traditional means quite different things in different cultural traditions. In Western cultures, whose roots lie in static worldviews, e.g. those put forth by Aristotle and Descartes, traditional tends to mean unchanged, or perhaps timeless. In Indigenous cultures, which typically have dynamic worldviews, traditional (a Western concept), implies that technology employed, knowledge bases, and even ceremonial practices can change when conditions require. Western thinking assumes that use of the word traditional implies that such concepts or knowledge are of the past and unchangeable, and irrelevant to the contemporary world. Non-Indigenous investigators have contended that traditional and change are contradictory concepts, and that "[traditional] carries the unacknowledged connotation that the item in question is in decline, thus in need of being preserved." In Indigenous thinking, the term traditional implies primarily that such knowledge and its related concepts have been in existence for a lengthy time, precisely because their ability to incorporate new observations and information has kept them fresh and relevant. I discuss these alternative concepts in the contexts of treaty and land rights and contemporary conservation concepts of biodiversity.

#### **Cassandra Quave - *Ethnobotanical Uses of Wild Flora and Fungi on the Aegadian Islands of Sicily, Italy* (T 3:30)**

The Aegadian Islands are located west of Trapani, Sicily. Once the site of bountiful tuna fisheries and fruit orchards (plums, peaches, apricots), grape vines, prickly pears, and grains, the local economy is now based on tourism and many traditional agricultural and maritime practices have been abandoned. The aim of this study was to evaluate the state of traditional ecological knowledge concerning the use of wild and cultivated plants and fungi for human health, food, maritime and agricultural purposes on the islands of Levanzo, Favignana, and Marettimo. A total of 48 inch-depth semi-structured interviews were conducted in Italian with prior informed consent from May 2016-July 2017. A total of 126 botanical and 5 fungal taxa representing 54 families were cited. Among the most pervasive species in the landscape, *Agave americana* and *A. sisalana*, had a diverse array of applications in the past, which ranged from cordage for agricultural and maritime applications, to tools for sewing, eating land snails, and constructing furniture. Fields of *Ferula communis* also dominate the landscape and the dry stems were used extensively in furniture making; this species also serves as an environmental indicator for the location of the most preferred edible mushrooms, *Pleurotus eryngii* var. *ferulae*. Other important flora included topical medicinal applications of *Glaucium flavum* for hematomas and *Artemisa arborescens* for ritual bathing of newborns. In conclusion, while many plant-based traditions have disappeared from daily practice, especially those related to traditional fishing and hunting, they remain in the memories of the eldest subset of the population.

#### **Cassandra Quave - *Innovative Strategies for Teaching in the Plant Sciences* (T 10:45)**

A major challenge faced by botany educators is that pedagogical techniques often rely heavily on rote memorization of plant names and characteristics that are hardly stimulating to students. In many cases, they may walk away from a botany course without ever seeing the big picture of why plants matter both to them as individuals or the world at large. In other words, without context, it is incredibly difficult-or even impossible-for students to become engaged with the plant world and make those crucial connections that are necessary for integration of knowledge into their long-term memory. On the other hand, student enthusiasm for the plant sciences must be fostered in order to both encourage the growth of future experts in this field and to cultivate a global community of citizen scientists with an appreciation for and connection to their environment that is mostly plant-based. To address this challenge, I will discuss how ethnobotany - the interdisciplinary study of how people interact with plants - can be leveraged to fill in this contextual gap in plant science education by helping students understand their personal and cultural relationship with plants, revealing the practical and persistent value of plants on an individual level. I will provide examples of different pedagogical techniques and tools that can be used to better engage students in the natural world.

#### **Diana Quiroz - *What Does the Absence of Informant Agreement Tell Us About Medicinal Plant Knowledge?* (M 1:15)**

In ethnobotany informant agreement is widely acknowledged as an indicator of the existence of medicinal plant knowledge. However, it is not always clear whether the absence of agreement is indeed an indication for the lack of this type of knowledge. We surveyed the medicinal plant markets of Michoaca State, central western Mexico in 2017 and found that the names and uses of almost a third of all plant products sold there (n = 323) were inconsistent among plant vendors and with those in the literature. Cross-sectional data (e.g. age, schooling, and ethnic background) and context-oriented motivation analysis (e.g. the underlying causes of plant adulteration) might be employed to provide an explanation for these incongruences. In the present problem, by contrast, we use an epistemological approach to address the question of under which circumstances it is likely that the absence of agreement is an indication of the lack of medicinal plant knowledge. We argue that informant agreement can explain the presence of medicinal plant knowledge when there is agreement on some basic assumptions (e.g. the items that conform cultural domains such as disease and health, or the causes and symptoms to a given disease). Likewise, we posit that agreement comes in different degrees and that the lack thereof does not necessarily imply that knowledge is wrong. We conclude by discussing the limitations and potentials of this approach to illustrate medicinal plant knowledge dynamics.

**Pauline Rameau & Serge Bahuchet - *Relation Between the Persistence of the Agrobiodiversity and Rural Alimentation in the Mexican Occident (Chiquilstlan, Jalisco) (T 3:15)***

Beside genetic and agronomical questions of crop management, there are others questions on socio-economic processes that bring farmers to maintain or abandon the cultivation of diverse local varieties. This research proposes a deep study of the socio-cultural choices associated with the persistence of local varieties in order to test the hypothesis that the persistence of the local diversity of varieties is linked to identity-related food choices. The objective is to understand how and why rural societies maintain local and old seeds despite the pressure by agro-companies that commercialize improved seeds. This question requires to take into account the whole food chain, from the production to the consummation, through exchanges and sales. The aim is to establish survey methods that allow highlighting the inter-relation between production and consummation strategies through the prism of the cultural and identity factors. The fieldwork was conducted in a rural village of Western Mexico, in which an inventory of some varieties was made. We made a survey the type of cultivation (in valleys or hills), the use (feeding families or cattle) and observed the foodways (cooking choices for every variety). The results support the hypothesis of a deliberate persistence of the two types of seed because of cultural choices, together with the economic conditions of each family. This study was associated with collections of specimens and tools for the biocultural collections of the Muse de l'Homme (Museum of Natural History, Paris), that will be briefly exposed in this paper.

**Jan Salick - *Phenological Changes After 150 Years Around Buzzards Bay, MA (T 3:45)***

Several studies have recorded phenological changes in New England. However, there is one study from 1860-1911 by Eliphalet Williams Hervey that is outstanding in its primogeniture, duration and thoroughness. In "Procession of the Flowers", Hervey monitored 1281 species around Buzzards Bay, whereas, over the last 4 years with 2609 observations, we have been able to monitor only 691 species. Among our results to date we find that species are flowering both earlier and later in the year, with additional bizarre out-of-season flowering such as New Year's Day 2017. Earlier flowering takes place in species that flower before summer solstice, while later flowering takes place in species flowering after the solstice. Although years differ somewhat, the trends remain significant. Duration of flowering is increasing significantly, with undetermined effects on pollination ecology or plant physiology. Both data sets show ephemerals throughout the year (i.e., not just spring), as well as continually flowering species. Phenological differences between native and introduced species are not found in Hervey's data, however the contemporary data show earlier flowering of introduced species. This is consistent with the theory that climate change is providing an empty flowering niche early in the year into which introduced species fit. Ethnobotanically, my Narragansett colleagues say that these results are notable in that yields of gathered species are decreasing (e.g., blueberries and cranberries), in that indicator species are disassociated from natural resources (e.g., shadbush and shad), and in that traditional knowledge and culture become irrelevant.

**Wendy Hodgson, Andrew Salywon, & William Doelle - *Hohokam Lost Crop Found: A New Agave (Agavaceae) Species Only Known from Large-scale pre-Columbian Agricultural Fields in Southern Arizona (W 11:30)***

For over thirty years archaeologists have provided evidence that southern Arizona pre-Columbian Native Americans, the Hohokam, extensively cultivated agave. However, no archeologists reported finding living agaves growing in the rock piled or gridded Hohokam fields, therefore researchers could only speculate about the species cultivated. Our work expands upon a recent publication noting several agaves growing in prehistoric dry-farmed fields on terraces overlooking the San Pedro River. We found these agaves to be extremely rare, reproducing asexually via rhizomatous offsets with no apparent fruit set, relatively uniform intra- and inter-population morphology, growing only with archaeological features and unknown from natural settings – all characteristics expected in a domesticated crop. We propose that this agave is a clonal, relic crop grown from ca. A.D. 800 – 1450 by the Hohokam, and thus represents a 'lost crop' as sought by archaeologists. The extensive size and wide distribution of Hohokam agave fields that transformed the landscape and are still visible today indicates the crop's importance in the Hohokam economy. The question of where and when this agave originated has implications for North American domestication centers. Our discovery emphasizes the importance of collaborative research between archaeologists and botanists whose distinctive data can provide a richer understanding of how the Hohokam developed and then sustained one of the American Southwest's largest prehistoric populations.

**+ Kate Sammons, A. C. Eschenlauer, & A. D. Hegeman - *Effects of Ploidy Level on Chemotype and Antimicrobial Activity in the *Achillea millefolium* Complex (P)***

*Achillea millefolium*, commonly known as yarrow, is a multiploid species complex, which occurs globally and has a long history of medicinal use as a vulnerary, anxiolytic, digestive aid, and antimicrobial. Ploidy differences in yarrow have been associated with highly varied essential oil composition, particularly the compound chamazulene. Variable quality is available in commerce, due in part to indiscriminate use of plants of various ploidy levels. Genome sizing by flow cytometry is underway on nearly 100 populations of *A. millefolium* and related *Achillea* species. Crude extracts of flowers will be analyzed with ultra-performance liquid chromatography-high resolution mass spectrometry (UPLC-HRMS) to correlate chemical profile with ploidy level using partial least squares-discriminatory analysis (PLS-DA). Antimicrobial activity is assessed in a 96-well plate assay with *Staphylococcus aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, and *Candida albicans* and visualized by the resazurin viability test.

**^ Olubunmi Josephine Sharaibi, Dolapo Abimbola Adeogun, & Olufunmilayo Feranmi Abati - *Ethno-Gynaecological Knowledge and Preliminary Phytochemical Screenings of Medicinal Plants Used in Lagos State, Nigeria (M 4:30)***

The prevalence of gynaecological disorders globally has given rise to increased female infertility, morbidity and mortality. Gynaecological disorders are various diseased conditions affecting female reproductive organs. This study was conducted to establish a regional profile of indigenous medicinal plants used for the treatment of various gynaecological disorders in Lagos State, Nigeria. Oral and semi-structured interviews were used to obtain information from 100 local informants while standard laboratory procedures were used for preliminary phytochemical analysis of the identified herbs. Fifty (50) plant species belonging to 35 families were identified for the treatment of gynaecological disorders in the study area. Ethnobotanical uses of 16 plant species for amenorrhoea; 9 species as aphrodisiacs; 7 species for vaginal infections and 6 species for sexually transmitted diseases were discovered in the study area. Leaves are the most commonly used plant part (29.03 %) followed by the bark (22.58 %) while bulb (1.61 %) is the least part used. The most frequently used mode of herbal preparation is decoction (48.08 %), powdered form (23.08

%) with taking raw herbs (1.29 %) as the least method of preparation. Phenols and flavonoids were present in all the plant identified. Steroids were present in all the plants too with the exception of 6 species while phlobatanins were present only in ten identified medicinal plants. This study showed that Lagos State is rich in indigenous plant species that contain significant bioactive compounds capable of significant therapeutic effects on various gynaecological disorders.

**^ Fabien Schultz - East and Central African Medicinal Plants as Inflammatory Inhibitors in the 15-LOX / 15-Hydroxyeicosatetraenoic Acid and COX / PGH2 Pathways (T 9:30)**

The majority of plant and insect species of the tropical rainforests in western Uganda and eastern DRC have not yet been discovered; 90% have never been screened for bioactivity. Approx. 60% of the world's population relies almost entirely on plants for medication. The knowledge of East and Central African plants and their traditional uses are mainly transferred orally from one generation to the next by traditional healers, leading to the loss of vital information due to lack of records. Our study provides documentation of 16 different African medicinal plants traditionally used to treat inflammation and related disorders such as pain, arthritis, osteoporosis, asthma, dermatitis and even cancer. Phenolic compounds are often thought to possess anti-inflammatory properties. The MOAs of many phenolic compounds are most likely associated with their inhibition of pro-inflammatory enzymes in the arachidonic acid pathway such as lipoxygenases (LOX) and cyclooxygenases (COX) in inflammatory cascades or with their free radical scavenging activity. Due to undesirable effects of non-steroidal anti-inflammatory drugs (NSAIDs) such as gastrointestinal bleeding, selective inhibition of COX-2 is preferred to the COX-1 inhibition. We present results of diverse in vitro experiments performed with 61 different plant extracts: 1. 15-LOX inhibition screening; 2. Selective COX-2 inhibitor screening; 3. DPPH assay for anti-oxidant activity; 3. Determination of the total phenolic content. Traditional use could be scientifically validated in some cases. This study was performed according to the international and national rules considering the Convention on Biodiversity and the Nagoya Protocol.

**+ Fabien Schultz, Godwin Anywar, Ogechi Favour Osuji, Anh Nguyen, Luc Pieters, & Leif-Alexander Garbe - Investigation of Antimalarial & Genotoxic Properties of African Medicinal Plants Traditionally Used in Western & Central Uganda (P)**

Many plant and insect species of the tropical rainforests in western Uganda and eastern DR Congo have not yet been discovered; 90% have never been screened for bioactivity. Approx. 60% of the world's population relies almost entirely on plants for medication. The knowledge of African plants and their traditional uses are mainly transferred orally from one generation to the next by traditional healers, leading to the loss of vital information due to lack of records. Our study provides documentation of 16 different African medicinal plants, which are claimed to possess antimalarial, anti-cancer and antibiotic properties amongst others. We present results of diverse bioassays performed with 61 different plant extracts: 1. Antimalarial heme biocrystallization assay as a pre-screen for upcoming in vitro and in vivo evaluation; 2. Evaluation of antiplasmodial activity against chloroquine-resistant *Plasmodium falciparum* K1 strain 3. Cytotoxicity testing with human MRC-5 lung fibroblast cells 4. GC-MS-assisted Ames test with human S9 liver fractions for investigation of mutagenic/potential carcinogenic effects of the extracts. Of all plants tested, diethyl ether extracts of *Warburgia ugandensis* showed the lowest IC50 value with 0.5 µg/ml. In many cases, the traditional use of the plant species could be scientifically validated. Bioassay-guided fractionations combined with GC/LC-MS techniques enabled identification of bioactive compounds in some of the tested African plants. For instance, extracts of *Zanthoxylum chalybeum* contained 8% of antimalarial lupeol. This study was performed according to the international and national rules considering the Convention on Biodiversity and the Nagoya Protocol.

**Anju Batta Seghal - Role of Ethnic Tribes in Conservation of Biodiversity of the "Great Himalayan National Park" -- A Paradise Waiting to be Explored (T 3:30)**

The Himalayas have been source of awe and inspiration for millennia to countless individuals. They are largest, tallest and geographically youngest mountains on earth. Himalayas are also one of most fragile mountain regions of world and hold an enormous repository of biological diversity which is increasingly under pressure from human activities. Unique ecological aspects of western Himalayas led to creation of Great Himalayan National Park. Located in Kullu District of Himachal Pradesh, India, initially constituted in 1984, GHNP was formally declared a National Park in 1999, covering area of 754.4 sq kms. 1994, two major changes were made in land use around Park. A buffer zone of 5 km from Park's western boundary, covering 265.6 sq km. and including 2,300 households in 160 villages, was delineated as Ecozone. Most of population (15,000 to 16,000 people) in Ecozone are poor and dependent on natural resources for livelihoods. Great Himalayan National Park is home to more than 375 faunal species. So far species of 31 mammals, 181 birds, 3 reptiles, 9 amphibians, 11 annelids, 17 mollusks and 127 insects belonging to six orders have been identified and documented. Most of the Himalayan fauna has been given protection under high priority protection category of Schedule I of Indian Wildlife (Protection) Act, 1972. State government has banned hunting in the state for more than ten years. Track of 35 to 45 km in any of Park's valleys brings one into the high altitude habitat (3,500 m and above) of animals such as blue sheep, snow leopards, Brown bear, Himalayan thar, and musk deer. Best sightings can be made in autumn (September–November) as animals start seasonal migration to lower altitudes. World Heritage Committee of UNESCO met at Doha in Qatar has bestowed status of World Heritage Site on Great Himalayan National Park.

**Sangyoung Seo, Eun-seok Park, Chang-Su Kim, Hyo-Jin Kim, Dong-Won Kim, Hee-Jun Kim, & Ki-Beom Kwon - Effect of Chitosan Basic Fertilization on Cultivation of Korean ginseng (*Panax ginseng* C. A. Meyer) in Plastic House (P)**

Korean ginseng (*Panax ginseng* C. A. Meyer) is a plant distributed in Far East region including Korea and China. This study was carried out to investigate the effects of chitosan on the growth of ginseng in plastic house and its effect on Korean ginseng growth and ginsenoside content. Chitosan is a polymer compound obtained by deacetylation of chitin and is used for various purposes such as food additives. It has been reported to inhibit decay and browning in strawberry, apple, and orange. In this experiment, two varieties, "Chunpung" and "Yeonpung" were cultivated in soils that given chitosan granule (40kg/10a) as a basal fertilizer. Growth characteristics and ginsenoside content of 4 years old ginseng were investigated. It was a slightly higher than the appropriate figure of 6.5 in the test group with chitosan fertilization, the growth of aerial part and underground part of ginseng were better than non-treatment. The ginseng roots weighed 40.3g/plant in the group of untreated chitosan and 46.5g and 49.9g in the chitosan-treated group, respectively, which were 15~24% higher than the untreated group. The content of ginsenoside was 14.9 mg/g in the chitosan-untreated group, 21.6 mg/g in the "Chunpung" and 16.4 mg/g in the "Yeonpung" of chitosan-treated group. The content of

ginsenoside was increased by 10~45% in the chitosan-treated group compared to the untreated group. These results suggest that the basal fertilizer of chitosan in the soil during Korean ginseng cultivation promotes the growth of ginseng, which is effective in increasing root weight, increasing ginsenoside content.

**L. Jen Shaffer, Jessica Breiffeller, Alison Thieme, & Reginal M. Harrell - *Safe Passage: Conservation and the Role of Culture in the African Vulture Trade (M 3:15)***

Vultures provide important ecosystem services by removing waste, controlling disease, and recycling nutrients. As demonstrated by the near extinction of India's vultures during the 1990s and early 2000s, the loss of these raptors from sub-Saharan African ecosystems could possibly have devastating impacts on ecological, cultural, economic, and human-health systems. Several anthropogenic drivers currently threaten Africa's vulture species with extinction. Over 90% of vulture population losses can be attributed to poisoning and traditional belief use trade. Market observations also document the sale of the birds as a cheap source of bushmeat protein. Yet, cultural taboos and/or religious customs protect these scavenging raptors from targeted hunting and human consumption in many parts of the African continent. Herein, we review the literature to explore the cultural ecosystem services vultures provide to sub-Saharan cultures. We document market observations of vultures sold for bushmeat and traditional belief use (e.g., muti, vodun). Our analysis highlights African vulture ethno-ornithology; identifying knowledge gaps and illuminating opportunities to work with communities and cultures to protect these threatened species and reinforce the value of the ecosystem and cultural services they provide.

**Daniela J. Shebitz - *Training Environmental Professionals Through an Experiential Learning Capstone (W 2:45)***

Union County, New Jersey is one of the most densely populated areas of the United States. This location simultaneously leads to students feeling disconnected from nature, while presenting countless opportunities to study and mitigate human impact on the environment. The Independent Practicum for Sustainability at Kean University is a senior capstone that serves as a transition from undergraduate student education to post-graduate work. The course structure enables students to build skills in leadership and management while reinforcing knowledge gained through previous courses. Through a student-centered, experiential learning framework, undergraduates adopt an environmental consulting approach to working for a client and carry out a project from proposal to final delivery phase. Each "team" designates a project manager, a technical editor, and specialized staff that works directly with a client. This paper presents three projects that have been conducted over the past couple of years that illustrate the development of student confidence and knowledge while assisting in local environmental projects: 1) Developing a permaculture plan for a local farm run by the non-profit organization Groundwork Elizabeth; 2) Assessing restoration potential of a river through dam removal for Trout Unlimited; and 3) Designing sustainable infrastructure and a hydroponic greenhouse for Springstone Farm. Through these examples, project development and learning outcomes are presented. Additional outcomes including awarded grants and job opportunities are also discussed. The format of this capstone course is easily transferable to other areas around the world, and serves as an important model for integrating professional experience into undergraduate education.

**Daniela J. Shebitz, Bethania Rocha, & Bianca Wentzell - *Evaluating Effects of Historic Cranberry Agricultural Practices and Current Restoration Techniques on Wetland Restoration in the New Jersey Pine Barrens (W 10:45)***

This study investigates cultural and environmental dynamics of an ongoing restoration project on retired cranberry bogs. The New Jersey Pine Barrens (NJPB) is a heavily forested area expanding 1.1 million acres along the coastal plains of the state. Much of the NJPB's forest and wetland ecosystems remain largely undeveloped due to strict regulations and its sandy soil that is unsuitable for growing most crops. Cranberry and blueberry, however, thrive in the NJPB and have played important economic and cultural roles in the area. As a result of cranberry agriculture, wetland hydrology is often significantly changed since combinations of canals and dikes are added to control the water table, the diversity of plants decreases, and the soil changes in composition and becomes severely compacted. Many cranberry bogs in the NJPB were historically dominated by Atlantic white-cedar (*Chamaecyparis thyoides*). In December of 2003, one such cranberry farm of the NJPB became the focus of wetland restoration efforts. The purpose of this study is to examine effects of various agricultural and restoration strategies on vegetation succession with the ultimate goal of determining which combination of strategies is most effective at restoring native plant diversity. A secondary goal of this research is to document the cultural importance of the cranberry industry in in NJPB and the social dynamics between conservationists and the cranberry farmers. Since the majority of the restoration activity occurred in 2004 and 2005, this project provides a unique opportunity to observe succession and people's perceptions over a decade later in 2017.

**^ Erin Mae Smith - *The Shifting Place of Wild Foods for Food Security and Cultural Identity in Rural and Tribal Communities of Montana in the Context of Global Environmental Change (M 1:30)***

Wild foods contribute to food security and cultural identity worldwide. However, global environmental and land-use change are impacting wild foods and the communities who rely on them. We applied a mixed-methods approach to characterize wild food consumption, values, observations, and perceptions of community members in Montana in the context of global environmental change. A total 30 semi-structured interviews were carried out with community members on the Flathead Indian reservation in Western Montana. In addition, 218 surveys were completed with long-term residents of Montana including those who hunt (81.7%), fish (85.3%), and harvest wild foods (69.7%). The interviews and surveys were coded by a panel of coders to identify prevalent themes. Wild foods were highly valued among survey participants with 88.1% agreeing that wild foods contribute to dietary quality and 69.2% agreeing that wild foods contribute to their cultural identity. Interviews findings from the Flathead Indian reservation indicate that both higher consumption rates of wild foods as well as greater diversity of wild foods consumed were associated with increased food security. At the same time, environmental observations of participants in Montana emphasize the shifting place of wild foods with environmental and land-use change. Montana residents reported a change in the distribution of fish (37.2%) and wild edible plants (37.6%), the types of wild game available (33.5%), and the water quality of lakes and rivers (35.3%). Findings indicate the need for efforts to support continued access to wild foods for food security and cultural identity.

**S. H. Sohmer & Jimbo Tiberius - *Food Security, Sovereignty and Traditional Knowledge in a small village in Morobe Province, Papua New Guinea (W 4:00)***

It was a privilege to be able to spend a month in Papua New Guinea thanks to a National Geographic Society grant. My colleague and I spent two weeks botanizing in the Morobe Forests using as our base the village of Wagau. The villagers are nearly self-sustainable, raising Yams, pit-pit, banana and utilize free range chickens and pigs. Slaughtering of pigs takes place regularly as does the slaughter of chickens. But the villagers are mainly dependent on plants from their gardens. The study area is located about 40km south west of Lae City, Morobe Province, PNG. Wagau forest area (6°52'09.1"S 146°43'45.5"E) presents a tropical rainforest system that perhaps has all the major forest types (Lowland Rainforest, Lower Montane Rain Forest, Mid-Montane Rain Forest) along a single mountain range known as the Herzog Range.

**John Richard Stepp** - *Getting Into the Weeds: Discovering Where Medicinal Plants Grow* (T 9:30)

This exercise is based on an experiment I first developed at the University of Georgia where students collected all of the weedy species they could find growing along railroad tracks and discovered that 38 out of 60 were considered medicinal. In its current form, students are divided into two or more groups and assigned either disturbed habitats or forested habitats. They collect or identify every species within a pre-defined unit and then consult literature to determine if the plant is medicinal and/or weedy. Students are surprised to learn that disturbed habitats usually contain a much larger number of medicinal species. The learning outcomes are to evaluate different types of habitats and discern which are potentially most useful. One alternative approach to the exercise is to instead focus on wild edible species. The exercise has met with great success over the years and was the subject of a human interest story by Charles Osgood on ABC News Radio.

**Damon Swain** - *Iakwe Majol: Untold stories of Marshallese Immigrants in the United States* (T 7:30)

Today the negative effects of climate change with rising sea levels, increased natural disasters, and higher levels of greenhouse gases are worldwide. These effects are creating a new kind of refugees - climate change refugees. These refugees, specifically in the Marshall Islands, are losing their homes because of climate change. Their islands are slowly disappearing because of rising sea levels. On average, their islands are 6 feet above sea level, and due to salt water seeping into the soil the islands will become uninhabitable long before they disappear in the ocean. The Marshallese will be some of the first climate refugees. Because of the Compact of Free Association, some Marshallese have already sought refuge in the United States. My research has focused on understanding their point of view and capturing their voice by asking the question, "How do Marshallese immigrants in the United States interpret, process, and cope with their experiences of dislocation because of climate change?" This ethnographic project is set on further researching their stories by conducting unstructured interviews with Marshallese immigrants in Utah. The results and recorded interviews were compiled into an ethnographic short film that captures their stories. Their point of view is significant because it raises awareness about rising sea levels due to climate change in the Marshall Islands and this research is an essential step before seeking out possible solutions.

**Lyn M. Tackett** - *Tracing Ancient Healing Practices In China and Egypt Through The Hibiscus* (M 2:15)

Ancient plant medicines go back several thousand years. Many of today's treatments for diseases were adapted from various indigenous cultures but with origins veiled in supernatural legends and folklore. My work focuses on tracing ancient healing practices through the use of various medicinal plants. This project focuses on the hibiscus and its use in tea. Through the use of iconography, microscopy, historic medicas and archaeological discoveries, this study shows how medicinal knowledge once thought to have originated with Ancient Greece through Hippocrates may have earlier origins in China and Egypt with Shennong and Imhotep respectively. The similarities between Shennong and Imhotep are also compared. Results suggest that knowledge of medicine may have been a reason for long distance trade, the merging of foreign cultures, and the gradual refinement of medicinal treatments still in use today. This project contributes to further paleoethnobotanical research.

**Maite Lascurain-Rangel, Sergio Avenda-Reyes, & Richard S. Tan** - *Report on Ongoing Research on Plants Used as Condiments in Mexico* (M 4:00)

The richness of Mexico's cuisines is due in large part to the vast range of food plants that continue to be an intrinsic part of traditional knowledge in local communities. These include plants used as condiments, i.e. that contribute flavor, color or aroma to food. Many of these are characterized by discrepancies in taxonomic identification, confusion of ethnographic/linguistic information, and poor understanding of ecology and use. For the last three years, this team of botanical researchers has gathered field notes, herbaria materials, bibliographic references to produce an updated register. Vernacular names were clarified with linguists. A number of introduced species are fundamental to Mexican cuisine; we limit our study only to plants native to the Americas. Some species have global economic importance, including vanilla and allspice. Others, for different historical reasons, have fallen into disuse e.g. ancient cacao additives, or are today limited in scope to pockets of the country, e.g. *Cymbopetalum penduliflorum* (moste) or *Ipomoea dumosa* (xonequi). Included in the study are functional categories such as those of chiles, and leaves (e.g. of *Calathea lutea* and *Oreopanax spp.*) used as wrappers for cooking, imparting specific flavors to food. Plants such as *Turnera diffusa* (damiana) were used in infusions for ritual or medicinal purposes but are today flavorings for recreational beverages. Also examined are indigenous (non-Linnean) categories such as "hierba de conejo", "cilantro" (including various species of *Peperomia*) and the Mixtec "nduva", a word referring to *Leucaena spp.* (guaje) but extended to classify several herbs eaten raw as a condiment.

**Richard W. Tate, Tatia Kalatozishvili, Vakhtang Kareli, Konstantin Kereselidze, Levan Ozbetelashvili, Gocha Golubianni, & Vazha Bedinadze** - *Washing Away the Evil Eye: Herbal Healing of Childhood Rickets in Adjara, Georgia* (W 4:45)

Plant-based remedies form the foundation of healthcare in many societies around the world. A strong and varied heritage of herbal healing in the country of Georgia (Georgian: საქართველო, Saqartvelo) reflects a rich tapestry of biocultural diversity. Here we examine overlapping cultural, ecological, and spiritual influences on treatment of childhood rickets, a disease of notable salience in participant interviews, in the Georgian region of Adjara. We gathered information concerning ethnobotanical use of plants in the region through interviews with local peoples, summarizing their knowledge regarding rickets and its cures. Common elements of participant observations of this disease include: a common set of identifiable symptoms, prescription of herbal baths for treatment of the disease, and the influence of the evil eye concept as a personalistic disease-causing agent in these cases. While there was general agreement about the bathing method of curing, cultural consensus of plant taxa used in healing of rickets was relatively low. A biomedical explanation of the prevalence of childhood rickets in the region may be attributable to climatic factors and an adherence to local codes of modest dress by pregnant women. Conceptions of rickets and other diseases held by the people of

Adjara can be linked to trends evidenced in the broader Middle East and Mediterranean regions, but further comparative study is required to illuminate the magnitude and directionality of these influences on healing practices in Adjara.

**Kerstin Andrea-Marobela, Barbara Ngwenya, Sundana Simonambango, David Williams, Zabrina Brumme, Mark Brockman, Andersen Raymond, & Ian Tietjen** - *Traditional Medicinal Plant Regimen from Southern Africa that Targets HIV* (T 11:00)  
Despite recent advances, Human Immunodeficiency Virus (HIV) remains a global threat to human health. On the African continent, uneven access to antiretroviral therapies combined with the occurrence of long-term side-effects have led to searches for traditional medicines as alternative or complementary remedies to conventional HIV/AIDS management. Here we document and characterize the antiviral properties of a three-step medicinal plant regimen traditionally used for HIV/AIDS management in Northern Botswana and Zambia. By combining qualitative interviews of traditional healers and users of traditional medicine with laboratory-based in vitro HIV studies, we show that each step consisting of “Mororwe” (*Cassia sieberiana* root), “Mofofu” (*Vitex doniana* root), and “Mukungulu” (*Croton megalobotrys* bark) confer increased potency against HIV. Notably, “Mukungulu” inhibits HIV in vitro at concentrations as low as 0.05 µg/mL and also targets the latent and lifelong HIV reservoirs, indicating a potential therapeutic lead toward ongoing HIV remission and cure strategies. Consistent with the properties of “Mukungulu”, we have isolated two novel chemical compounds (Namushen I and II, named after the traditional healer who first communicated use of “Mukungulu”) which are sufficient to confer these in vitro activities. Our collaborative model, with healers and their patients as equal partners in the research process, is now being used to document and characterize several additional HIV/AIDS regimens in Botswana. Our observations also support the “reverse pharmacology” model where documented traditional knowledge and clinical experiences are incorporated to characterize natural products of therapeutic value.

**Alexandra M. Towns** - *African Indigenous Vegetables for Food Security: An International NGO Perspective* (W 9:30)  
Since 2015, the international humanitarian and development organization Catholic Relief Services (CRS) has carried out African Indigenous Vegetables (AIV) assessments in our food security programs in Malawi, Zambia, Uganda, and Niger. With a team of CRS and local partner staff, data collection included 46 focus group discussions, 27 key informant interviews, 21 household interviews with dietary recalls, 20 market vendor interviews, and botanical specimen collection and identification in local herbaria. We identified household AIV preferences and practices related to collection, cultivation, preparation, consumption and sale on local markets. Our findings identified 90 species overall, including *Amaranth* ssp., *Cleome gynandra*, *Cucurbita maxima*, and *Hibiscus* ssp. that were cited in multiple countries. Our findings also indicated wide-spread interest of the part of communities, agricultural field agents, and health promoters, as well as governments, to expand the cultivation and consumption of AIVs. However, additional research and extension efforts are needed to maximize the contributions that food security actors can make to scaling up these underutilized, nutrient-dense food sources in their communities. We conclude with a proposed research agenda on African indigenous vegetables for food security, including key research questions and a call for multi-sectoral partnerships.

**Kate Utech & Kelly Kindscher** - *Calculating Oshá Root Yield for Stands Using Average Percent Cover by (P)*  
Oshá (*Ligusticum porteri*) is an important medicinal plant in the U.S. Southwest and into Mexico whose roots are harvested as an herbal remedy for flu, sore throat, and other illnesses. However, little is known about population structure, root production, and how much occurs in the wild. In order to determine the population density of oshá in the San Juan and Rio Grande National Forests, we found and delineated at least 29 polygons or stands encompassing separate populations. Populations were defined geographically rather than genetically as they were separated by either large gaps with no oshá occurrence or by the existence of some physical barrier. Each stand (a mapped polygon) consisted of a number of GPS marked waypoints approximately 100m apart on its boundaries. Approximately 20 meters toward the interior of the stand from each waypoint, the vegetative cover was determined in a randomly placed plot, followed by two more plots each located 5 meters away. The amount of cover for our oshá stands averaged 12.98% of the area. Due to our previous work, we can calculate the percent cover of oshá in each stand and we can potentially calculate the weight of roots that each stand would yield.

**Ben-Erik Van Wyk** - *A Review of Ethnobotanical Studies in Southern Africa (1685 to 2017)* (T 9:15)  
The Shenzhen Declaration, adopted by the XIX International Botanical Congress in Shenzhen, China, stressed the urgent need to “value, document and protect indigenous, traditional and local knowledge about plants and nature.” In southern Africa, this process started in 1685, when the Governor Simon van der Stel undertook an expedition to Namaqualand to record the local flora and its uses. Indigenous knowledge about plants can also be found in the accounts of pioneering plant collectors in the eighteenth and nineteenth centuries, such as Thunberg, Masson, Burchell and Gordon. Important early contributions to the documentation of medicinal plants were those of Pappe and Smith in nineteenth century and Watt and Breyer-Brandwijk in the twentieth century. More recent highlights include the review of food plants by Fox and Norwood-Young, and the reviews of Venda, Zulu and Sotho medicinal plants, respectively by Mabogo, Hutching and co-workers, and Moffett. The paucity of information on Khoi and San ethnobotany has been highlighted several times. The traditional home of these ancient cultures corresponds with the rich Cape Flora and its high level (ca. 62%) of floristic endemism. As a result, there is a great urgency to document traditional Khoi-San plant use knowledge before it becomes irretrievably lost to future generations. Recent developments in ethnobotanical research, including the creation of plant use inventories and the documentation of large volumes of new data using quantitative methods, will be highlighted.

**Anne Lucy Stilger Virnig, Jamison Ervin, Christina Supples, & Dhruva Shrestha** - *Food Security: A Local Catalyst for Accelerating Biodiversity Conservation and Sustainable Development* (T 3:00)  
Food production exists at the nexus of social and ecological sustainability, and is an essential dimension of work to achieve the Aichi Biodiversity Targets and Sustainable Development Goals. Over the next two decades, the global population will grow by more than 1.2 billion people, and the demand for food will increase by 35% and for water by 40%. It is clear that a ‘green revolution’ model will not be sufficient to sustain the world’s growing population. Context-specific approaches to food production – drawing on locally-adapted plant varieties, local water-use strategies, and local land management practices – provide diverse solutions to global food production, thereby contributing to both human well-being and ecological sustainability. The UNDP Equator Initiative uses a rigorous peer-review process to identify outstanding local initiatives working to meet environment and development challenges. This paper draws from the Equator Initiative database to analyze 78 community-based groups from a resilience thinking perspective.



Building on the work of UNDP (2015), we created a 'taxonomy' to characterize food security strategies according to the seven principles of resilience developed by Biggs et al. (2012). We then systematically categorized 313 food security strategies used by these groups according to this taxonomy. The purpose of this analysis is to systematically document the breadth of existing community-based solutions for food security and assess the degree to which these solutions provide a means to withstand stresses and shocks. The analysis provides a rich source of data to identify solutions that contribute to sustainability at the local and global levels.

**Gail E. Wagner - *Teaching Ethnobotanical Ethnography (T 11:15)***

Collecting ethnobotanical data requires ethnographic skills. I outline how I have taught over 480 undergraduate students in low-level, no-prerequisite courses to collect data and write hypothesis-driven papers after they have passed a national CITI certification for conducting human subject research. Instruction on process (rather than solely content) is required, and I recommend concentrating on a class project that all the students share.

**Gail E. Wagner - *Conflicted Understanding of Vegetable (M 4:00)***

Vegetable is an interesting and somewhat elusive cultural domain for Americans that refers to selected edible plant portions. As a fuzzy category that is based on function and often learned by example, vegetable is not easily defined. Nevertheless, vegetable is a term used in many American food-related situations despite the fact that the U.S.D.A. does not provide a usable definition of a culinary vegetable. Instead, on the ChooseMyPlate.gov web page, to answer the question "What foods are in the vegetable group?" the following unhelpful answer is given: "Any vegetable or 100% vegetable juice counts as a member of the Vegetable Group". I report on over 680 interviews collected mostly by undergraduate students at the University of South Carolina under a project approved by the IRB. People's categorization of specific foods or dishes as vegetable or not are influenced by a number of factors, including cross-classification with dietary nutritional components, personal likes/dislikes/acquaintance, confusion over whether cooking or combining ingredients alters classification, and confusion between botanical and culinary categories.

**Sarah Walshaw - *Trade, Tools, Transport, and Timber: Potential Contributions from Wood Analysis on the Swahili Coast (W 2:30)***

The Swahili coast of Tanzania supported vibrant trading communities connected through the use of wooden boats, called dhows. For millennia, important wood products including mangrove poles and cinnamon bark were transported by dhow, and a predominance of wood charcoal at archaeological sites speaks to the importance of wood as a local fuel. To date, not much is known about the extent and nature of this local wood trade, or its Indian Ocean entanglements, because wood from archaeological sites has received very little attention. In this presentation, I review historic documents attesting to trade in wood products by the first century CE. Together with ecological information, historic reports can help determine which trees would likely have been used for construction, fuel, crafts, and cuisine on the Swahili coast over the past two thousand years. This information will be valuable in moving wood identification forward and in providing contextualizing data to better interpret anthracological assemblages. It is hoped that a more refined picture of the use of mangrove environments, and other coastal forests, can be drawn. This study is the foundation for a project examining similarities and differences in wood use in Zanzibar and Kilwa during the tenth to sixteenth centuries CE.

**Grace Ward - *Tracing Landraces of Maize in the Central Mississippi Valley (W 11:00)***

After domestication, people remain embedded in the evolution of crops. Plants are introduced into new ecosystems and management strategies that alter future generations, writing events into the genetic histories of those plants that people have engaged with most. The past forty years of paleoethnobotanical analysis in the particularly well-researched region of Eastern North America (ENA) have established it as a hotbed of plant domestication. However, the adoption and diversification of extra-regional domesticates has been the subject of less inquiry, though these processes are essential to the agrobiodiversity of the indigenous eastern North American landscape. *Zea mays* L. ssp. *mays* is a particularly informative crop to track through introduction to the region approximately 1400 years before present, diversification, and intensification due to its genetic plasticity and well-documented role in other agricultural systems throughout the Americas. In order to approach a more complete understanding of the varietal diversity of maize cultivated by indigenous farmers of the Central Mississippi Valley (CMV) of ENA before European colonization, I use morphological markers to track variation in carbonized maize cob assemblages. The material included in this study comes from archaeological sites spanning the northern American Bottom in Illinois south to the Arkansas River confluence. I examine shifts in kernel row number, cupule shape, and other morphologies; attempt to identify patterns across samples, and compare intra- and inter-assemblage variation in order to approach the re-creation of the lost maize landscape of the CMV.

**James R. Welch, Giovane Oliveira Vieira, Aline A. Ferreira, Rui Arantes, & Carlos E.A. Coimbra, Jr - *Social, Cultural, & Economic Determinants of Household Food Diversity Among the Indigenous Xavante People, Central Brazil (T 4:00)***

Among many available frameworks for understanding public health and epidemiological dynamics, social and cultural health determination models articulate concepts of human wellbeing with multiple dimensions and scales of social, economic, environmental, and behavioral factors. One of the challenges involved in using health determination models is ascertaining interactions between variables that impact human wellbeing less directly, such as circumstances affecting which foods are available for consumption by members of households within a community. In this paper, we evaluate the contributions of diverse social, cultural, and economic determinants of household food diversity in eight Indigenous Xavante villages in the Pimentel Barbosa Indigenous Reserve, Central Brazil. Over the last 60 years, this population has experienced environmental, economic, and social changes with major repercussions for the community's foodways and nutritional health. Participation in the market economy has led to a mixed dietary economy with simultaneous reliance on local wild and garden resources, as well as industrialized foods. Accompanying these changes is evidence of emergent socioeconomic and nutritional differentiation between households and villages. Considering household food diversity as a potentially useful epidemiological indicator at the nexus between nutritional, economic, social, and environmental processes, we assess village and household variables contributing to its patterns of variation according to three groups of foods: wild, garden, and industrialized. We place special emphasis on determinant factors that reflect Xavante cultural notions of social and physical wellbeing.

**Ashton Welcome** - *Taxonomic Diversity & Spatial Patterns of Indigenous & Naturalized Food Plants of Southern Africa (W 9:45)*  
Southern Africa (including South Africa, Lesotho, Swaziland, Namibia and Botswana) is rich in botanical and cultural diversity. A comprehensive inventory of edible plants revealed interesting patterns when compared to the rest of the world. Surprisingly, the Apocynaceae turned out to be the most species-rich food plant family of the region. The ca. 1730 edible species are mostly from the families Apocynaceae (131), Fabaceae (111), Asteraceae (71), Poaceae (54) and Iridaceae (58). In contrast, the Fabaceae, Rosaceae, Poaceae, Asteraceae and Rutaceae ranked the highest for the rest of the world. Fruits and leafy vegetables are the most species-rich categories of use in the region; others include underground storage organs (eaten raw or cooked), gums, flavorants, milk additives, yeast substitutes and alcoholic or non-alcoholic beverages. A very important category that will also be highlighted is that of famine foods. The Ethnobotanical Overlap Method has been developed, using ArcMap (GIS platform) and collection data to determine plant use and preference patterns within the distribution ranges of all 19 southern African language groups, as well as the availability within the biomes. Nutritional data from the literature were used to determine the patterns of nutritional availability within the region. Some interesting differences were found for the levels of vitamin C in wild fruits and the carbohydrate content of edible underground storage organs. The insights resulting from this study have proven to have impact beyond the field of ethnobotany and such an inventory could have profound implications for the food security of the region.

**+ Daniel R. Williams & Paul E. Patton** - *The Role of Polymorphism in Chenopodium Domestication (P)*

*Chenopodium* species were domesticated independently in at least three regions the Americas. In archaeobotanical samples, domesticated chenopods are distinguished from wild chenopods by morphological characters including seed coat thickness and truncate seed margins. Modern wild chenopods produce polymorphic seeds with a range of seed coat thicknesses, margin shapes, and colors. Light colored “red morph” seeds produced by wild chenopods have similar morphology to domesticated chenopod seeds while dark colored seeds generally have morphology not associated with domestication. To study polymorphism in relation to domestication syndrome, wild chenopod seeds were collected from individual plants and separated into morphological types by color. From each plant, ratios of seed morphs were counted, morphological measurements were taken, and germination was tested under a range of stratification and germination conditions. The same measurements and tests were conducted on the seeds of modern domesticated chenopods. Results show differences in dormancy and overwintering survival based on morphological type. Differences in the ratios of seed morphs among wild chenopods suggests differential reproductive success dependent on the overwintering environment, i.e., the presence or absence of seed saving practices. The findings support the practice of seed saving as a selective pressure in the domestication *Chenopodium* separate from artificial selection and weed bed competition. Future characterization of the traits underlying *Chenopodium* seed polymorphism will inform re-domestication efforts and crop improvement programs using wild germplasm.

**Nellie Winters** - *The Land is Full of Beauty and Good Things to Eat (T 4:00)*

Nellie Winters is an Elder from Okak Bay living in the Inuit Community of Makkovik, Nunatsiavut (Labrador). She was raised in Okak Bay, on the north coast of Labrador. Her family was relocated to Makkovik in 1956 when services to the area were cut off by the provincial government. Nellie Winters is a respected artist whose works, including traditional sewing, embroidery, and caribou tufting, are commissioned and exhibited by galleries, museums and private collections both in Canada and internationally. Her recent publications include an article in the Journal of Ethnobiology Special Issue on Fishing (2017) featuring her Inukluk illustrations, and the book *Inoviasitutet katattauninga / The Christmas Drop*, based on her story and illustrated by her granddaughter Jessica Winters. In 1976, she was personally invited to demonstrate her artistic work at the Montreal Olympics, an event she discussed during her presentation at the 2017 Society of Ethnobiology conference in Montreal. In her presentation this year, Nellie Winters discusses how plants and animals are more than traditional foods – they are part of everyday life through every season and make life possible and beautiful.

**Olubunmi Abosede Wintola, Wilfred Otang Mbeng, & Anthony Jide Afolayan** - *The Prevalence and Perceived Efficacy of Medicinal Plants Used for Stomach Ailments in the Amathole District Municipality, Eastern Cape, South Africa (W 4:00)*

The high rate of immuno-compromised individuals in South Africa has made an estimated 70–80% of black people consult with traditional healers before consulting with formal health-care services. The study aimed to evaluate the prevalence and perceived efficacy of medicinal plants used in the management of stomach ailments in the Eastern Cape, South Africa. The study was carried out by interviewing 101 local inhabitants with a mean age of 33.56, comprising 53 (52%) males and 48 (48%) females in 4 locations of the Amathole District. Twenty three plant species distributed in 15 families and 19 genera were cited for the treatment of one or more stomach disorders. The most representative family was Xanthorrhoeaceae (3 species) while Apiaceae, Apocynaceae, Euphorbiaceae, Fabaceae and Lamiaceae were represented by 2 species each. The species with the highest use-values (UV) were *Aloe tenuior* (UV = 12), *Strychnos henningsii* (UV = 11), *Sonchus asper* (UV = 10), *Ricinus communis* (UV = 12), *Hypoxis argentea* (UV = 10), while *Acacia mearnsii*, *Acokanthera oppositifolia* and *Zingiber officinale* each had a use-value of 9. Herbs constituted 44%, trees 13% and shrubs 43%. The leaves (57%) were the most frequently used plant part for the treatment of the stomach diseases, followed by the bark and root (10%) each. Seven methods of preparations were mentioned, among which infusion (34%) was the most frequently mentioned, followed by decoction (23%) and juice (16%). Administration of the different plant parts was mainly oral (100%).

**^ Saskia Wolsak** - *Of Fishpots, Bonnets, and Wine: The Cultural History of the Bermuda Palmetto (W 10:30)*

The ethnobotanical history of Bermuda presents a window into the effects of Atlantic World colonialism on the plant knowledge of translocated, hybridized communities. Settled in the early 1600s, the previously uninhabited island soon gave rise to a set of hybrid cultures formed by people from around the Atlantic Basin. Each group arrived with ethnobotanical knowledge which they rapidly adapted to the new social-ecological climate. This presentation will focus on the historical ethnobotany of the endemic *Sabal bermudana* (Bermuda palmetto) which, until the 1900s, played a key role in the islanders' survival: it was a source of food, shelter, and household goods to early settlers; it was used for wine by early African-Bermudians, a practice which was systematically outlawed as Bermuda became a slave society; its leaves were central to the female-led plaiting and hat-making industry of the 1700s, facilitated by Bermuda's central role in maritime trade; it was a source of fascination to natural historians visiting the island in the late 1800s, highlighting the rise of Western science as a type of ethnobotany; and, now an endangered species, it is central to

today's conservation and cultural revitalization movements. From a broader perspective, the 500-year evolution of the use and perception of the palmetto may serve as a framework to better understand the driving forces behind shifts in plant knowledge under colonialism generally, including those processes of deracination, adaptation, legislation, privatization, exploitation, commodification, industrialization, globalization, conservation and, finally, cultural revitalization. Inviting the question: Where to from here?

**Steve Wolverton & Dana Lepofsky - *The Mandala Exercise for Increasing Ecological Understanding (W 3:15)***

It is difficult in the typical college classroom to encourage opportunities that increase ecological understanding, or values resulting from direct encounters with outdoor environments. We adapted the approach developed by David Haskell in his popular book, *The Forest Unseen: A Year's Watch in Nature*, for our ethnobiology and ethnoecology classes. In his book, Haskell describes his recurring visits to a square meter of an old-growth Appalachian forest in eastern Tennessee, which he termed his mandala—a term he used to metaphorically describe continual processes of ecological change in a place. We set up mandala exercises for our students, such that they would establish routine visits to small outdoor places, to record observations in terms of biota, place, and people (including themselves), and to note changes over time. Each week, students might have chosen a biotic theme to explore, research it as a thread, and compose a short blogpost about their experiences. Alternatively, they may have simply recorded human-biota interactions in their mandalas. We found that student engagement and writing were exceptional. We describe outcomes of the exercise in this presentation.

**Do Yeun Won, Seung Han Kim, Yang Ae Choi, Myeong Hwan Jang, Ji Yun Jung, Im Soo Kim - *Eco-friendly Method to Decrease Injury of Ginseng Rhizome Rot (P)***

Ginseng is a perennial plant and harvest of it needs around five years after transplanting. Since mass cultivation of it in the field by human, diseases was caused severe problem leading to death of plant in cultivation field. This study was carried out to find out the optimum eco-friendly materials for suppression of rhizome rot on *Panax ginseng*. The four eco-friendly materials were selected and each materials were diluted by manufacturer's guide as 150 dilution of Microbial agent, 200 dilution of lime sulfur mixture and Lime-Bordeux Mixture 8-8 type, 1,000 dilution of Sodium Hypochlorite(NaOCl). As a control pesticide, a Floodoxonil, Iminostadine tris-allylsilate·Polyoxin B were used. Regarding the treatment method of eco-friendly materials, 2 times and 4L per 1.62m<sup>2</sup> were perfused at the beginning of March and early April, and the leaves were sprayed 1 time at the beginning of May. Comparing the chemical properties of the subsoil with the topsoil's, Nitrate nitrogen(NO<sub>3</sub>) content and electric conductivity(EC) appeared in the topsoil where ginseng rhizome was located more than in other parts. As a result of treatment of eco-friendly product, the injury of rhizome rot was mostly decreased by Lime-Sulfur Mixture treatment, followed by agricultural chemicals, Microbial material and Sodium Hypochlorite. In addition, the rate of pathogens isolated from root rot symptom was 53.3% of *Botrytis* sp., 36.7% of *Fusarium* sp., 6.7% of *Rhizoctonia* sp., 1.7% of *Pythium* sp., and 1.7% of *Alternaria* sp.. Therefore, it was effective to treat Lime sulphur on decrease of the injury by ginseng rhizome rot.

**Ye ji Yoon, Kwangjae Lee, Jaehee Won, Jaehyung Yi, Jeongsu Jeong, & Youngmoon Mo - *Proper Shading Material in Rain Shelter House for Direct Seedling of 4 Years Old Ginseng (Panax ginseng C.A. Meyer) (P)***

Korea is a ginseng suzerain country, and it is mainly cultivated in the field. Recently, Ginseng cultivation using rain shelter house is increasing. It prevents the inflow of rainwater and suppresses the occurrence of pests and diseases, which is advantageous for eco-friendly cultivation. Also, Ginseng cultivation for direct seedling using the rain shelter house is effective for reduction of labor, excellent growth. Based on these advantages, it is necessary to select the shading materials in rain shelter house for direct seedling of 4 years old ginseng in the northern area, Korea. The rain shelter house shading method was PE film with layered polyethylene net 75%, blue-white duplicated PE film 85, 90%. We compared with conventional shade structures. In case of blue-white duplicated PE film 85%, yield of 4 years old ginseng was increased by 14% compared to shading PE film with layered polyethylene net 75%. Also, growth characteristics were good both above ground and underground. We concluded that blue-white duplicated PE film 85% could be a great shading method for 4 years old ginseng cultivation in northern region, Korea.

**Grady Zuiderveen, Eric Burkhart, & Joshua Lambert - *Effects of Harvest Time and Forest Site Conditions on Alkaloid Content in Goldenseal (Hydrastis canadensis L.) (W 3:15)***

Goldenseal (*Hydrastis canadensis*) is an Appalachian forest plant whose roots and rhizomes are widely used for medicinal purposes. Much of the commercial raw materials originates from wild populations in the eastern United States and overexploitation concerns persist, fueling interest in forest-based stewardship and cultivation (i.e., forest farming). In order to meet market demand with a sustainably-harvested, quality product, it is necessary to have a better understanding of factors that influence key medicinal constituents (e.g., Berberine, Hydrastine, and Canadine). Previous results we obtained from a single Pennsylvania wild population suggest that time of harvest can dramatically influence the alkaloid content in the dried root and rhizomes. Alkaloid content was found to peak in July (fruiting stage) and October (senescent stage), while samples between those times fell well below current recommended industry constituent levels (c.f., United States Pharmacopeia). Accordingly, our current research more deeply investigates the effect of harvest timing by expanding previous work to include (1) increased population sampling (including "farmed" plants); (2) comparison of aerial portion and root/rhizome chemistry; (2) time of day harvested; (3) full season phenological stages; and (4) drying temperature. Samples collected in 2017 are currently being analyzed using High Performance Liquid Chromatography and results will be shared in this presentation. These results will help identify production, harvest, and post-harvest factors that can influence quality and may assist in guiding more consistent forest stewarded or farmed production.

**Grady Zuiderveen & Eric Burkhart - *"Stocking the Hunting Ground:" Insights into the Source of "Wild" Ginseng (Panax quinquefolius L.) in Pennsylvania (P)***

Pennsylvania is one of nineteen states in the United States that exports wild American ginseng (*Panax quinquefolius* L.) roots into the international marketplace. Given concerns over sustainability, there is a need to understand the wild supply chain along with any husbandry involved in the production of exported roots. Since 2012, we have been employing an ethnobotanical approach which gathers confidential information into wild ginseng supplies from Pennsylvania via an annual survey instrument mailed to people involved in the sale of wild ginseng (gathered from licensed buyer transaction logs). Results indicate that a variety of husbandry practices are used to produce ginseng which ultimately is sold and traded as "wild," ranging from intensive agroforestry (e.g., "forest farming") to enrichment plantings. The first five years (2012-2017) have revealed that 23% to 57% of sellers participating in this

survey effort indicated that their 'wild' ginseng originated from intentional planting on forestlands. This scenario presents a dilemma regarding interpretation of "wild" harvest data because current industry reporting mechanisms are inadequate to accommodate the complex range of husbandry practices being utilized, and which often result in "wild" appearing roots. Producer concerns and misgivings about issues such as price gouging, theft, taxation – coupled with a lack of consensus around what actually constitutes "wild" – drives secrecy around forest based husbandry and cultivation. We suggest that annual confidential surveying of root sellers could serve as an important tool to help inform ginseng conservation and management programs, and provide insights into public involvement in forest farming.

# *Save the Date*

2019 Annual Meeting  
June 2-6, 2019

University of  
Cincinnati

**SOCIETY**

*for Economic Botany*

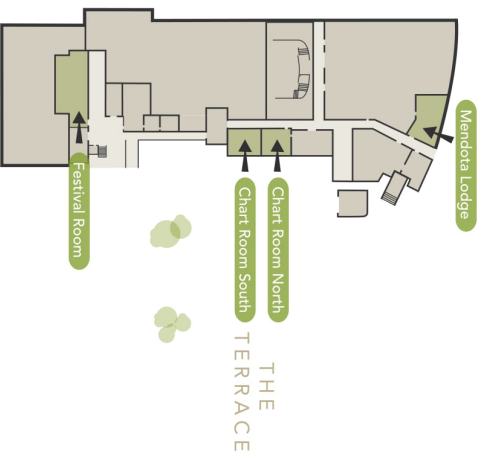


**THEME - Agroforestry: From Indigenous Management Practices  
to Climate Change Buffer**

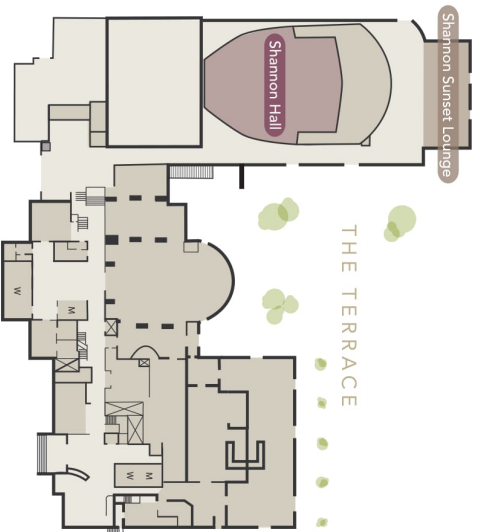
**ABOUT OUR SPACES**

Meeting spaces on the second and third floors specifically recognize the UW and the State. Second floor rooms honor UW-Madison students, alumni and campus ideas. Motif and art in each room are linked to their namesakes.

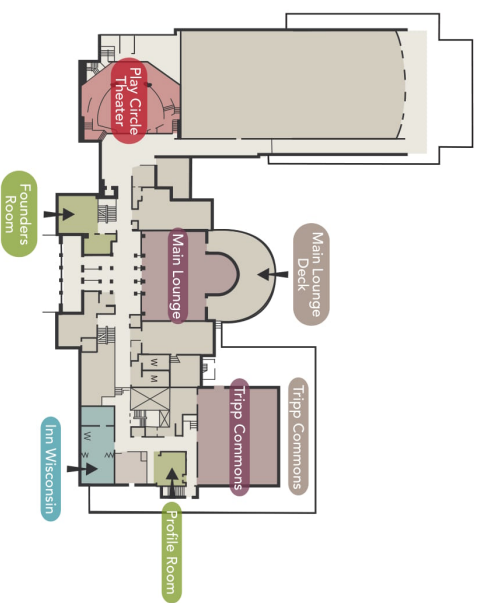
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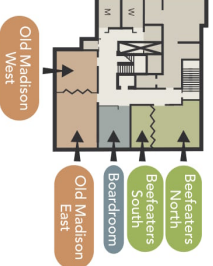
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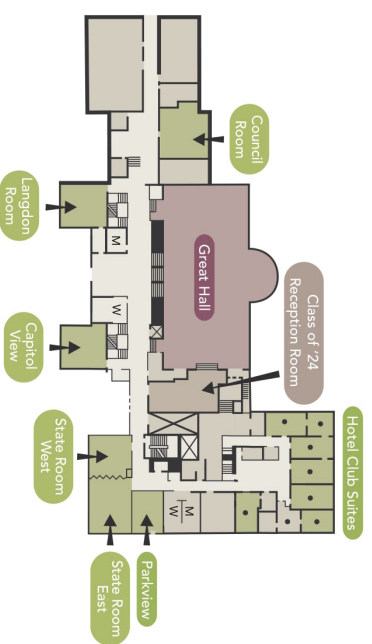
Second Floor



Third Floor



Fourth Floor





# SAVE THE DATE

**2019 Society of Ethnobiology Annual Meeting**

May 8–11, 2019

University of British Columbia, Vancouver, Canada

*The traditional, ancestral, and unceded territory of the  
hə́ŋqəmíhəm̓-speaking Musqueam people.*



**"Salmon People"**  
by Arianna  
Augustine

The conference theme is "Voices" to honor ethnobiology and language, song, stories, and activism. However, all ethnobiological oral or poster submissions are welcome.

For more information about the logo artist and design, or the conference, please visit our website, [www.ethnobiology.org/upcoming/conference](http://www.ethnobiology.org/upcoming/conference)

**Questions?** Dana Lepofsky [dlepofsk@sfu.ca](mailto:dlepofsk@sfu.ca) or Liz Olson [conference@ethnobiology.org](mailto:conference@ethnobiology.org)