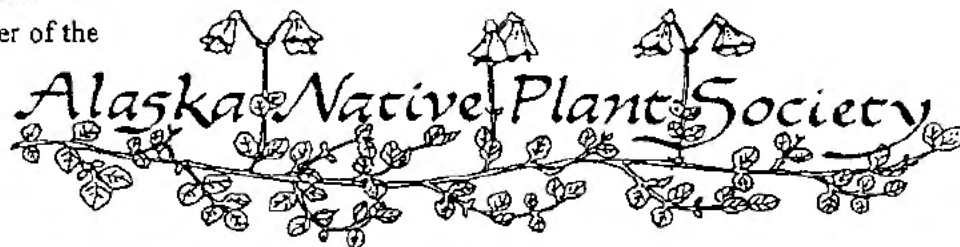


Borealis

the newsletter of the



PO Box 141613, Anchorage, Alaska

Apr/May 2019

Join us at our Next Meetings!

Monday, April 1, 7:00 PM

Main Topic: "Equisetum – Horse Tails
about Horsetails"

Speaker: Marilyn Barker

Mini-Botany – "How a Plant Moves"

Speaker: Marilyn Barker

Plant Family: Roseaceae: *Dasiphora*

Speaker: Tom Choate

Monday, May 6, 7:00 PM

Main Topic: "Alaska Plant Fossils"

Speaker: Anne Pasch

Professor Emeritus, UAA

Anne is an expert scientist and extraordinary story-teller. She will keep you entertained!

Mini-Botany – "What a Plant Hears"

Speaker: Beth Baker

Plant Family: Roseaceae: *Comarum*

Speaker: Tom Choate

All of our meetings, unless otherwise announced, are held at the Campbell Creek Science Center, S600 Science Center Drive, just off Lake Otis Parkway, south of Tudor.

For the latest information about ANPS events and field trips, go to www.aknps.org/

"Like" Us on Facebook!

SEASON FINALE

Indoors to Outdoors

Our May 6 monthly meeting will mark the end of another season of indoor botany for the Alaska Native Plant Society. We'll all be eager to head for the hills, and the meadows, and the coast, and even the dunes to look for signs of our natural world moving into another season of its own.

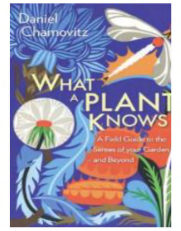
Beth Baker reports that there is one slot left in the moss and lichen workshop May 16-18 and 2 left for Sitka field trip, June 16-20. If they fill she will also take a wait list, in case folks cancel. You can email her at daisymae@mtaonline.net if interested, or call and leave message

INTRO TO ALASKA'S FLORA – (BIOL F195-UX1) is once again being offered as an online botany lab, taught by Steffi Ickert through UAF. To create a lab experience, Ickert-Bond carefully chose technology that allows students from all over the state (and even outside Alaska) to collect data, perform dissections and have a hands-on learning experience within the flora's native environment. Instead of traditional course materials like textbooks, students purchased a wide-angle macro lens that connects to their smartphone or tablet. This 2-inch lens, which costs about \$15 and easily attaches and detaches, lets students take high-resolution, detailed photos of flora on the go.

This class will have two synchronous online meetings which will be coordinated with students. All course materials will be made available through Blackboard and the class website. Students must purchase a laboratory kit that includes a plant dissecting kit. Students will also need a smartphone or tablet, capable of taking photographs and that can be fitted with a macro lens to take magnified images of flowers and dissections. Software needed includes Google docs, Google slides, iNaturalist, Thinglink. Students can register at UAOnline. Non-University of Alaska students can register via the [eLearning registration form](#).

SAVE THE DATE: AMGA Annual Statewide Conference, "Urban Gardening in the Last Frontier" at UAA Campus, Lucy Cuddy Hall. The Keynote speaker Robert Kourik, is author of "Understanding Roots", and "Roots Demystified". For more information on the conference go to www.alaskamastergardeners.org/conference.html

"What A Plant Knows" – What a Plant "Hears"



At our May meeting, Beth Baker will complete our study of "What a Plant Knows" by discussing what WE know about how plants respond to sound. Pseudoscience has been claiming for years that plants respond to music, and while that hasn't yet been scientifically proven, new research suggests that some plants may be capable of sensing sounds, such as the gurgle of water through a pipe or the buzzing of insects. A recent report from scientists in Israel found evidence that plants can actually *hear* the buzz of passing bees and produce sweeter nectar in response to entice the flying insects in.

Based on observations of evening primroses (*Oenothera drummondii*), the team behind the new study discovered that within minutes of sensing the sound waves of nearby bee wings through flower petals, the concentration of the sugar in the plant's nectar was increased by an average of 20 percent. The flowers even seemed able to tune out irrelevant background noises, such as the wind. This capability could well give some plants an evolutionary advantage, say the scientists, maximizing their chances of spreading pollen.

A 2014 study showed the rock cress *Arabidopsis* can distinguish between caterpillar chewing sounds and wind vibrations—the plant produced more chemical toxins after "hearing" a recording of feeding insects. "We tend to underestimate plants because their responses are usually less visible to us. But leaves turn out to be extremely sensitive vibration detectors," says lead study author Heidi M. Appel, an environmental scientist now at the University of Toledo.

Another more gruesome study released in 2014 by scientists at the University of Missouri claims that some plants can respond defensively to the sound of something chewing on them. They sense the sound vibrations and produce and release mustard oil to ward off the insects. You can watch a video of this at <https://vimeo.com/99635253>.

The science of plant interaction with sound is called "phytoacoustics" and scientists all agree that while these new studies are exciting, there's still a lot left to learn about how plants perceive sound and the mechanism of those relationships.

Borealis

the newsletter of the



ALASKA NATIVE PLANT SOCIETY

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Anchorage Chapter Program Coordinators

Membership	Mary Stella
Plant Family	Dennis Ronsse
Mini-Botany	Marilyn Barker
Field Trips	Dennis Ronsse

Newsletter ("Borealis")

Editor	Ginny Moore
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Borealis is published bi-monthly, fall through spring. Articles may be sent to Ginny Moore, , Anchorage, AK 99516. Phone or FAX: , E-mail: elfinwood@gmail.com



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- **You still earn your Rewards Points, Fuel Points, and Rebates, just as you do today.**
- If you do not have a Rewards Card, they are available at the Customer Service desk of any Fred Meyer store.
- For more information, please visit www.fredmeyer.com/communityrewards.

Range Expansion - Invaders or Residents?

Bruce Bennett
Yukon Conservation Data Center
White Horse, Yukon CANADA

Editor's Note: Last spring Bruce Bennet gave a talk at the Alaska Rare Plant forum entitled "Range Expansion - Invaders or Residents?" . The topic seems so germane that we asked if he would be willing to write up a summary for our newsletter. The Yukon Conservation Data Centre (CDC) is a member of a network of data centers and Natural Heritage Programs around the world coordinated by NatureServe International. The Yukon CDC gathers, maintains and distributes information on all Yukon animals, plants and ecological communities and maps the known localities of those that are of conservation concern. <http://www.env.gov.yk.ca>

As our climate warms, species ranges are shifting. Some, such as American Pika (*Ochotona princeps*), have shifted to higher elevations as the forests slowly move up alpine slopes (Brown and Knowles 2012; Grayson 2005). Others, such as beaver (Jung et al. 2016) and moose, shift northwards as willows expand in range and height. Many animals such as Mule Deer have moved northwards into Yukon, possibly with the help of new corridors such as the Alaska Highway. When I first moved to Yukon in 1995, I discovered a lone crow. I was quickly told that Yukon did not have crows, but no one had told the crow that either. By 2008, the American Crow (*Corvus brachyrhynchos*) were breeding in Whitehorse. Similarly, the House Sparrow (*Passer domesticus*) was first seen in Whitehorse in 1994 and attempted to overwinter. By 2007 there was a breeding population in Whitehorse which are now well-known residents (YCDC 2019). The rise of the House Sparrow and American Crow in Yukon started my reflection on how society views these two species, as invaders or as rare species. American Crow is a native species that evolved in North America. House Sparrow evolved in Europe and was first introduced to North America in 1851 in Brooklyn, New York. Through the later part of the 19th century additional introductions and movement of the birds resulted in the House Sparrow being established throughout the lower 48 states. House Sparrows were established in California by 1910. Since then, House Sparrows have undergone rapid evolution in their new countries, developing unique local races (Johnston and Selander 2008). The arrival of the House Sparrow to Yukon is the result of a species range expansion, not unlike the beaver, deer, and moose, and coincides quite closely with the arrival of the crow. The species is still considered to be exotic even though 500 generations have passed since their introduction. Even though the species has become established in Yukon, in North America as a whole the House Sparrow populations declined by over 3.5% between 1966 and 2015, resulting in a cumulative decline of 84%, according to the North American Breeding Bird Survey (Sauer et al. 2017).

The situation becomes even more complex with plants. Typically exotic plants are species that are not native to a region but have been introduced either purposely or accidentally through the activities of man. However lines get blurry between exotic and native, particularly in a time of rapidly expanding native populations. In 2015, I surveyed the village of Tuktoyaktuk, Northwest Territories. Whenever I visit northern communities I am always in the lookout for exotic plants. In this case I found nothing out of the ordinary except for a single plant of Prostrate Knotweed (*Polygonum aviculare*). It is possible that it arrived with human assistance, but it also is possible that it was spread by birds. It becomes even more complex as there are both native and exotic subspecies of this weedy species. I began to review other vascular plant species. Broad-leaved Cattail (*Typha latifolia*) was first known from some ponds in central Yukon (Porsild 1975; YCDC 2019), the only known locality until the mid-1970s when it began to be found in southeast Yukon (YCDC 2019). It has since rapidly spread throughout southern Yukon north to Dawson City. The Umbellate Hawkweed (*Hieracium umbellatum*) was until recently considered to be a rare species in Yukon restricted to hot springs (Douglas et al. 1981; Cody 1996). By 2004, plants had reached the Alaska Highway in Watson Lake, in just 3 short years the species rapidly expanded along the highway to Whitehorse, often forming monospecific stands similar to the invasive species Perennial Sow-thistle (*Sonchus arvensis*).

A well-known invasive species in Alaska, Bird Vetch (*Vicia cracca*), has a native sister species, American Vetch (*Vicia americana*). Once again a rare species, once restricted to hot springs in southeast Yukon (Douglas et al. 1981; Cody 1996) is rapidly expanding throughout Yukon (Cody et al. 1998, 2000, 2004, 2005; Bennett and Mulder 2008) and is now found as far north as the Dempster Highway in Yukon and Inuvik, Northwest Territories. It colonizes undisturbed open forests, and successfully moves both along roads and river.



Extensive patches of American Vetch (*Vicia americana*) were found in Carmacks in 2016. Photo B. Bennett
As the climate continues to warm and habitats get wetter, more species, both those of European origin and those native to North America, are moving rapidly northward. The rate may be unrepresented and clearly not well studied or documented. Will these new arrivals be viewed as invaders or additions to the native flora and fauna?

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FROM WHAT WE GATHER



A new study published in *Ecology Letters* is using observations made by Henry David Thoreau -- 19th-century American naturalist, social reformer, and philosopher -- to explore the effects of climate change on tree leaf-out and, as a result, the emergence of spring wildflowers.

The paper was coauthored by Susan Kalisz, head of the University of Tennessee, Knoxville's Department of Ecology and Evolutionary Biology, and Mason Heberling, a National Science Foundation postdoctoral research fellow affiliated with UT. Researchers from the University of Maine, Boston University, and Syracuse University also participated in the research.

The study draws on scientific observations initiated by Thoreau in Concord, Massachusetts, in the 1850s. These observations, combined with current research, include tree and wildflower leaf-out dates measured for 37 separate years between 1852 to 2018. "Leaf-out" refers to the time of spring in which a species of plant begins producing leaves. A change in the timing of this stage has downstream consequences for other elements of the ecosystem.

Temperatures in Concord have warmed by 3 degrees Celsius (5 degrees Fahrenheit) over the past century. In this same time period, tree and wildflower leaf-out dates have shifted significantly.

"Wildflowers are now leafing out about one week earlier than 160 years ago, but the trees are leafing out two weeks earlier," said Caitlin McDonough MacKenzie of Boston University. "Understory wildflowers need the sunny conditions before the trees leaf out for their energy budgets."

To understand the impact that tree leaf-out could have on wildflower growth, the research team compared the Concord observations to photosynthesis data collected by Heberling and Kalisz in a forest in Fox Chapel, Pennsylvania, as part of a long-term field experiment.

"Long-term research is invaluable for detecting changes that cannot be quantified over shorter time scales," said Kalisz.

By adapting these measurements, the team calculated how temperature-driven shifts in tree leaf-out have affected wildflowers from Thoreau's time until now. "Combining our work from Pittsburgh with Thoreau's data revealed an overlooked yet critical implication of how our changing climate is affecting native wildflowers beloved by so many people" Heberling said.

The combined analysis shows that wildflowers and trees differ in the way their leaf-out patterns respond to climate change, and those differences could already be hindering wildflower abundance and flowering, with greater effects in coming years.

As the climate warms, the window of time between wildflower emergence and tree leaf-out will likely shorten further, leaving wildflowers less time to photosynthesize in the spring. Current climate models predict a temperature increase of 2.5 to 4.5 degrees Celsius (4 to 8 degrees Fahrenheit) in the northeastern US by 2080 -- potentially more than double the temperature increase that has been observed over the past century.

Information provided by **University of Tennessee at Knoxville**.

Journal Reference:

1. J. Mason Heberling, Caitlin McDonough MacKenzie, Jason D. Fridley, Susan Kalisz, Richard B. Primack. **Phenological mismatch with trees reduces wildflower carbon budgets**. *Ecology Letters*, 2019; 22 (4): 616 DOI: [10.1111/ele.13224](https://doi.org/10.1111/ele.13224)

It Takes One To Know One

Similarity to resident alien species increases establishment success of new invaders

A recent study by researchers in Europe, led by Christine Sheppard of the University of Hohenheim, Germany and published in January 2018, investigated the role that previously established alien species play in facilitating or hindering new invasions in plant communities. As we plant our gardens and

Darwin's Naturalization Conundrum

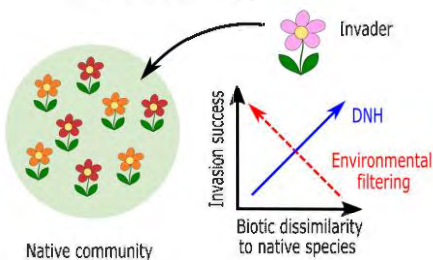
Darwin originally proposed that alien species that have no close relatives in the introduced range should be more likely to establish (Darwin, 1859). This idea, coined Darwin's naturalization hypothesis (DNH), proposes that dissimilarity to native species may benefit alien species establishment due to empty niches, reduced competition or a lack of natural enemies (Darwin, 1859; Figure 1a). Conversely, Darwin also suggested that relatedness to the resident community should facilitate establishment due to similar adaptations to environmental conditions (environmental filtering). These two opposing hypotheses are jointly known as Darwin's naturalization conundrum (Diez, Sullivan, Hulme, Edwards, & Duncan, 2008; Thuiller et al., 2010). In line with the contradictory theory, empirical studies of the DNH have reported mixed results (Carboni et al., 2016; Diez et al., 2008; Park & Potter, 2013; Strauss, Webb, & Salamin, 2006). Furthermore, recent studies that considered functional similarity in addition to phylogenetic relatedness found contrasting results between the two approaches (Marx et al., 2016; Ordonez, 2014). However, all previous tests of the DNH and community invasibility, using either the standard phylogenetic approach or functional similarity, neglected the contribution of resident alien species to invasion success.

Conclusions

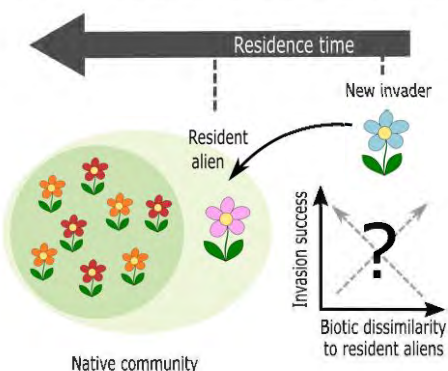
Following 500 years of species introductions around the globe and the ongoing arrival of new species facilitated by global change and trade, it is urgent to consider the effects of resident alien species on invasion success of subsequent invaders. Our study provides novel insights into how biotic similarity to resident alien species may affect new invaders. The generality of our principal finding that invader similarity may increase invasion success needs to be tested across other study systems. Inference of the actual ecological mechanisms at play is difficult from observed species associations, as various processes such as a multitude of biotic interactions and habitat requirements could produce these patterns. One hypothesis based on our results is that with greater invader similarity, invasion success increases possibly due to greater facilitation or relative interaction strengths leading to an overall facilitative effect. Whether this hypothesis applies or the

suggested alternatives (competition driven by fitness differences or abiotic filtering based on recent environmental changes) should now be tested with an experimental approach to provide conclusive evidence. Determining how initial invasions pave the road for subsequent invasions contributes a new aspect to our understanding of community assembly and has important implications for multispecies management decisions and conservation of permanent grasslands.

(a) Traditional test of Darwin's naturalization hypothesis

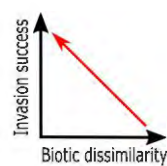


(b) Additional test of alien interactions

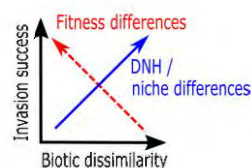


(c) Possible mechanisms

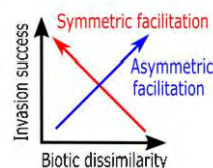
Environmental filtering



Competition



Facilitation



<https://onlinelibrary.wiley.com/doi/epdf/10.1111/ddi.12708>

FROM OUR BOOKSHELVES



Fern Fever: The Story of Pteridomania

by Sarah Whittingham
2012

"A fascinating literary foray" - *Canadian Gardening*

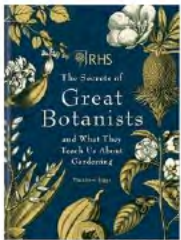
"This rarefied botanical pursuit is usually considered a British eccentricity, but Ms. Whittingham has turned up much proof that it reached American shores." - *The New York Times*

"One of those remarkable tales you never knew you needed to read and that, once begun, you never want to put down" - *Dallas Morning News*

"Pteridomania or Fern Fever took a frantic hold in Britain from the 1840s. It was a craze fostered by an array of books and magazines and special equipment designed for fern hunting trips and the cultivation of the finds in delicate fern cases.

Sarah Whittingham has searched every nook and cranny for her subject, finding ferns in splendid glazed ferneries, Pulhamite grottoes and decoratively across every imaginable surface in the Victorian home. You would sit on your Coalbrookdale 'Fern and blackberry' garden bench and sup from your Ridgway 'Maiden Hair Fern' dinner service.

The industrious Victorians lavished much love and care (and knowledge) on their beautiful fern albums. This ravishing book shines a sympathetic light on an enthusiasm that looks as if it might well take hold again." Publisher's Description



The Secrets of Great Botanists – And what they teach us about gardening

By Matthew Biggs
Royal Horticultural Society
October 2018

An informative and beautifully-presented guide to 35 botanists, plant collectors and gardening pioneers of past and present, from the creators of the bestselling *RHS Botany for Gardeners*.

"Botanists are the trailblazers who first discovered how plants work and collected from around the world many of the species that we find in our gardens today. This informative and beautiful guide presents the stories of 35 plant collectors and gardening pioneers of the past and present, including Joseph Banks, Asa Gray and Marianne North.

Arranged in chronological order, each profile covers one botanist, presenting their life story, discoveries and legacy, while special feature pages reveal their secrets, exploring the qualities that brought them success and showing what ordinary gardeners can learn from them.

Illustrated with beautiful period botanical watercolors and vibrant photographs, *RHS The Secrets of Great Botanists* will provide inspiration and practical guidance for gardeners of all levels, from successful plant cultivation to adding interest to your garden." Royal Horticultural Society

The RHS publications are available from Amazon and other US booksellers, but if you check out their own website you'll find lots of other fun titles, including "*Genealogy for Gardeners*", "*Latin for Gardeners*". <http://www.rhshop.co.uk>

ANNUAL MEMBERSHIP APPLICATION/RENEWAL

The Alaska Native Plant Society was organized in 1982 by an enthusiastic group of amateur and professional botanists. It is a non-profit educational organization with the goal of uniting all persons interested in the flora of Alaska. Membership is open to any interested individual or organization. If you wish to join us, please indicate the category of membership you desire, fill in the form below and mail it with the appropriate remittance to:

**Alaska Native Plant Society,
P.O. Box 141613,
Anchorage, AK 99514**

STATUS New RENEWAL

CATEGORY

- | | | |
|--------------------------|-------------------|------|
| <input type="checkbox"/> | Full-time Student | \$12 |
| <input type="checkbox"/> | Senior Citizen | \$12 |
| <input type="checkbox"/> | Individual | \$15 |
| <input type="checkbox"/> | Family | \$20 |
| <input type="checkbox"/> | Organization | \$30 |

Name _____

Address _____

City: _____ State _____ Zip _____

Telephone: (Home) _____ (Work) _____ E-Mail: _____

Membership is on a calendar year basis.

HERE AT LAST!

The April/May hard copy of the newsletter did not get mailed out to members who requested snail-mail communications. We apologize for any confusion and hope you'll have time to enjoy it now, even though you should be outside!

Alaska Native Plant Society
P.O. Box 141613
Anchorage, AK 99514