



# Koma Kulshan Chapter WNPS Newsletter

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## Find Koma Kulshan Online

**Website:** [www.wnpskoma.org](http://www.wnpskoma.org)  
**Facebook:** WNPSKomaKulshan

## Programming Committee

We're looking for volunteers to join the programming committee. No experience necessary, just bring your ideas for what you'd like to see and be willing to help reach out to potential presenters. The committee meets periodically over Zoom, and eventually once again in person, to discuss ideas.

## Winning Limerick

This spring, to help celebrate Native Plants Awareness Month, Abe Lloyd initiated a native plant limerick contest. By popular acclaim, Rosalind Spitzer's ode to skunk cabbage was named the winner:

### Skunk Cabbage

Yellow spears foretelling Spring,  
In a bog, it sprouts this thing,  
Fetid and funky,  
Squalid and skunky,  
Fetching flies with phallic bling

Read more entries at  
<https://wnpskoma.org/plant-poetry/>

## Summer (July, August, September) 2021

### President's Corner

by Allan Richardson

This seems like a good time for some reflections as my time as your president is nearing its end and the COVID pandemic is loosening its grip. The outdoor potluck picnic at Abe and Katrina's was well attended with over 30 of us, and we all hope that we can have in-person chapter meetings come fall. Hoorah!

Field trips and other native plant outings this spring have been a great lift to the spirits. There is a good variety of summer field trips, including a campout at the eastern extreme of Whatcom County at Hart's Pass. I am repeating two trips that I led in 2019, when both were cut short by rain. Maybe this year we will see the great views and have more time with the plants!

Our chapter has been active on many fronts, despite the pandemic. We had a successful plant sale this year with on-line orders and drive up delivery. Molly and Lyle put in extra effort to make it happen. The consensus of the board is that we would rather go back to in-person sales combined with some form of a flora fair next year.

In response to two years with no introductory plant walks and limited field trips, loyal WNPS members Jazmen and Aimee have named themselves the Pinedrop Sisters and gone into video production. See the article in this newsletter, then go to YouTube and search for Pinedrop Sisters or Northwest Natura.

In the past three years our chapter has established conservation and stewardship committees with many plans for future projects, often with ways to involve the rest of us. As an example, the stewardship committee is talking with Bellingham Parks and Recreation about on-going care of the Native Plant Trail signs and plants in Maritime Heritage Park at the Whatcom Creek estuary.

Have a great summer of botanizing.

### Native Plant Video series

Koma Kulshan's own Jazmen Yoder and Aimee Wright are producing a series of videos on native plants, plant identification and ecology. Jazmen noted that she found few resources on Pacific Northwest native plants when she was first learning about plants, and she hopes they can help fill that void.

The videos don't stop at identification. They also include information about plant families, ethnobotanical uses, and history. Jazmen and Aimee plan to have guest appearances by experts in medicinal plants and mushrooms to provide their perspectives.

Their first two videos feature trips to the Chuckanuts and Washington Park to examine spring wildflowers. Jazmen also documented a solo camping trip to Cypress Island,

Find them on Youtube by searching on Pinedrop Sisters. You can follow them on Instagram (@pinedrop\_sisters) and Facebook (Northwest Natura @pinedrop\_sisters).

# Koma Kulshan Chapter WNPS Newsletter

## Announcements

**NATIVE PLANT STEWARDSHIP COURSE:** Space is still available in our native plant stewardship course, which starts on August 19. If you are somewhat new to working with native plants and want to know more about their habitats, and how to restore these, this could be the class for you. Go to our chapter website (<https://wnpskoma.org/>) under stewardship for more information and a link to the on-line application.

**HELP WANTED: VICE PRESIDENT, PROGRAMMING TEAM, HOSPITALITY, PLANT SALES:** The WNPS Koma Kulshan chapter needs some committed volunteers. There will likely be an opening for the chapter vice president this fall. The program team will soon be down to just Anu, who would very much like helpers with ideas and time to put together the programs for our chapter meetings. Hospitality for chapter meetings has been a committee of one for a few years now and I'm sure that Ellen would appreciate some help. Molly certainly needs more help with plant sales. None of these jobs require advanced botany--time and interest is all that is needed!

## Photosynthesis Evolution

by Jim Kling

It's summer time, so it's time to think about photosynthesis. Plants certainly are. It's the method they use to pull carbon dioxide from the atmosphere and turn it into sugars that fuel their growth and metabolism.

Erika Edwards is a professor of ecology and evolutionary biology at Yale University, and her group is thinking about photosynthesis in cactuses and related groups like the purslanes. The reason is that these plants have some unusual photosynthetic pathways, and she's interested in how they evolved. She's also a past president of the Society of Systemic Biologists and described her group's recent research at a presidential plenary session of the Virtual Evolution 2021 meeting.

Photosynthesis requires a tradeoff. Pores on leaf surfaces open and close to let in carbon dioxide, but they also allow escape of water. So the more food a plant makes, the greater the danger of dehydration. To complicate matters further, the enzyme that drives photosynthesis, called Rubisco, works best at higher concentrations of carbon dioxide. At lower concentrations it can react with oxygen, creating a toxic compound that must be eliminated. That can occur under drought conditions when the plant favors closed pores to conserve water.

Photosynthesis uses the enzyme Rubisco to transform carbon dioxide into sugar. In C3 photosynthesis, this process occurs entirely in mesophyll cells close to the leaf pores. But some plants have evolved additional mechanisms to cope with water loss and low carbon dioxide levels. Plants with C4 mechanisms use existing enzymes in mesophyll cells to capture carbon dioxide as part of a small molecule called malate, then transport the molecule deeper into the leaf to bundle sheath cells, where the carbon dioxide gets released during a process called the Calvin cycle, and where Rubisco resides in these plants. That keeps the concentration of carbon dioxide high around Rubisco, and sequesters the Rubisco away from the mesophyll cells, where oxygen concentrations are higher.

Another photosynthesis type called CAM uses the same process, but does it all in the same cell. It fixes carbon dioxide as malate at night, then stores it in a cellular compartment. During the day, when the pores close to prevent dehydration, the stored malate is released where it can drive photosynthesis by Rubisco.

To work well, CAM requires large cells filled with compartments to store malate, as well as tightly compact cells to prevent carbon dioxide from leaking once it's released from malate. Cacti and other succulents possess those traits, and many have adapted the CAM pathway. But a wide range of plants use both C3 and CAM, only employing the latter during drought or other times of stress.

C4 evolved in grasses and CAM in eudicots quite recently, in the past 10-30 million years, and the mechanisms have arisen independently hundreds of times in a wide range of plant types.

Although C4 and CAM use similar mechanisms, Dr. Edwards had believed that the separate structural modifications required make it unlikely that they have evolved in the same plant. "Certain steps along the evolutionary trajectory of C4 and CAM are almost antagonistic to one another, so it would be very difficult for one plant to evolve C4 and CAM at the same time," said Dr. Edwards during her talk.

And yet, there is one example of C4/CAM coexistence in *Portulaca*, a group of about 100 plants in the purslane family, some of which are commonly found in gardens.

To figure out what is happening in *Portulaca*, members of Dr. Edwards' group used laser microdissection and gene expression analysis to examine flash-frozen leaf structures from *Portulaca oleracea*, including water storage tissues, bundle sheath cells, and mesophyll cells.

They put individual sections on slides, conducted a gene expression analysis to determine which genes were active in the tissue, and then mapped the tissue back on to the original leaf structure. That allowed them to plot out genes involved in C4 and CAM photosynthesis and determine when and where they functioned within the leaf. "You can take any photosynthesis gene of interest and just light up their degree of expression across the leaf," said Dr. Edwards.

The evidence suggested that the plant is operating with a two-cell CAM system, which hasn't been described before. Under drought conditions, malate formed at night by CAM gets delivered from its storage location in bundle sheath cells to the C4 system in mesophyll cells during the day. "It's beautifully simple if you step back and think about it. It's a perfect way for it to work," said Dr. Edwards.

The results hint that it might be possible to improve drought tolerance in plants like corn, which already uses C4, by introducing a CAM system. "It's a much simpler system than we thought it would be when we first started this project," said Dr. Edwards.

# Summer (July, August, September) 2021

## Chapter Meetings

As COVID-19 restrictions ease, we plan to hold an in-person meeting on September 15. However, be aware that this could change if pandemic conditions change, and if needed this meeting will be moved to a Zoom format. If a decision is made to move to Zoom, this will be announced on the Koma Kulshan website and email lists. Inquiries can also be made to [jkling@gmail.com](mailto:jkling@gmail.com), or by phone at 206-876-0231. In the case of Zoom format, to register, go to the state events website (<http://wnps.org/events>) and click on Koma Kulshan events. There you can also find other Zoom webinars sponsored by WNPS.

In-person meetings begin at 7pm in the Sustainable Living Center education room at the ReStore (2309 Meridian St.). The entrance is off the back alley and the SLC is upstairs.

### September 15: A Celebration of Seeds!

We'll kick-off our return to in-person meetings with a program that celebrates the seeds and fruits of our native plants. After a quick introduction to the basic anatomy and physiology of seeds and seed dormancy, we'll hold a photo quiz, with prizes for folks who are most adept at identifying native seeds and fruits! The photo quiz will be followed by a seed swap. If you have collected seeds and fruits of native plants, consider bringing some to gift or exchange. Also, if you have nice photos of native seeds and fruits, please consider contributing them for use in the quiz competition. All photographs will be duly acknowledged. Send your photos to Anu Singh-Cundy: [anu.singh-cundy@wwu.edu](mailto:anu.singh-cundy@wwu.edu).

## Field Trips

Washington state COVID safety guidelines have eased since publication of our last newsletter, affecting our field trips. As of May 15, in general, face masks are required outdoors only for unvaccinated people who are within six feet of someone else. Beyond the general requirements, as of June 11, there are no longer any special requirements for outdoor recreation groups. Enjoy the fresh air!

### July 10, Saturday: Summer Lake Bog

A perennial favorite among those that enjoy spending a hot summer day with their feet in soft damp moss, the Summer Lake Bog is one of the most picturesque and diverse peat bogs in Western Washington. It has exciting ericaceous plants like Bog Cranberries and Labrador Tea, enough sedges to occupy the fastidious botanist, and more carnivorous plants than you can shake a drumstick at. Bring water shoes (like aquasocks or tennis shoes that you are fine getting wet), lunch, a sun hat, and a hand lens (if you have one). Hiking is minimal with virtually no elevation gain, but there is no trail and the terrain can be soft, slippery, and uneven with some potential for total submersion in water. Meet at the west side Fairhaven Parkway Park-and-Ride at 9:00AM and expect to return between 3-4PM. The trip will be led by Vikki Jackson and Abe Lloyd. Contact Vikki with questions at [vikki.jackson8\[at\]gmail\[dot\]com](mailto:vikki.jackson8[at]gmail[dot]com).

### August 2-4, Monday-Wednesday: Hart's Pass Location

Hart's Pass is on the far eastern edge of Whatcom County. We will access the area through the community of Mazama in Okanogan County. Hart's Pass is a unique high country area along the Pacific Crest that is accessible by car only a few months a year. Late July and early August are peak flower bloom times for the alpine and subalpine native plants that are found in the area. We will camp in the area for two nights and take multiple hikes along the Pacific Crest Trail (PCT) and in adjoining meadows. The road to Hart's Pass is quite challenging in places (e.g., Dead Horse Curve) and may not be suitable for regular passenger cars, depending on how recently it has been maintained by the Forest Service. Hiking is only moderately difficult, with most of the PCT following the "relatively flat" ridge line. It will likely be cold at night (hopefully not below freezing), so adequate shelter and clothing are essential. It is important for some of our party to arrive early on Monday to secure adequate camping sites. Carpooling is optional and will be arranged as we get closer to the outing. Please RSVP and direct questions to Jim Davis ([jimdavispcp@comcast.net](mailto:jimdavispcp@comcast.net) or 360-296-5159). Given that much of the area is designated wilderness we will need to limit our party size to 12 or less.

### August 18, Wednesday, 7:30 am until 5 or 6 pm: Boundary Way Trail and Cowap Peak

A moderate hike through forest and wet areas, along a rock slide, and into wildflower meadows, then a summit perch; about 5 miles round trip and 1,400' elevation gain. Many interesting plants and the question: Where did the name Cowap come from? Allan will share his knowledge of the 1857-62 Boundary Survey and Nooksack place names from the viewpoint. Meet to carpool at the southeast corner of Sunset Square Safeway parking lot for a 7:30 AM departure. Contact Allan Richardson at 360-733-5477 or [asrichardson5@gmail.com](mailto:asrichardson5@gmail.com) with any questions and to confirm.

### September 8, Wednesday, 8:00 am to 5 or 6 pm: Chain Lakes Loop

This is an end of summer favorite with our group. We should see several species of late-blooming plants, ripe blueberries, picas, and perhaps marmots and mountain goats. On the way up we will drop a car at the Heather Meadows visitor's center for the return car shuttle. Our hike starts at Artists Point. After a mile we leave the Ptarmigan Ridge trail and descend into the Chain Lakes Basin. After passing three lakes we ascend to Hermann Saddle and drop down to the Bagley Lakes. Distance 6 miles, elevation gain 600 feet. Meet to carpool at the southeast corner of Sunset Square Safeway parking lot for an 8:00 AM departure. Limited to 12 persons in Mt. Baker Wilderness. Contact Allan Richardson at 360-733-5477 or [asrichardson5@gmail.com](mailto:asrichardson5@gmail.com) to sign up.

## Koma Kulshan Board

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### State Board Representative

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## Koma Kulshan Chapter WNPS Newsletter

If you would like to join WNPS

Please return the membership application form to:  
Washington Native Plant Society  
6310 NE 74th St., Suite 215E  
Seattle, WA 98115

Please make checks payable to WNPS  
(outside US add \$5 to dues)

or join online at <https://www.wnps.org>

Name: \_\_\_\_\_

Address: \_\_\_\_\_

City, State, Postal Code: \_\_\_\_\_

Phone: \_\_\_\_\_

Email: \_\_\_\_\_

Koma Kulshan Chapter Total Enclosed: \_\_\_\_\_

Membership Category:

\$20 Budget (Senior/Student)  
\$40 Individual  
\$55 Family  
\$75 Club/Institution

The Koma Kulshan chapter of WNPS is dedicated to the preservation and study of native plants and vegetation of Washington State and the education of the public to the values of native flora and its habitat.

WNPS -- Koma Kulshan Chapter  
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