GEORGESON BOTANICAL GARDEN

UNIVERSITY OF ALASKA FAIRBANKS

University of Alaska Fairbanks
School of Natural Resources and Extension

SNRE SCHOOL OF NATURAL RESOURCES AND EXTENSION

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Garden Gone Buggy

by
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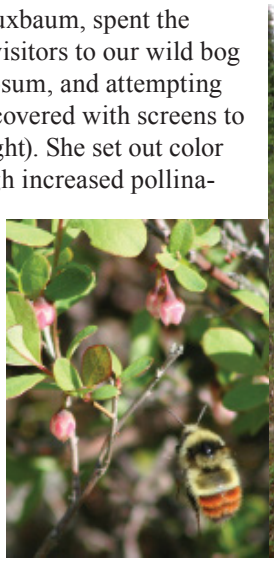
My entomology friends will be upset by my title announcing the garden has gone to the bugs. They're insects after all – wonderful, interesting, dynamic insects that are just as much a part of the garden as the flowers and berries. Calling insects bugs, is the same as calling soils, dirt. There's a lot more to insects than bugs, and our garden was a-buzz with insect studies this summer.

Graduate students, Katie Dicristina and Tina Buxbaum and I took Steve Peterson's class on beekeeping this past spring. Although I had kept bees at the garden for quite a few years, there is nothing like learning from one of the masters. Steve has very patiently put up with our amateurish hive-management skills and has engaged us in a conversation about bees that will enrich the garden for many years.

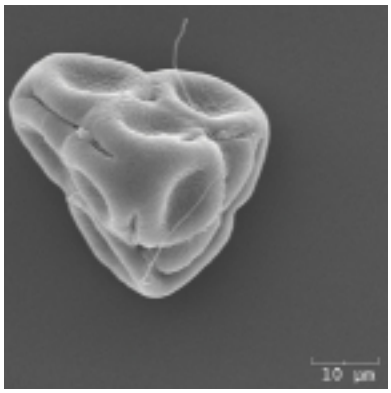
Honey bee hives at the Georgeson Botanical Garden with sign announcing "Office of the Queen" (top) and a well protected Katie DiCristina capturing a swarm on a crabapple bush in the garden.

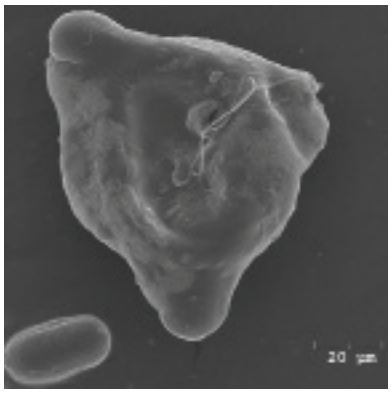
Katie harvested pollen every day from one of our hives on the hill to find out what flowers are important at different times of the year. Bees entering the hive crossed through a screen that knocked off some of the pollen from their bodies. Katie informed us we harvested more than 6 pounds (2742 grams) of pollen from one hive, less than half of what they harvested, from 10 May to 10 September. Next will come microscope work to identify the flower donors. It was amazing watching the changing colors of the pollen clusters collected each week. Although the flowers and pollen-bearing anthers might appear yellow, the harvested pollen was a rainbow of gold, red, orange, several shades of green and light brown. We will help Steve develop pollen charts from all this work.

Graduate student, Tina Buxbaum, spent the summer studying the insect visitors to our wild bog blueberry, Vaccinium uliginosum, and attempting to understand how the species is pollinated. She set out boxes covered with screens to test what happens when you exclude most insects (photo far right). She set out color attractants to see if color signals could improve fruit set through increased pollinations. She is measuring nectar output, what happens when you jiggle the flowers at high frequencies to emulate bumble bee buzzing, and lots more. She also spent a lot of time looking through the lens of an electron microscope to get fine detailed pictures of Alaska wildflower pollen. We will use these in the pollen charts to show the beauty and diversity of Alaska pollen.



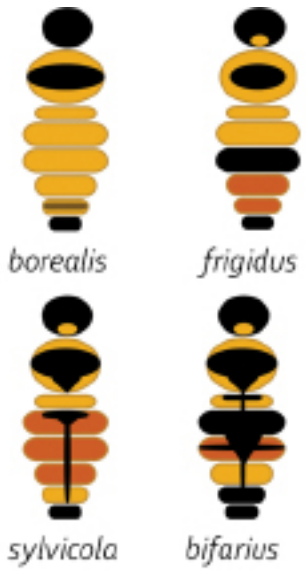
Photos by Tina Buxbaum



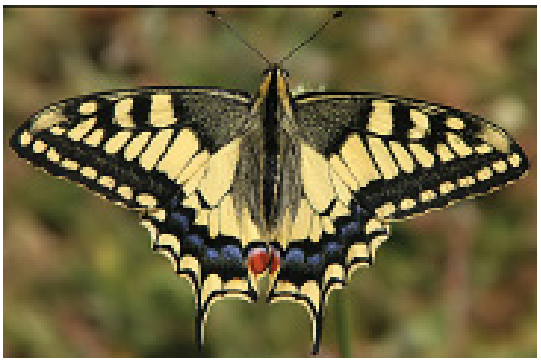


Left to right: Labrador tea (Ledum palustre) pollen grains (4) stuck together, fireweed (Chamerion angustifolium) pollen and wild rose (Rosa acicularis) pollen electron micrographs. Photos by Tina Buxbaum.

Graduate student, Rehanon Pampel spent two years capturing and identifying all the bumble bee species flying around farm fields in Fairbanks, Delta and Palmer. She identified 17 different species of bumble bees at the three locations. I thought there were only two – ones with orange butts and others with yellow and black ones. Boy was I wrong! She developed a very simple identification key to bumble bee species that will be a great asset to anyone interested in identifying and working with this most important group of plant pollinators. They are one of the most important group of pollinators for our wild berries including lingonberries and blueberries. Rehanon's thesis will be published early next year.



Rehanon Pampel (below) is out in the GBG flower garden collecting bumble bees. She found them on all kinds of plants including wild rose (upper left). She made color charts illustrating the species of bumble bees found in Alaska. The illustration (lower left) shows just four of the species. Photos by Rehanon Pampel (left) and Richard Ranft, below right.



The Old World Tiger Swallowtail (top, courtesy http://www.naturemuseum.org.cy) and the Canadian Tiger Swallowtail (bottom, courtesy Tina Buxbaum)

And, of course, a garden would not be complete without butterflies! We have begun to collect information on attracting butterflies to local gardens, spurred on by the great butterfly exhibit at the Museum these past few months. Our first information-gathering attempt is with one of the most colorful, and large butterflies, the yellow swallowtail. Actually, that's what we have called it for years, but it is two different races of a species called *Papilio machaon*. One race is more properly known as Old World Tiger Swallowtails, *Papilio machaon aliaska*) whereas its cousin is the Canadian Tiger Swallowtail, P.*m. canadensis*. They can be distinguished from one another by a bright orange spot on the wings of the Old World Swallowtail that is missing from the Canadian Tiger (photos left).

Cornell scientist, Dr. Shannon Murphy, has spent the past few years studying the Old World Tiger Swallowtail, the rarest of the two. She found that this race is known as a hilltopper. The butterflies emerge from cocoons in late May through early July, sup on nectar in the early part of the summer, but head to the tops of hills, especially Murphy Dome, Wickersham Dome, and Ester Dome. The males find a spot to land, then defend that spot while attracting females that fly up from the lowlands to mate. The females then flit to one of three plant species to lay their eggs: coltsfoot (*Petasites frigidus*), Arctic sage (*Artemisia arctica*), and wild celery or parsley (*Cnidium cnidiifolium*). That's it - they're pretty picky about their food source. They lay a dozen or so single eggs, a black and white larva (caterpillar) that looks like bird droppings emerges and proceeds to chomp on the chosen foods. The caterpillars molt three times, and during the last stage, they become green, black and orange (photo) below. At the end of the summer, the caterpillar wraps itself into a chrysalis and overwinters in this form. It emerges next year as the gorgeous butterfly we know and love.

Caterpillar, Papilio machaon Photo: http://www.vivo.sk

The Canadian Tiger Swallowtail is not a hilltopper, preferring to hang out in or near woodlands, especially mixed hardwood and coniferous forests. It goes through a similar life cycle, feeding mostly on members of the celery family (*Apiaceae*) but also aspen and willow. Graduate student, Tina Buxbaum, told us one of the biggest predators of the Canadian Tiger Swallowtail at GBG this past summer was the bald-faced hornet that stalked the butterflies as they fed on nectar on the crabapples. They swooped down, grabbed the butterflies in flight, stung them to death, dropped to the ground and then chewed off their heads! Dozens of headless butterfly bodies littered the ground beneath the crabapples in the garden. And you thought the garden was a calm, peaceful place!

In our garden our challenge is to grow some of the wild celeries, coltsfoot and Arctic sage that provide the food for the caterpillar stage, but we also need to watch carefully to learn which garden and native plants provide the sustenance for the butterfly stage such as lilacs and lilies. If you see us running wildly all over the garden next summer, look for a swallowtail nearby, and you'll know what we are doing. We have seen clouds of swallowtails clustered around mud puddles, perhaps taking a drink but also looking for minerals. Gardeners may be interested in making miniature "salt licks" for butterflies to see if they might attract more to their gardens. Also, plant the food source for the caterpillar here and there in the garden. If any of our readers have more information to share on this fascinating species, we'd love to hear from you.

Arctic sage, Artemisia arctica is a low-growing, busy, not-very-ornamental plant with tall spikes of clustered yellow flowers. It grows best in dry, rocky areas and is best planted in rock gardens. It will spread. Photo: http://apps.rhs.org.uk

Tiger swallowtail caterpillar food

Coltsfoot, Petasites frigidus, is a wetland plant that thrives in mucky soils near ponds and bogs. It can be grown near water gardens in soils that are continuously wet but not soppy or floating. Photo: http://newfs.s3.amazonaws.com

Wild parsley, Cnidium Cnidiifolium looks a little like Queen Ann's lace, but much more coarse and not very ornamental. It is best grown in wildflower meadows, ditch gardens and along roadsides. Photo: http://1.bp.blogspot.com

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