



Fairmont Hot Springs | January 24, 2024

# Secret Lives of Gall Makers



Whitney Cranshaw  
Colorado State University



**Gall:** An abnormal plant growth caused by the action of insects or other organisms



**Crown Gall  
(Bacterium)**



**Some Plant  
Pathogens  
Produce Gall-like  
Growths**

**Black Knot of Cherry  
(Fungus)**



Fruiting structures of some **Rust Fungi** can have unusual forms

Example: **Juniper-Hawthorn Rust**



Fruiting stages on juniper twig



Fruiting stages on hawthorn leaf



# Primary Groups of Gall Making Arthropods in Colorado

- Gall-making aphids
- Psyllids
- Eriophyid mites
- Gall midges
- Gall wasps



**Gall:** An abnormal plant growth caused by the action of insects or other organisms



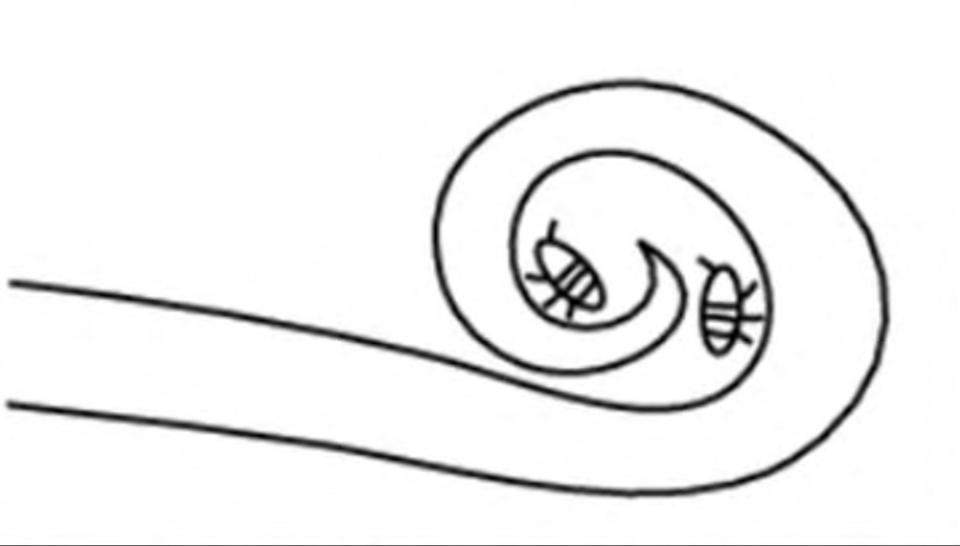


Figure courtesy of Karsten Schonrogge



Would a leaf curl  
be considered a  
gall?



# Leafcurl Injuries

**Default Diagnosis:** Produced by aphid feeding on emergent growth, producing distortion







**Hawthorn**

On some plants aphids make only minor leaf curls

**Snowball Viburnum**



**Chokecherry**



A few aphid injuries that produce extreme leaf distortions approach what would be considered a gall and are sometimes called “pseudogalls”



Leafcurl plum aphid injury



Leafcurl ash aphid injuries



# Some New Words

- **Cecidology** – the study of galls produced by insects, fungi, mites and other organisms
- **Cecidogen** – a substance that can produce a gall

# How do insects and mites produce galls in plants?

- **Selective wounding** of growing tissues produces cellular changes
- **Introduction of chemicals** (cecidogen) that cause cellular changes

**Important Note:** Gall production results from effects on actively growing (meristematic) tissues



Figure courtesy of Karsten Schonrogge

Open galls are produced by insects (and mites) with sucking mouthparts.

These form when the plant responds to the feeding of the gallmaker by producing a growth that surrounds the insect.



Aphids



Psyllids



Eriophyid mites



Closed galls are producing by gall-making insects with chewing mouthparts.

Eggs inserted into tissues and the developing larvae develop within the plant.

Figure courtesy of Karsten Schonrogge



# Gall-Making Aphids

- **Adelgidae (adelgids)**
  - Associated with conifers
  - Host alternation common
- **Eriosomatinae (“woolly aphids”)**
  - Associated with deciduous plants
  - Host alternation common

# Adelgids

Hemiptera: Adelgidae



The “woolly aphids” on conifers



# Cooley Spruce Gall - Produced by the Cooley Spruce Gall Aphid (Adelgid)



**Today, on spruce, Cooley spruce gall aphids are found on the underside of twigs, near the terminal. They are mated and are very small, wax-covered females throughout winter.**



In spring, the aphids resume feeding and growing. Just before bud break they have swollen full size.



Most of this cottony mass covers dozens, maybe hundreds of eggs.



Egg hatch coincides with bud break. The newly hatched insects settle at the base of the emerging needles.





UGA1325036





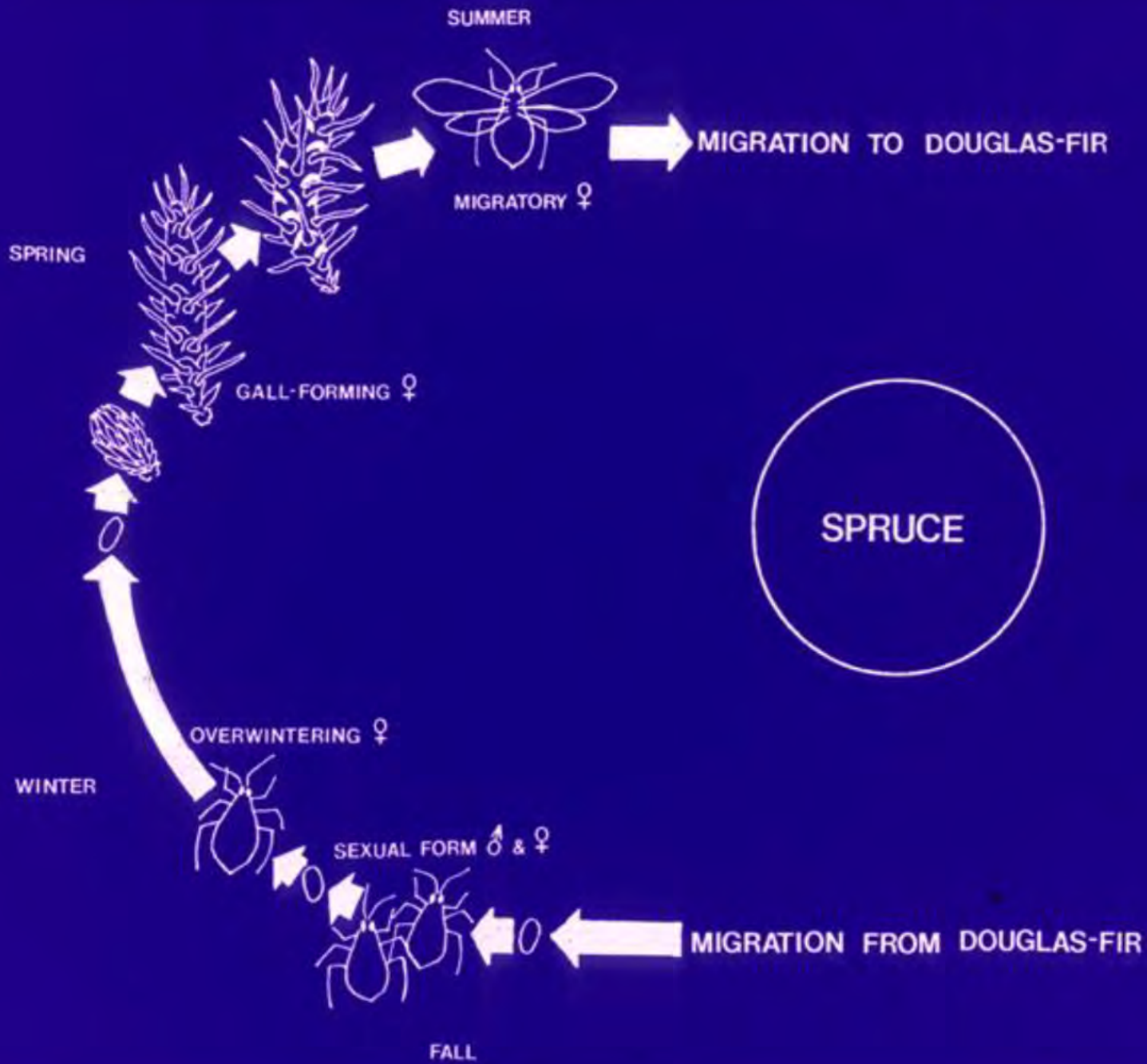






UGA1325027

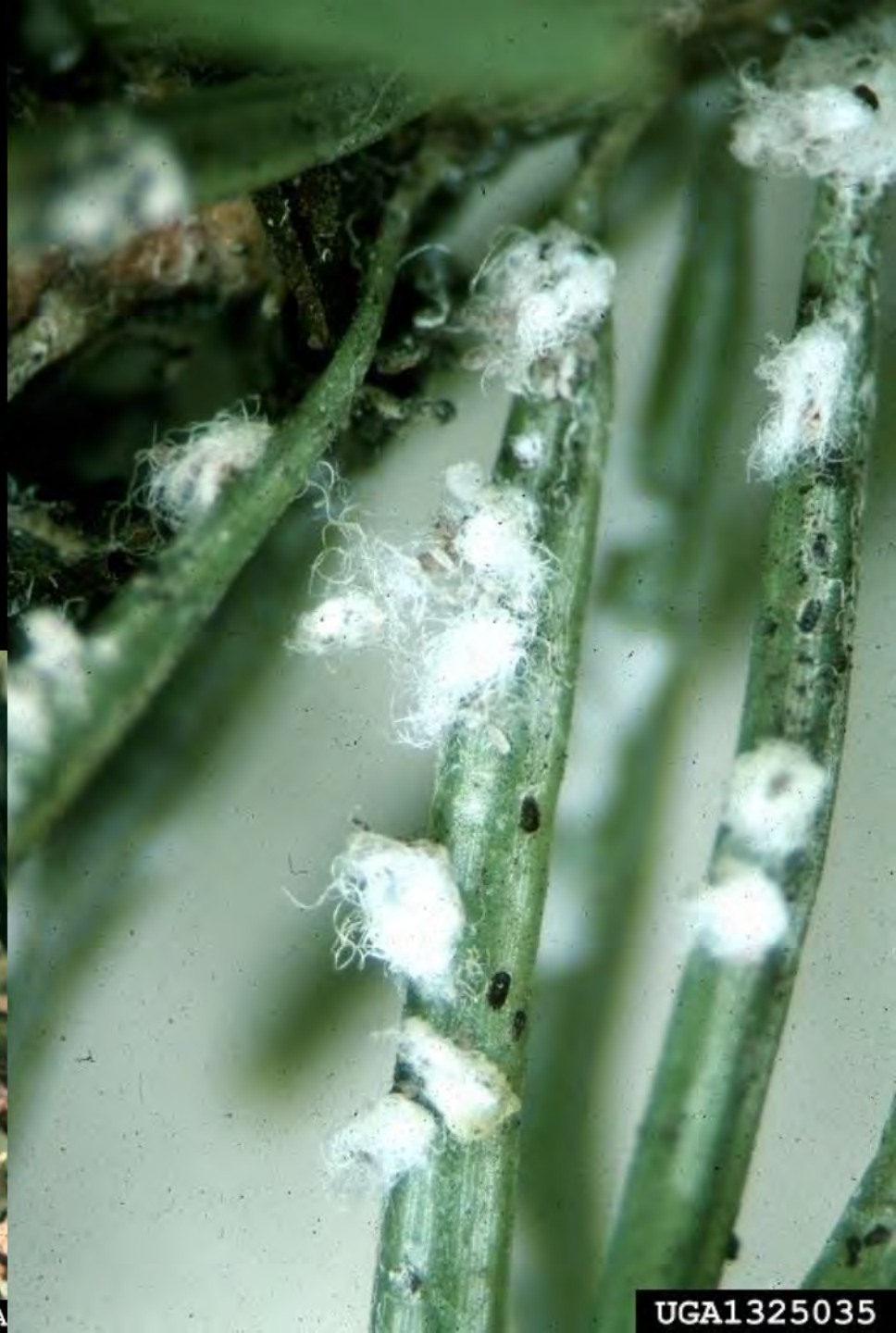




**Cooley spruce gall  
adelgid** – Woolly  
aphid form  
associated with  
Douglas-fir



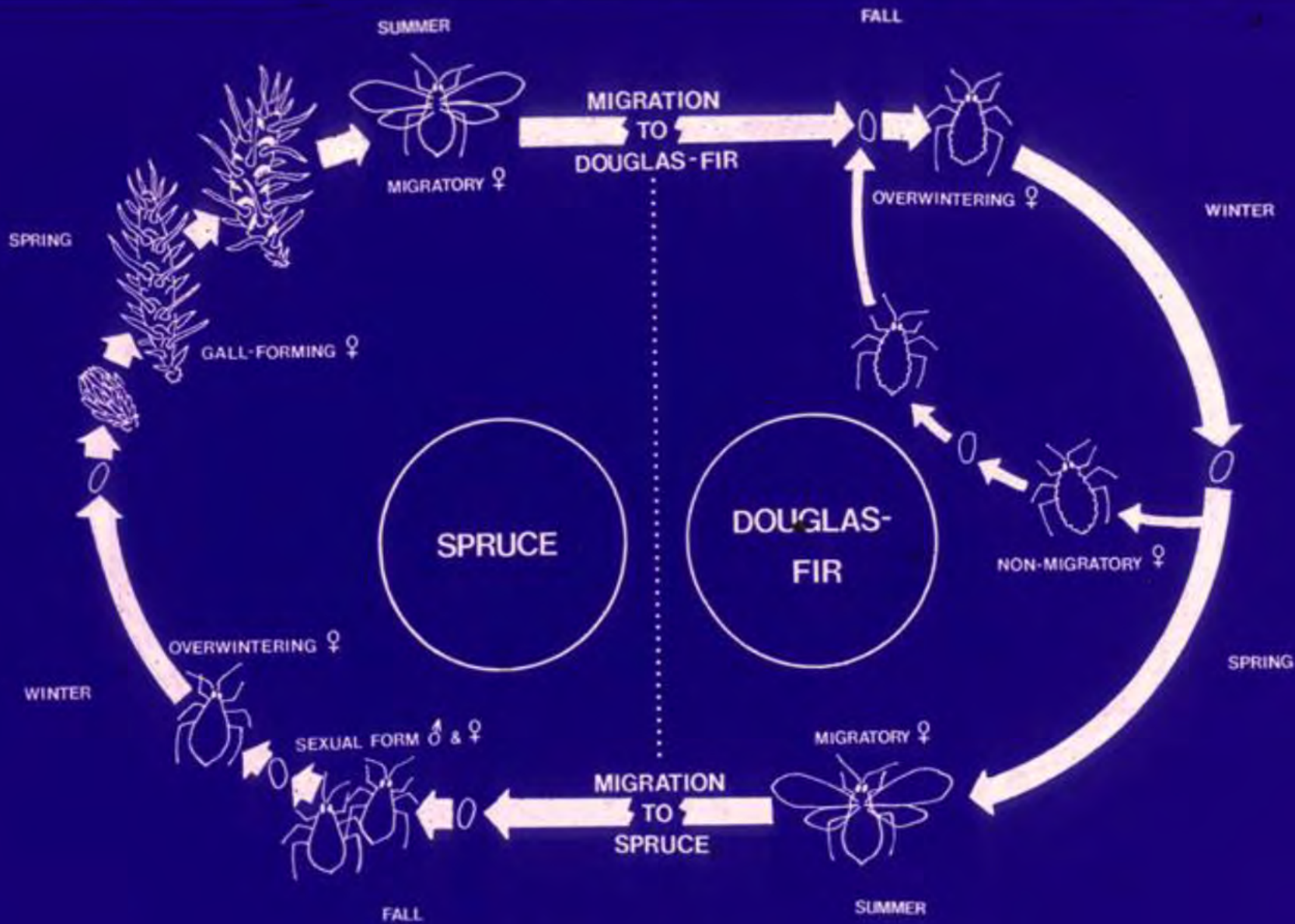
UGA



UGA1325035



UGA1246053



LIFE CYCLE OF THE COOLEY SPRUCE GALL ADELGID



UGA1325029



# Aphids

Hemiptera: Aphididae





***Pemphigus* species galls on *Populus***





***Pemphigus* spp. galls on *Populus***





**Summer hosts of  
*Pemphigus* spp.  
are roots of  
herbaceous  
plants**



# Poplar vagabond aphid

*Mordwilkoja vagabunda*

Produces a bladder-like enlargement of the leaf stipules of *Populus*



# Psyllids

Hemiptera: Psyllidae



5422206

**Common symptom:** Swelling of leaf at feeding site.

# Hackberry nipplegall psyllid



Photograph by Jim Kalisch,  
University of Nebraska



UGA1325046



UGA1325059

# Hackberry blistergall psyllid



UGA1325041





**Overwintered adults  
return to the new  
growth in spring to lay  
eggs**







**Hackberry nipplegall psyllid**

# Mixture of blistergalls and nipplegalls



UGA1325057







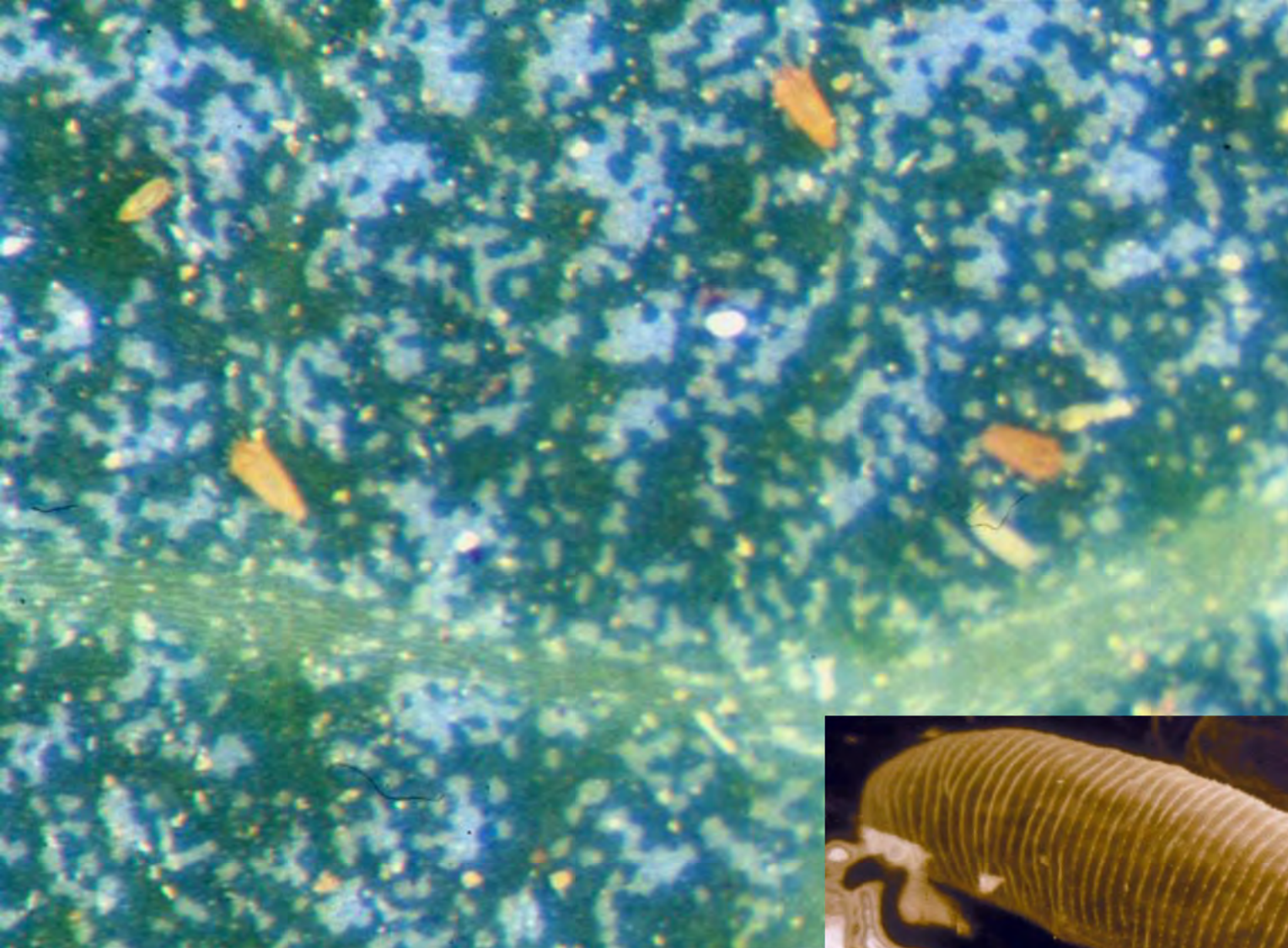
Psyllids make many kinds of galls on hackberry



# Eriophyid Mites

Acari: Eriophyoidea





**Eriophyid mites**





## Rust Mite Injuries





**Blistergalls (top)**

**Pouchgalls (bottom)**

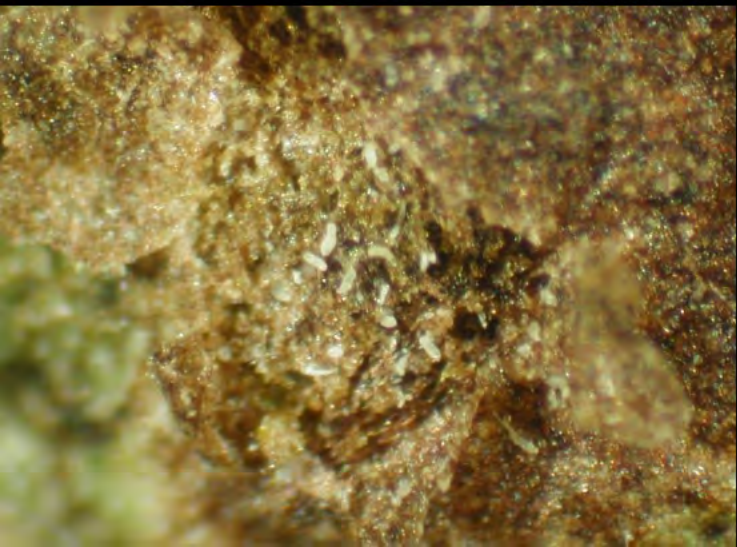


**Erineum (top)**

**Fingergalls (bottom)**



# Blistergalls



# Pearleaf blister mite



Phot courtesy Elizabeth Beers



Photo courtesy H. Riedl



© 2008 J.D. Young  
OSU Insect Clinic



**Pouchgalls or  
bladdergalls**





**Pouchgall on boxelder**



# Pouchgall on aspen





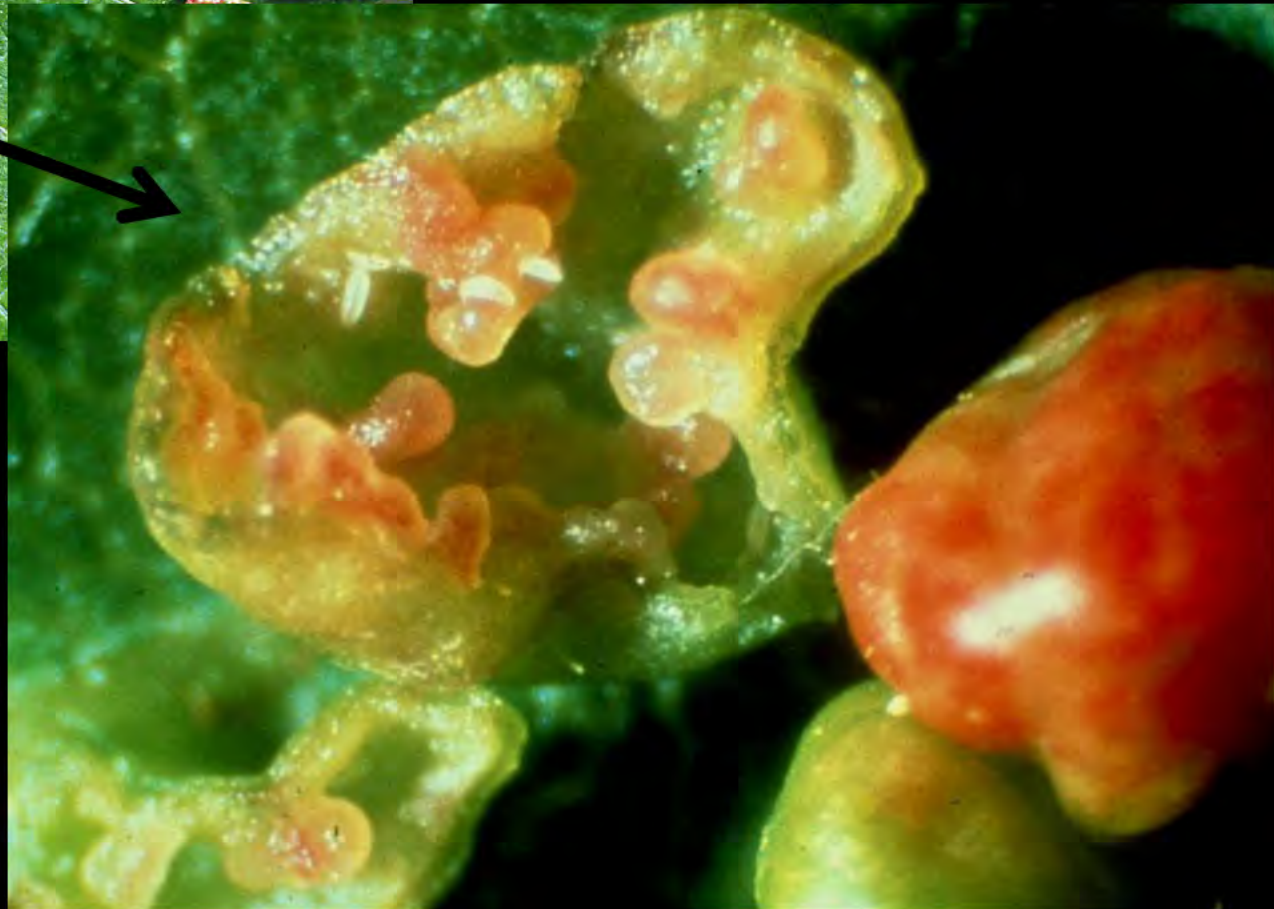
**Bladdergalls on  
willow**



# Maple bladdergall mite



# Maple bladdergall mite





# Fingergalls



# Fingergalls on maple



# Fingergalls on littleleaf linden



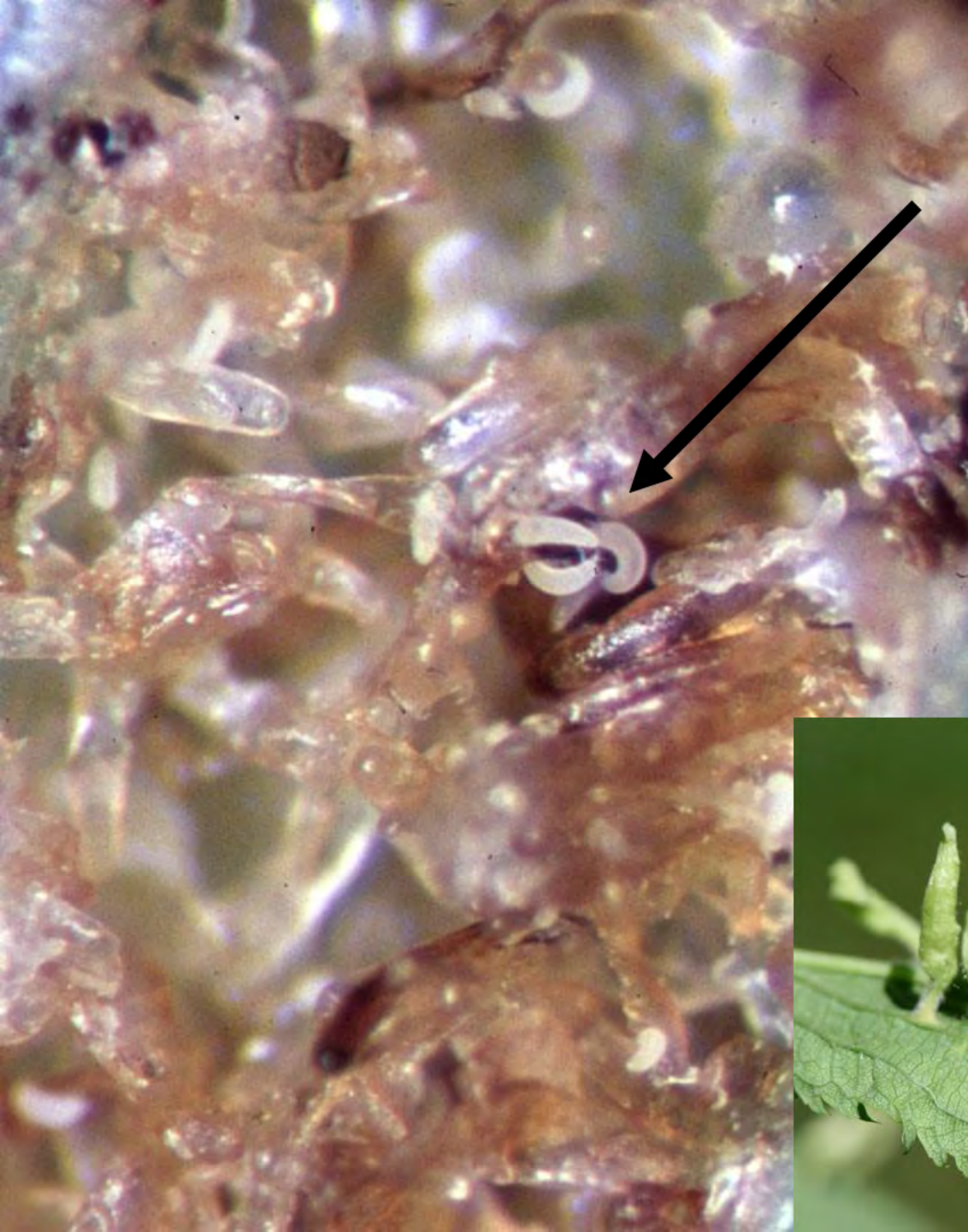
# Fingergalls on chokecherry







**Fingergalls on American plum**





**Erieneum producing eriophyid mites**



# Erinea on maples



**Cranberrybush  
viburnum  
erineum**





**Erinea  
associated with  
pouchgall of  
boxelder**





**Erineum associated  
with pouchgall of  
aspen**



# Erineum on aspen leaf







**Distortion of  
flowering  
structures**

# Ash flowergall mite





**Cottonwood  
catkingall mite**



**Poplar budgall**



# Gall Midges

Diptera: Cecidomyiidae



**Common symptoms:**  
Swelling and/or  
stunting of leaf growth



# Honeylocust Podgall Midge





**Adults lay eggs  
on emerging  
leaflets.**

**There are  
multiple  
generations  
produced  
annually.**







**A larva and two pupae of the honeylocust podgall midge**





UGA1325002

**Pinyon spindlegall midge**

**Ponderosa pine  
stuntgall midge**





Pinyon spindle gall  
midge larvae  
develop within the  
swollen base of the  
needles



UGA1325003



**Adults emerge  
coincident with new  
growth of the following  
June**



**Gouty veingall midge of boxelder**

# Juniper tipgall midge



## Willow conegall midges



# Wreath made of willow cone-galls (David Leatherman)

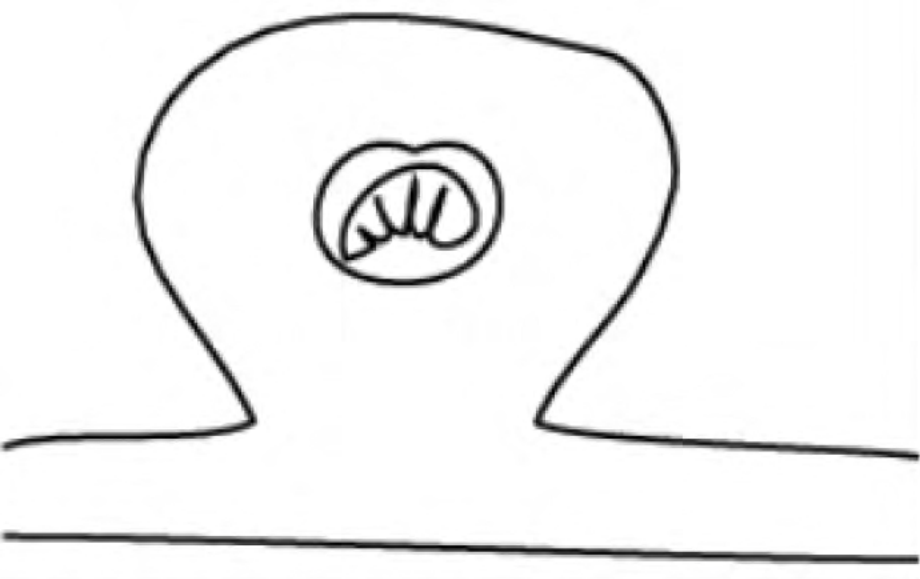






**Chokecherry fruitgall midge**





Closed galls are producing by gall-making insects with chewing mouthparts.

Eggs inserted into tissues and the developing larvae develop within the plant.

Figure courtesy of Karsten Schonrogge



# Leafminer Flies

Diptera: Agromyzidae



Only one significant  
gallmaker in the region –  
**poplar twiggall fly**  
(*Hexomyza schineri*)



Today, within a gall made in 2023, there is a small, yellowish maggot in the center, the larva of the poplar twiggall fly.





# Poplar Twiggall Fly

Above: **Adult**

Top right: **Adult resting on leaf**

Right: **Leaf tatters symptom produced by feeding (oviposition punctures)**





Top: **Ovipositing adult**

Upper Right: **Oviposition wound in early stage gall**

Right: **Early stage galls**





**Cumulative effects  
of galling (left),  
new galls (below  
left) and cross-  
section of gall  
(below)**





# Old poplar twiggall damage in forest near Salida



# Gall Wasps

Hymenoptera: Cynipidae











# Translucent oak gall









**Upper side  
of leaf –  
raised  
bumps**

**Under side  
of leaf –  
fuzzy balls**









# Iron-gall Ink

A permanent ink derived from oak galls





**Mossy rose  
galls**



This photo series courtesy of Ken Gray  
Collection/Oregon State University







# Bulletgalls on oak twigs



*Disholcaspus quercusmamma*



*Callirhytis flavipes*



**Most gall wasps on oak have two generations that produce two different types of galls**





**Oak rough bulletgall wasp**





**Stunting produced  
by oak rough  
bulletgall wasp**



**Adults emerge from  
galls in mid-October  
to mid-November  
and lay eggs in  
buds.....**





**The eggs from this hatch in spring to produce a generation within a budgall**









**Spring stage  
adults are much  
smaller than  
those observed  
in fall**

**Spring stages  
consist of both  
males and  
females**

**Spring stage adults lay  
eggs in the emergent  
twig growth.**



**New galls begin to erupt in late spring/early summer.  
They become full-sized by late summer.**



These galls exude **honeydew**



Photograph by Crystal Cooke

**The honeydew on the galls attracts many kinds of insects**



**Oak rough bulletgalls produce a sweet exudate that is attractive to wasps**





An interesting gall wasp-woodpecker interaction on bur oak



The gall wasp *Callirhytis flavipes* develops under the bark of twigs branches, and the trunks of oak





They are small and develop within small chambers. There are dozens of these chambers in the above photo.





Downy woodpeckers work the bark and extract the developing gall wasp larvae in winter and early spring





This can result in  
extensive debarking of  
trunks, branches



This can lead to dieback of limbs and the upper trunk



After this gall wasp emerges from the trunks//branches, it moves to new leaves. The summer generation develops within an irregularly shaped gall of the midrib.

# Gall Insect Management

- **Carefully assess the actual damage**
  - **Overestimation of effects is typical; Gall production typically looks worse than it is**
  - **Only developing tissues can be transformed to galls**



**Only actively growing tissues are “gallable”**

**Do they overwinter on the  
plant?**

**Dormant season sprays can  
usually be effective**





They are in this stage today, and through the next couple of months. Very easy to kill with most anything now (If you want to do that.)



Wait too long and you have 800 eggs or nymphs to kill.

**Spruce recovery from Cooley spruce gall injury – insects killed by soil-applied imidacloprid**



**Do they overwinter off the  
plant?**

**Treatments should  
coincide with egg laying**

**Hackberry psyllids –  
eggs laid on emergent  
foliage**





**Honeylocust podgall  
midge – eggs are laid  
on newly emerging  
leaflets (multiple  
generations)**



**Pinyon spindlegall  
midge – eggs are  
laid at base of newly  
emerging needles in  
June**





One group of gall makers that is never well controlled with insecticides



Gall wasps on woody parts of the plant

# COLORADO STATE SYMBOLS



STATE BIRD

**LARK BUNTING**



STATE FLAG



STATE FLOWER

**COLUMBINE**

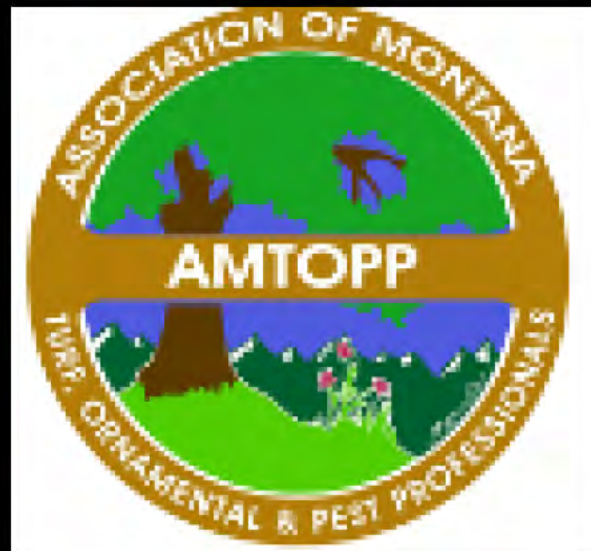


STATE GALL

**COOLEY SPRUCE GALL**



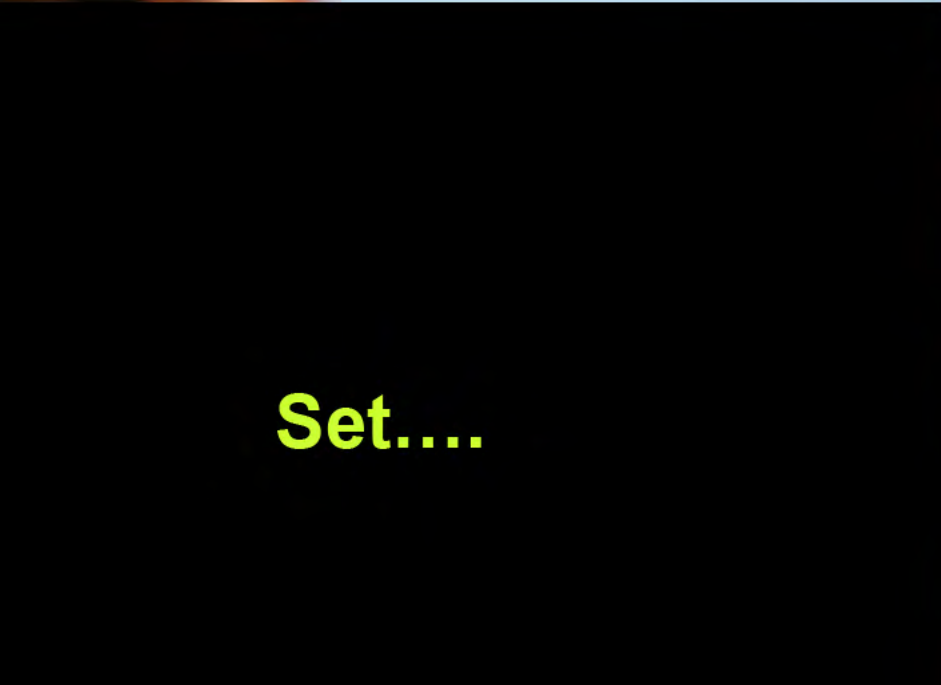
# Questions?



[whitney.cranshaw@colostate.edu](mailto:whitney.cranshaw@colostate.edu)



**Ready....**



**Set....**



***Go to the next program!***

