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2015 Update Mtg: Insect Outbreaks in Cranberry

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UMass Cranberry Station Research Update
Plymouth, MA January 14, 2015

Insect Outbreaks In Cranberry 2014

Martha Sylvia
Entomology Lab
Cranberry Station
UMass Amherst

Leaf Beetle



Fireworm



Scale





Putnam Scale



Dearness Scale

Scale Insects

Many cases of outbreaks in MA cranberry

Putnam Scale



Dearness Scale

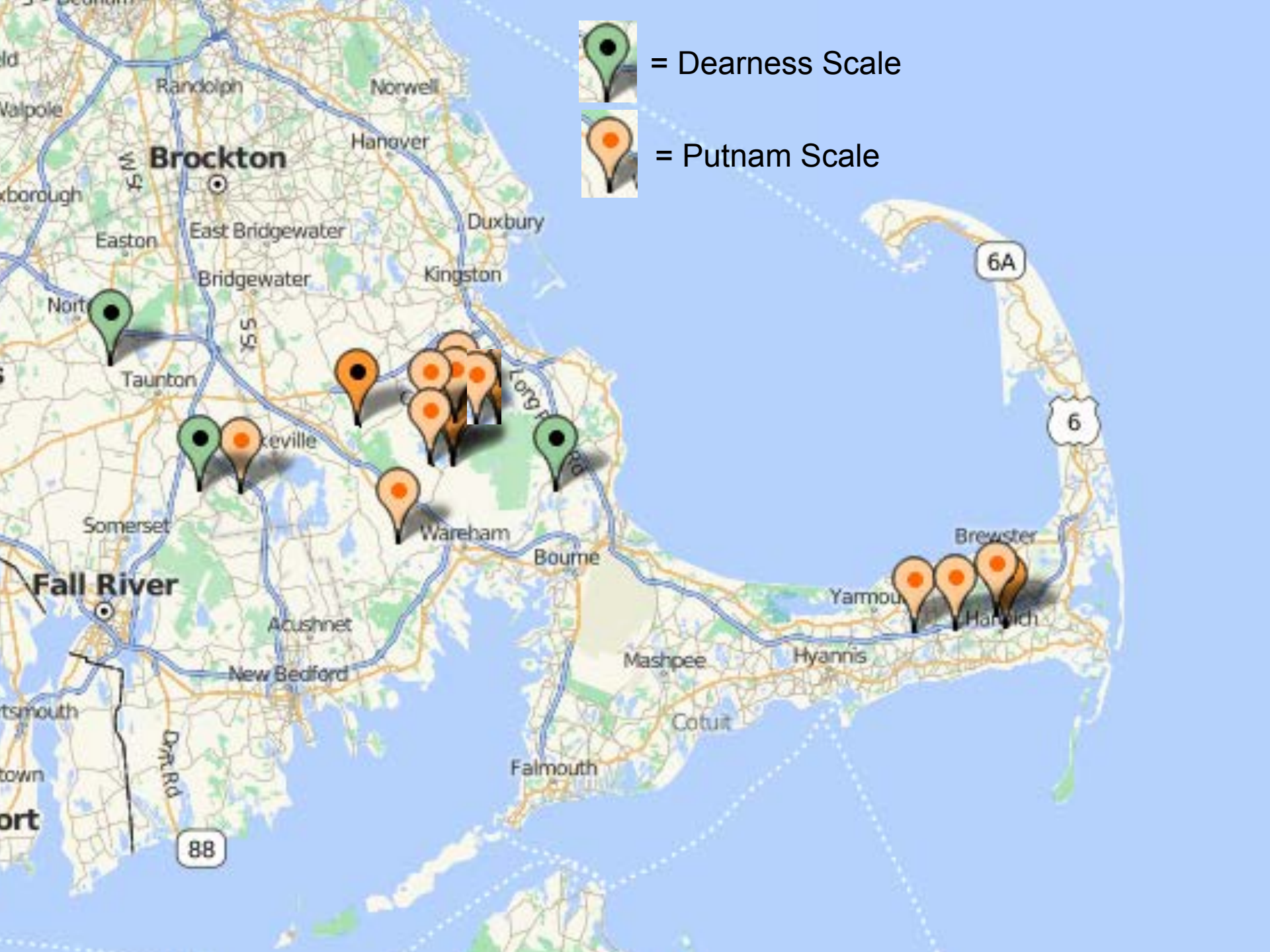




= Dearness Scale



= Putnam Scale



Scale Insects

- What is scale
- Lifecycle
- Damage
- Different species
- Where
- Thru the season



- *Scale* are tiny parasitic *insects* that adhere to plants and live off the plant's sap
- They look like bumps on the plant's stem and are often mistaken for a disease
- Adult female scale are immobile and permanently attach to the plant
- They secrete a waxy coating for defense that looks like a fish scale, thus the name



Scale Insects

- There are 2 kinds of scale
 - Armoured and soft bodied scales
- Most species of armored scales overwinter as eggs beneath the female cover



Putnam Scale

- Likely what Franklin IDed as Cranberry Scale
- Now Putnam scale (*Diaspidiotus ancylus*)



**LIFE HISTORY OF THE PUTNAM SCALE, *DIASPIDIOTUS ANCYLUS*
(PUTNAM) (HEMIPTERA: COCCOIDEA: DIASPIDIDAE) ON BLUEBERRIES
(*VACCINIUM CORYMBOSUM*, ERICACEAE) IN NEW JERSEY, WITH A
WORLD LIST OF SCALE INSECTS ON BLUEBERRIES**

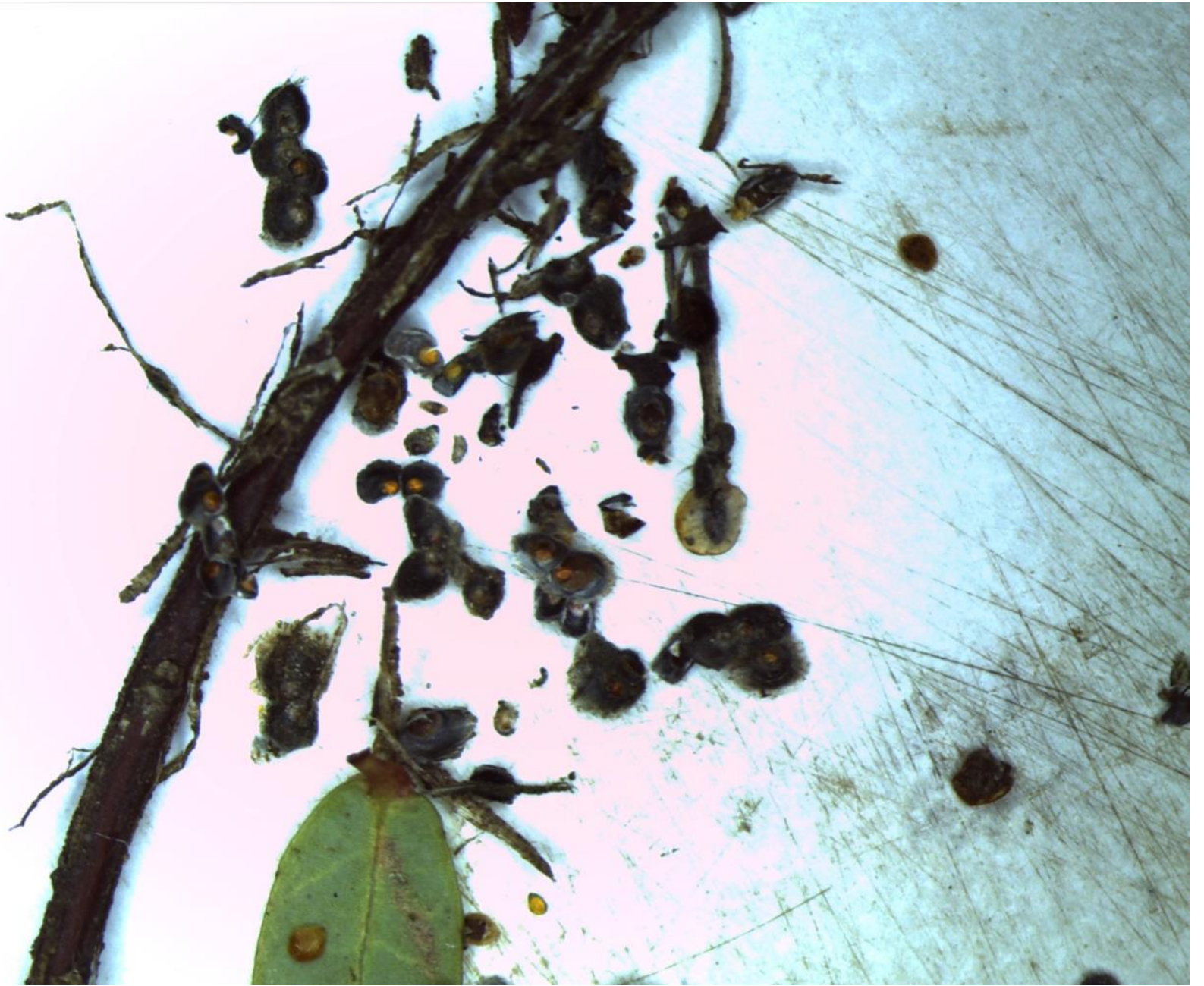
SRIDHAR POLAVARAPU, JOHN A. DAVIDSON, AND DOUGLASS R. MILLER

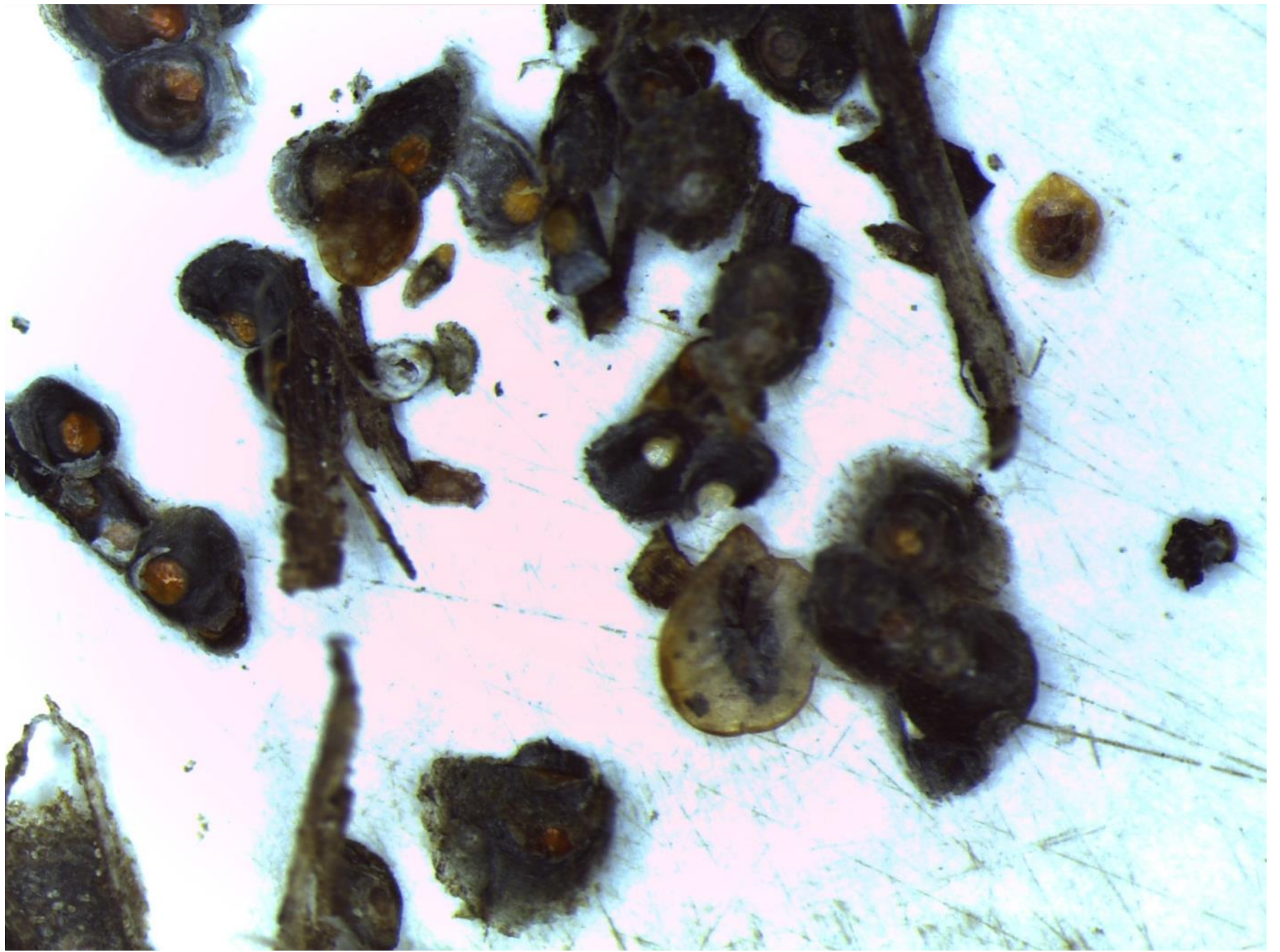
(SP) Blueberry and Cranberry Research Center, Rutgers University, Chatsworth, NJ 08019, U.S.A. (e-mail: polavarapu@aesop.rutgers.edu); (JAD) Department of Entomology, University of Maryland, College Park, MD 20742, U.S.A. (e-mail: jd12@umail.umd.edu); (DRM) Systematic Entomology Laboratory, PSI, Agricultural Research Service, USDA, Bldg. 005, BARC-W, Beltsville, MD 20705, U.S.A. (e-mail: dmiller@sel.barc.usda.gov)

Abstract.—Life history of the Putnam scale was investigated during 1997 and 1998 on highbush blueberries in the pine barrens of southern New Jersey. Putnam scale has two generations each year. Crawler emergences in the first and second generations peaked during late May and early to mid-August, respectively. This species overwinters as second instar nymphs, primarily under the bark (cork cambium) of the host. Adult females that occur on or under the bark of blueberries differ morphologically from those on the leaves



Covering shell lifted to show female scale insect underneath.

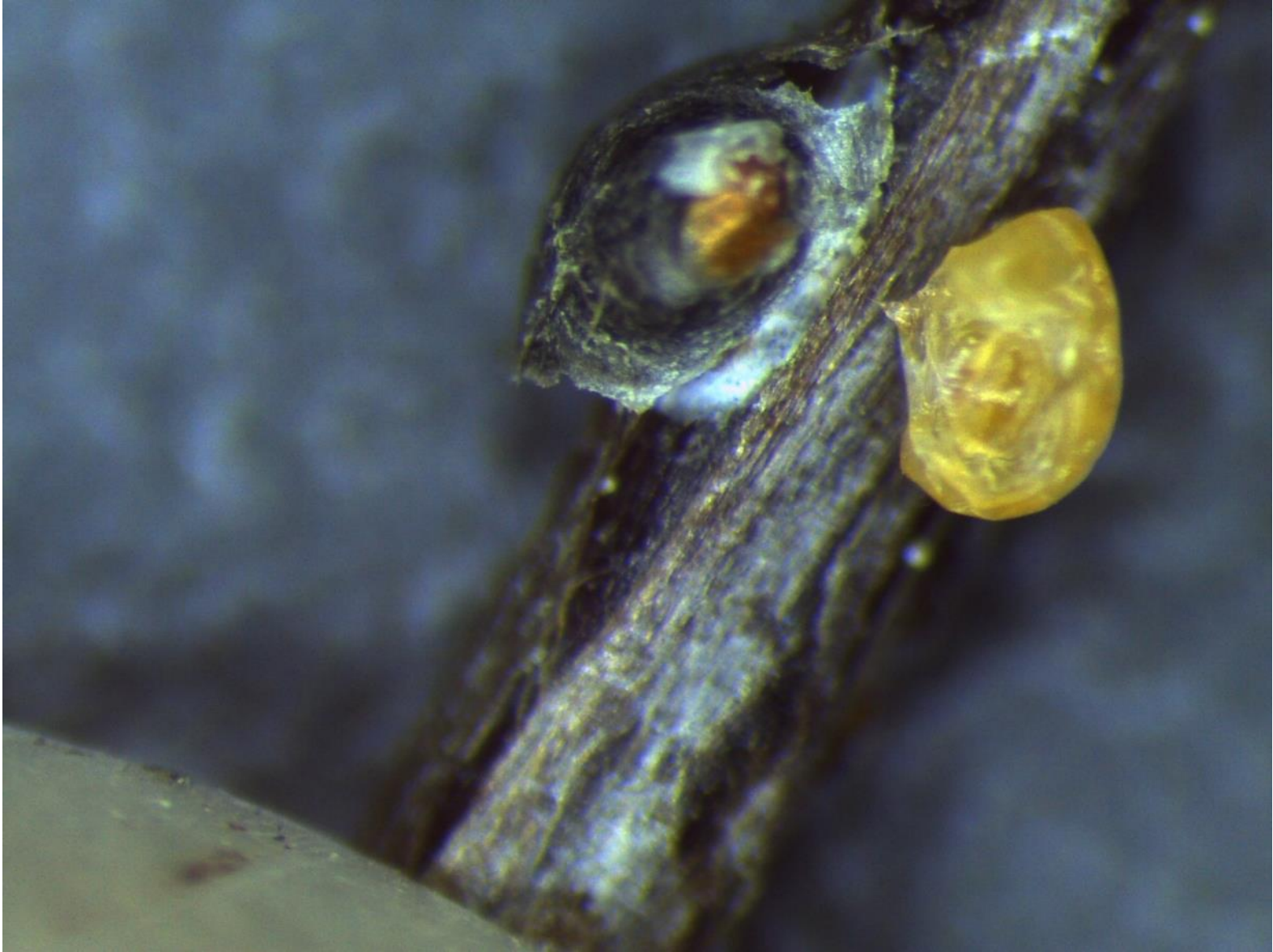






Covering 'shell' removed to show female insect.

Rostrum (or piercing mouthpart) is just a thread





Armored scales

- Females produce eggs while under cover



Precrawler – early June



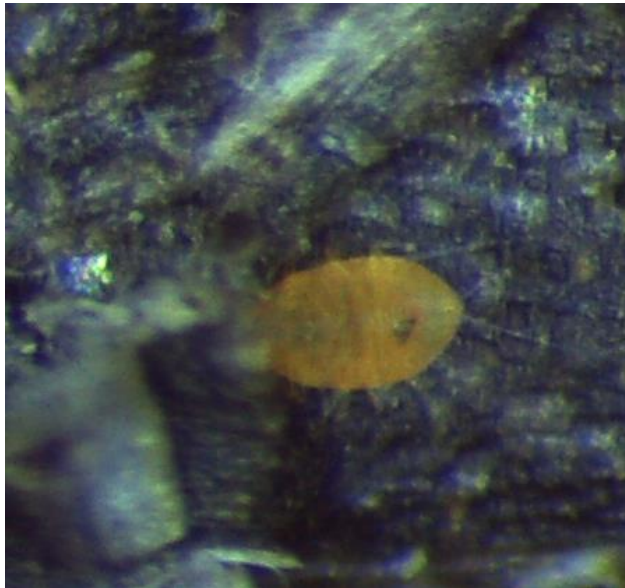
- Crawlers, newly hatched and mobile immatures of the scale, active mid-June
- Stagger emergence to late June
- Tiny orange/yellow crawlers disperse
- Settles, begins feeding, produces new shell in 2-4 days



Crawlers



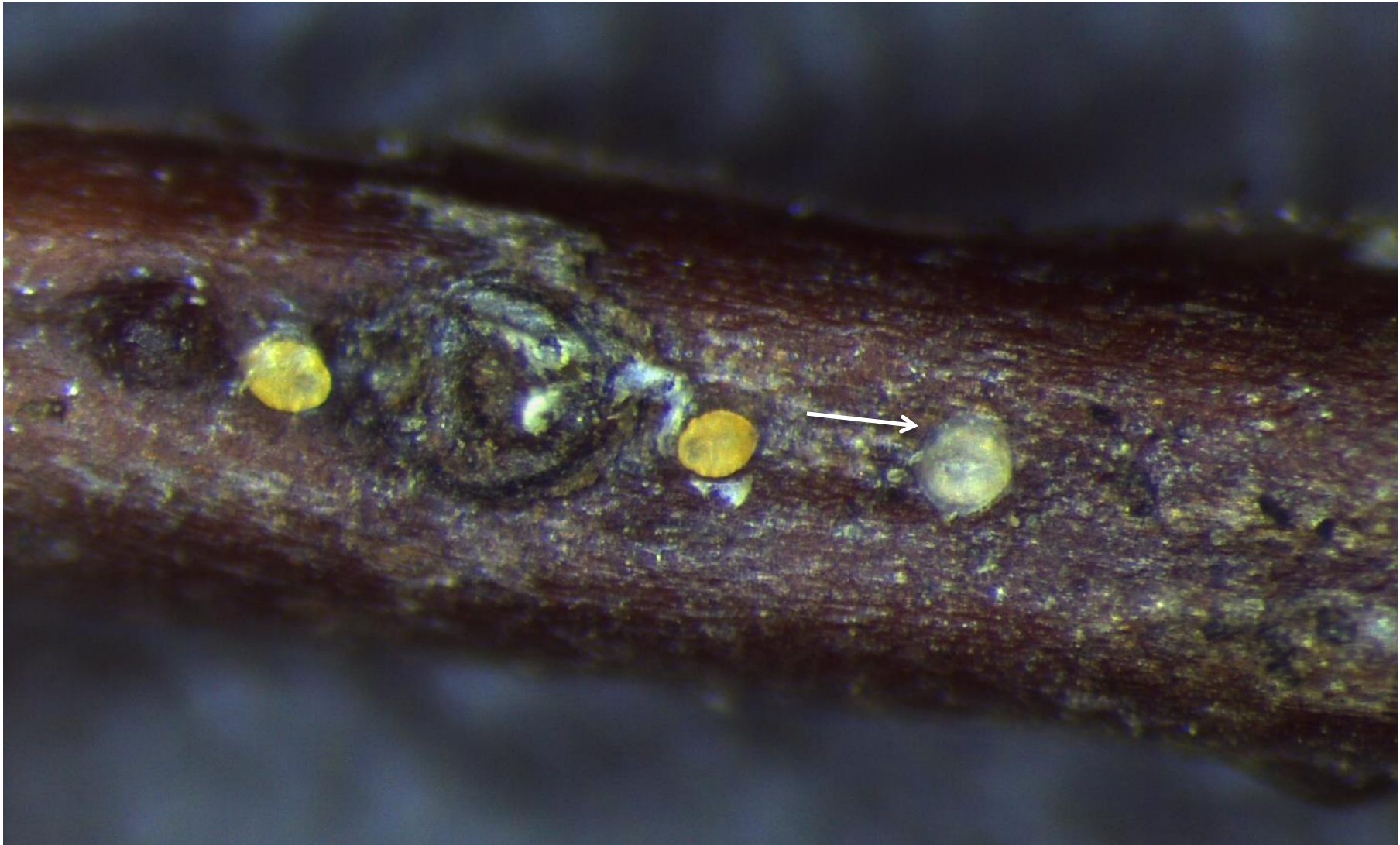
Crawlers

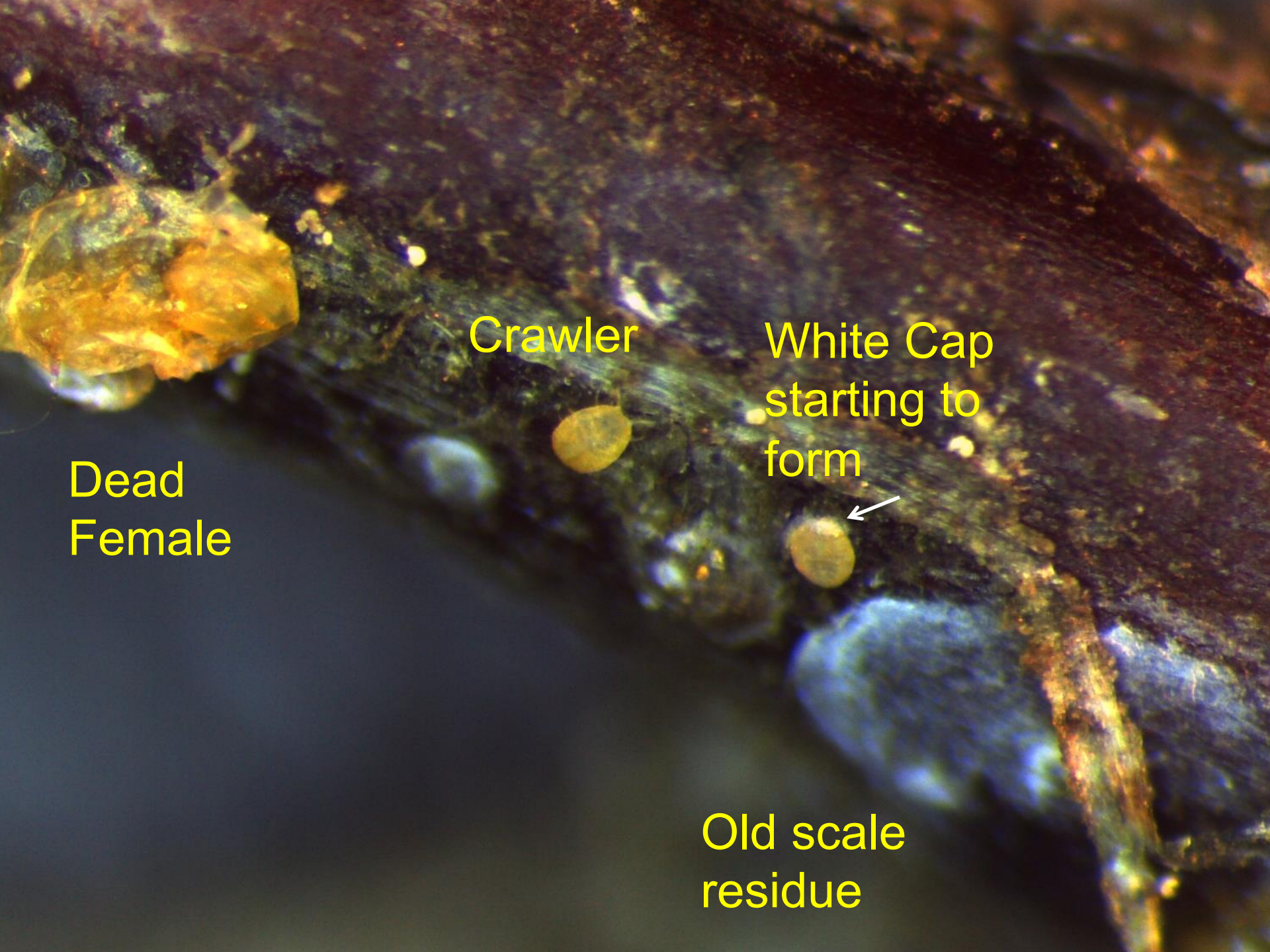




- Crawlers settle after a few days, insert their mouthparts in the plant, and begin to feed.
- They secrete a protective cover and lose their legs
- Large populations can build up before plants begin to show visible symptoms

Crawler has settled on right,
formed **white cap** over





Dead
Female

Crawler

White Cap
starting to
form



Old scale
residue

DAMAGE PUTNAM SCALE

One Year Damage in Spring Putnam Scale





**ONE SEASONS DAMAGE
SPRING TO FALL
AT HARVEST**

Damage after pulling late water



2nd year damage







**ORIGINAL INFESTATION
LAST YEAR (OR LONGER) DAMAGE
NO ACTIVE SCALE**

**OVERWINTERING SCALE
ACTIVE SCALE**

- Many year infestation
- Not managed
- June



July, after sprays



August, after sprayed





Fall
'Putnam scale'
Where treated

Fall: 'Putnam scale'

New infestation where **UN**treated



Yes, there is a 2nd generation if unchecked.

Management

- Scale insects' waxy covering makes them quite resistant to pesticides



Management

- pesticides are only effective against the first-instar nymph *crawler* stage

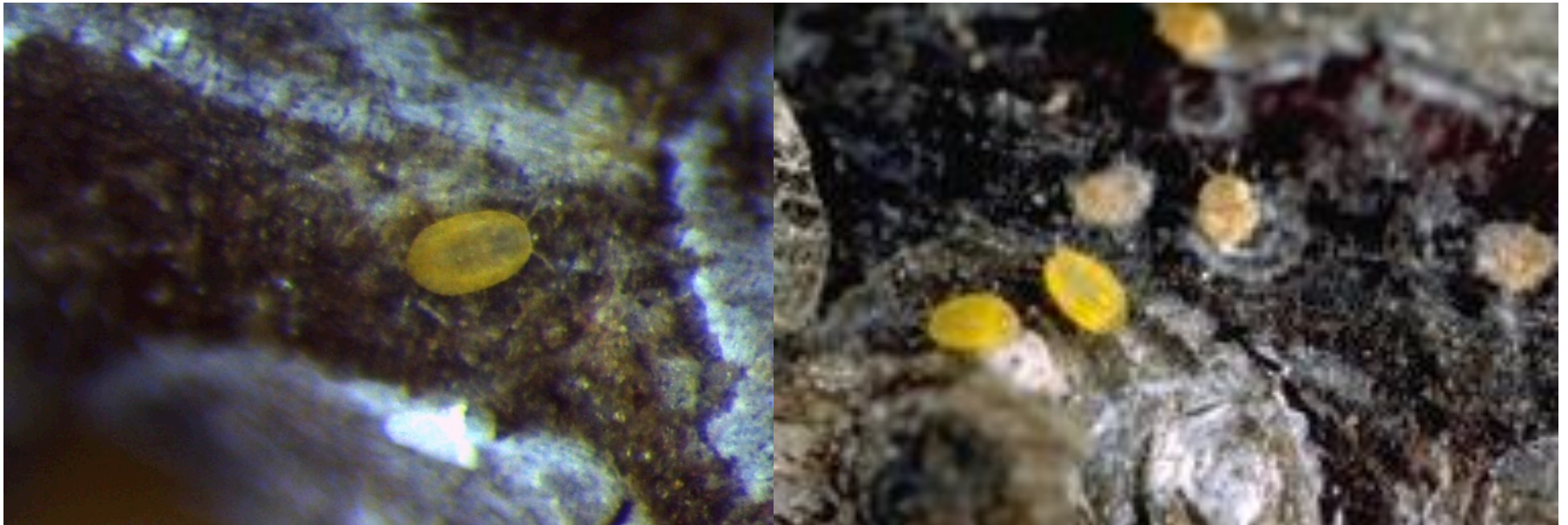
IN JUNE DURING BLOOM

- DIAZINON
- LORSBAN
- SEVIN



Management

- Target first-instar nymph *crawler* stage
- Organophosphates at bloom
 - Diazinon, Sevin, Lorsban
- Other pesticides for crawlers?



Putnam Scale Infestations

8 sites, 4 Harwich, 4 Carver

4 sites rated HI infestation

3 MED, 1 LO

JUNE 2014



Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
	3	4	5	6	7
	Last Avaunt sprays				
	10	11	12	13	14
	Scattered bloom				
	17	18	19	20	21
	1 st fungicide		BB Quads Arrive		
	6/16 Harwich 5 eggs 1 crawler 6/16 Carver 5 eggs 5 crawler				
	24	25	26	27	28
	6/23 Harwich 4 eggs 3 crawler 6/23 Carver 3 eggs 4 crawler				
	1	2	3	4 th of July	
	1 st fruitworm				

Average count/set

Putnam Scale Sprays

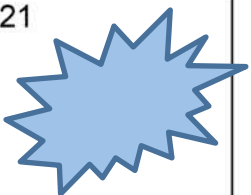
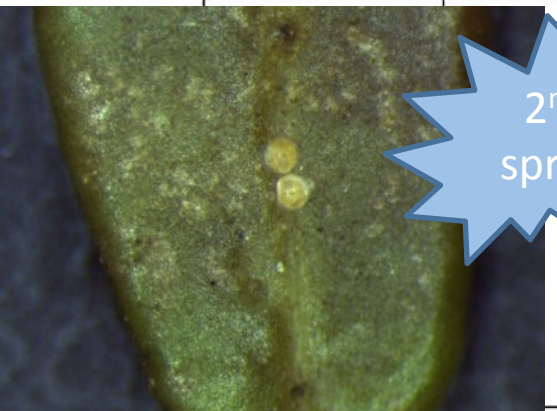
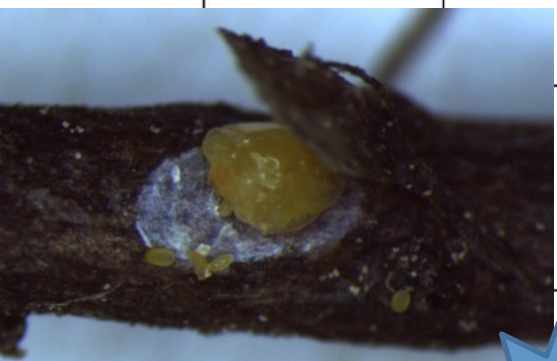
8 sites, 4 Harwich, 4 Carver
 4 sites treated 2 x
 9 diaz, 2 Iorsban

Putnam Scale Infestations

8 sites, 4 Harwich, 4 Carver
 4 sites rated HI infestation
 3 MED, 1 LO

JUNE 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
Last Avaunt sprays						
	10	11	12	13	14	
Scattered bloom						
	17	18	19	20	21	
BB Quads Arrive						
	24	25	26	27	28	
Diaz 6/25						
	1	2	3	4th of July		
7/12 Diaz						



JUNE 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
		Last Avaunt sprays				
		10	11	12	13	14
		Scattered bloom				
		17	18	19	20	21
		1st fruitworm		BP Quads Arrive		
		6/16 Carver 4 eggs 5 crawler, wc		6/16 Harwich 5 eggs 1 crawler		
		6/16 Carver 5 eggs 5 crawler				
		24	25	26	27	28
		6/23 Carver 3 eggs 4 crawler, many wc		6/23 Harwich 3 eggs 3 crawler		
		6/23 Carver 4 eggs 4 crawler				
		Diaz 6/25				
		1	2	3	4 th of July	
		1st fruitworm				

2nd generation made it through at this site!!

JUNE 2014

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
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		1st fruitworm				
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		6/16 Carver 5 eggs 5 crawler				
		24	25	26	27	28
		6/23 Carver 3 eggs 4 crawler, many wc				
		6/23 Harwich 5 eggs 3 crawler				
		6/23 Carver 5 eggs 4 crawler				
		Diaz 6/25				
		1	2	3	4 th of July	
		1st fruitworm				

DEARNESS

Spring, 3rd week of May 'Dearness scale'



- In 1952 Franklin reported 6 different species of scale insects in MA (so nothing new!)
- Reported in WI, 2005 Dearness Scale
- Reported in western growing regions
 - 2007 Dearness Scale in BC





Wisconsin Fact Sheet
2005
Dan Mahr,
University of Wisconsin

DEARNESS SCALE

Common Name: Dearness scale

Scientific Name: *Rhizaspidiotus dearnessi*

Order: Homoptera (aphids, leafhoppers, spittlebugs, cicadas, mealybugs, scale insects)

Family: Diaspididae (the armored scales)

Dearness scale is a tiny, sedentary insect that sucks sap from the stems of cranberry plants. It is usually under good natural control from naturally occurring tiny parasitic wasps. On rare occasions outbreaks can occur. When populations are large, the vines turn red, the stems become brittle, and production is lost.

Biology and Damage

Host Plants:

Cranberry, *Vaccinium macrocarpon*

Common ragweed, *Ambrosia artemisiifolia*

Goldenrod, *Solidago* spp.

Boneset, *Eupatorium perfoliatum*

Joe-pye weed, *Eupatorium maculatum*

Horseweed, *Erigeron canadensis*

Leatherleaf, *Chamaedaphne calyculata*

Bugleweed, *Lycopus virginicus*

Grass-leaved goldenrod, *Solidago graminifolia*, has been the most common weed host in Wisconsin cranberry beds.

Description and Diagnosis:

The eggs are retained internally by the female, which gives birth to live young. The young "crawlers" are bright orange, oblong, very tiny – initially 0.25 mm - 0.33 mm, and mobile. After molting to the second instar, the female dearness scales remain stationary for the rest of their lives. A white protective wax coating is secreted and eventually mixes with the cast off skins after future moltings to cover the insect's body. It is unclear as to how many instars there are but the male dearness scale shell elongates while the female shell remains oval. The adult males are winged, white, elongate, 1.0 mm long, have well developed legs and antennae, and are free living. The females are wingless, pale gray, oval, 2.0 mm long, do not have eyes or legs, and are immobile, staying under their scale coverings. Heavily infested plants have numerous small white scales along the stems, which are easily seen against the dark background of the bark. By using a pin, the white upper scale covering can be lifted off, revealing the sac-like body of the insect within. There is also a lower scale covering attached to the plant, thereby giving the appearance of a tiny clam shell.



Dearness scale on cranberry stem.

Dearness Scale

- Much easier to see
- More robust
- Bigger areas damaged
 - Swaths not spots



Putnam Scale

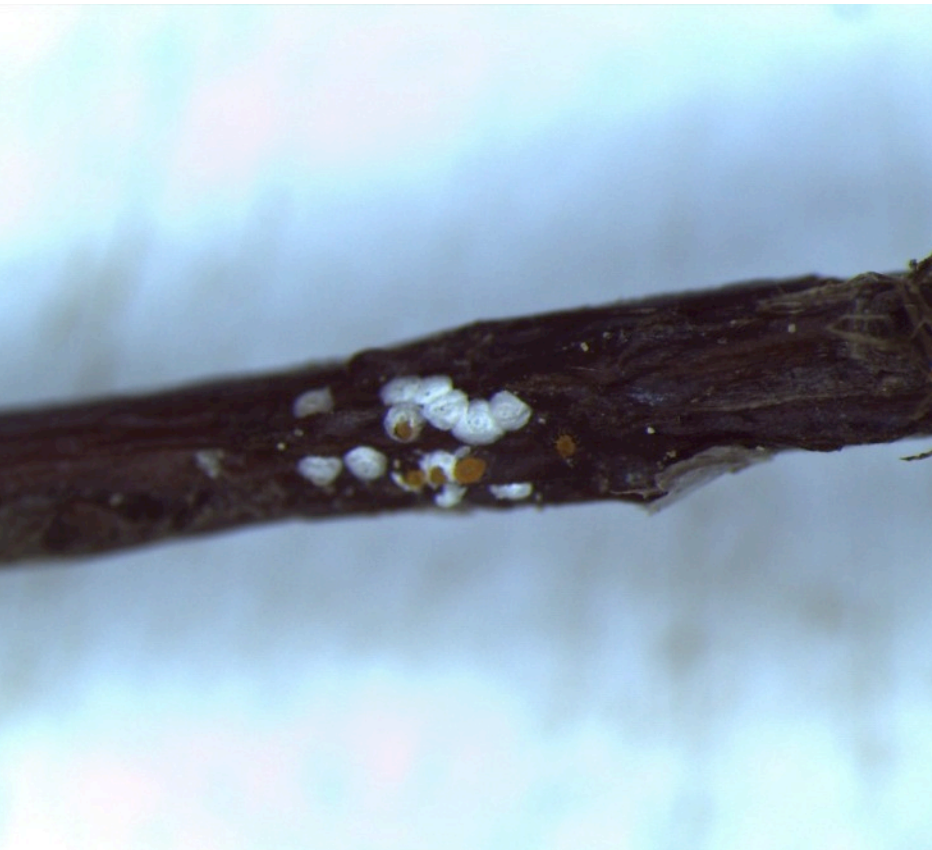
Dearnness Scale





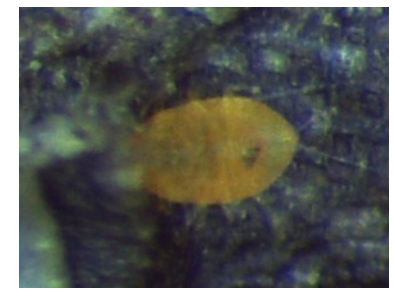
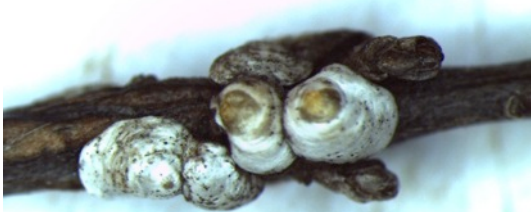
Dearness Scale, White cap

- Can almost see with naked eye
- More of a pileup than individual like putnam scale
- Earlier than putnam scale!



Dearness Scale

JUNE 2014

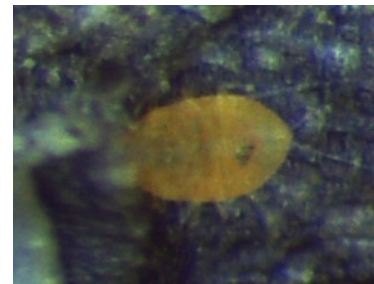


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	1	2	3	4 th of July	
	1 st fruitworm				



Dearness Scale

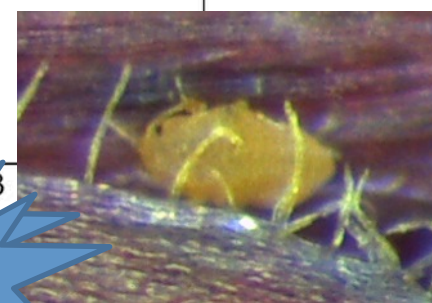
JUNE 2014



6/12 Plymouth and Taunton
Crawlers and white caps

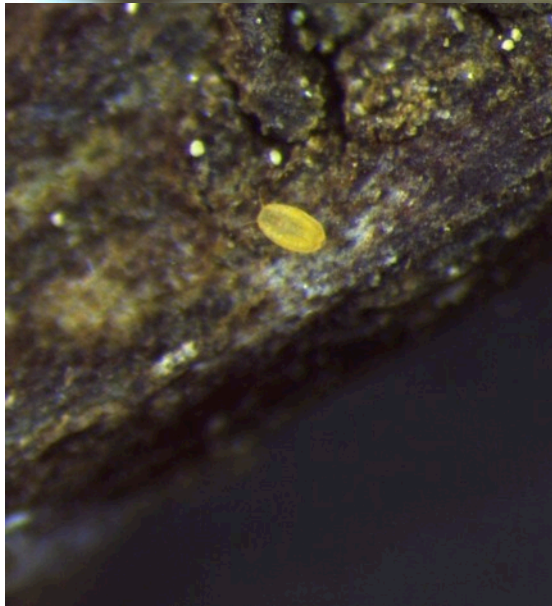
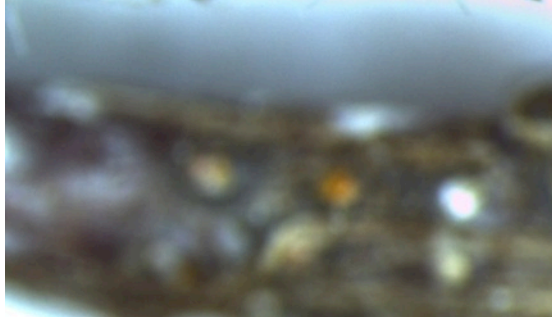
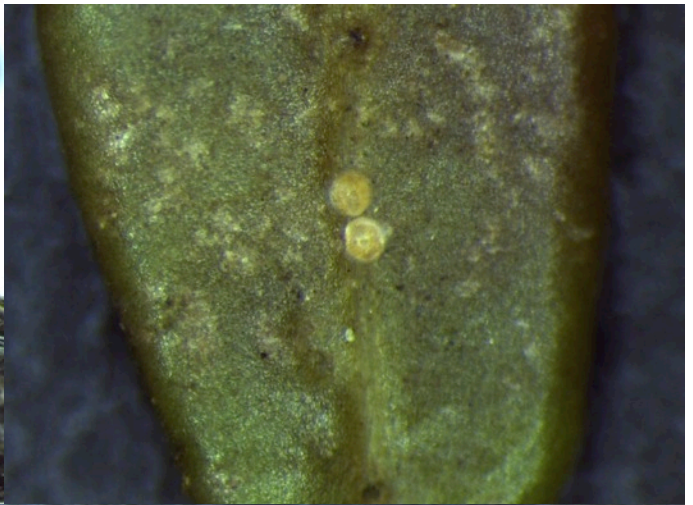
Lorsban
6/12

Diazinon
6/24



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	Scattered bloom				
	6/12 Plymouth and Taunton Crawlers and white caps				
	17	18	19	20	21
	1st fungicide			BB Quads Arrive	
		6/16 Harwich 5 eggs 1 crawler			
		6/16 Croydon 5 eggs 5 crawler			
	24	25	26	27	28
			3 eggs 3 crawler		
			3 eggs 4 crawler		
			3	4 th of July	
	1st fruitworm				





Red-Striped Fireworm



Red-Striped Fireworm

- An insect not seen in 50 years
- 2 sites
 - Carver, new planting
 - Outer cape, wild bog



Red-Striped Fireworm Moth



- The moth is dark brown or black body with a white face and white spots on the legs and forewings.
1.25 cm or ½ inch long

U. S. DEPARTMENT OF AGRICULTURE.

FARMERS' BULLETIN No. 178.

INSECTS INJURIOUS IN CRANBERRY CULTURE.

BY

JOHN B. SMITH,

Professor of Entomology, New Jersey Agricultural College.



WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1903.

CRANBERRY INSECT PROBLEMS AND SUGGESTIONS FOR SOLVING THEM

H. B. SCAMMELL,

*Entomological Assistant
Deciduous Fruit Insect Investigations*



FARMERS' BULLETIN 860

UNITED STATES DEPARTMENT OF AGRICULTURE

Contribution from the Bureau of Entomology

L. G. HOWARD, Chief

Washington, D. C.,

December, 1911

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Black headed fireworm

Yellow headed fireworm

Red-striped fireworm

dry-bog species

1903

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1917

- Yellow headed fireworm and red-striped were considered the same insect (in 1903!)
- Both “essentially dry-bog” species
- Winter flowage takes them out
- Red-Striped different because it overwinters at a larvae (yellow headed as a moth, BHF as a pupa)
- Red Striped Fireworm moths emerge in May 2nd generation in July/Aug
- Larvae live in loosely constructed case among the foliage

INSECTS INJURIOUS IN CRANBERRY CULTURE.

JOHN B. SMITH,

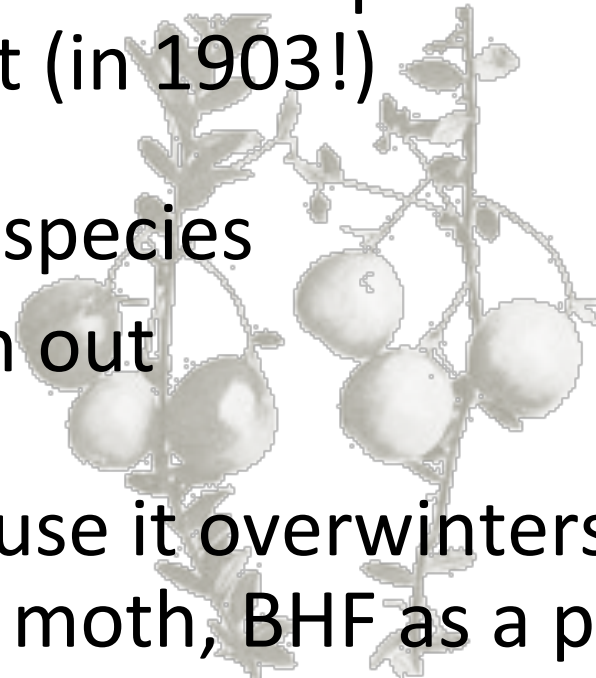
Professor of Entomology, New Jersey Agricultural Experiment Station



GOVERNMENT PRINTING OFFICE.

CRANBERRY INSECT PROBLEMS AND SUGGESTIONS FOR SOLVING THEM

J. B. SCHMIDT



UNITED STATES DEPARTMENT OF AGRICULTURE

Contributed from the Bureau of Entomology
J. B. SCHMIDT, ENT

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Red-striped worms differ from that of the other fireworms in that the winter is passed in the worm stage. In late fall the worm becomes dormant in a narrow, tubular case of frass-covered silk, formed in the uprights among badly mangled leaves and remains therein until the following spring. H. B. Scammell, 1917.





Wild site



Wild site



Red-Striped Fireworm

- Commercial
- New planting
- Late Sept





Almost all uprights were damaged



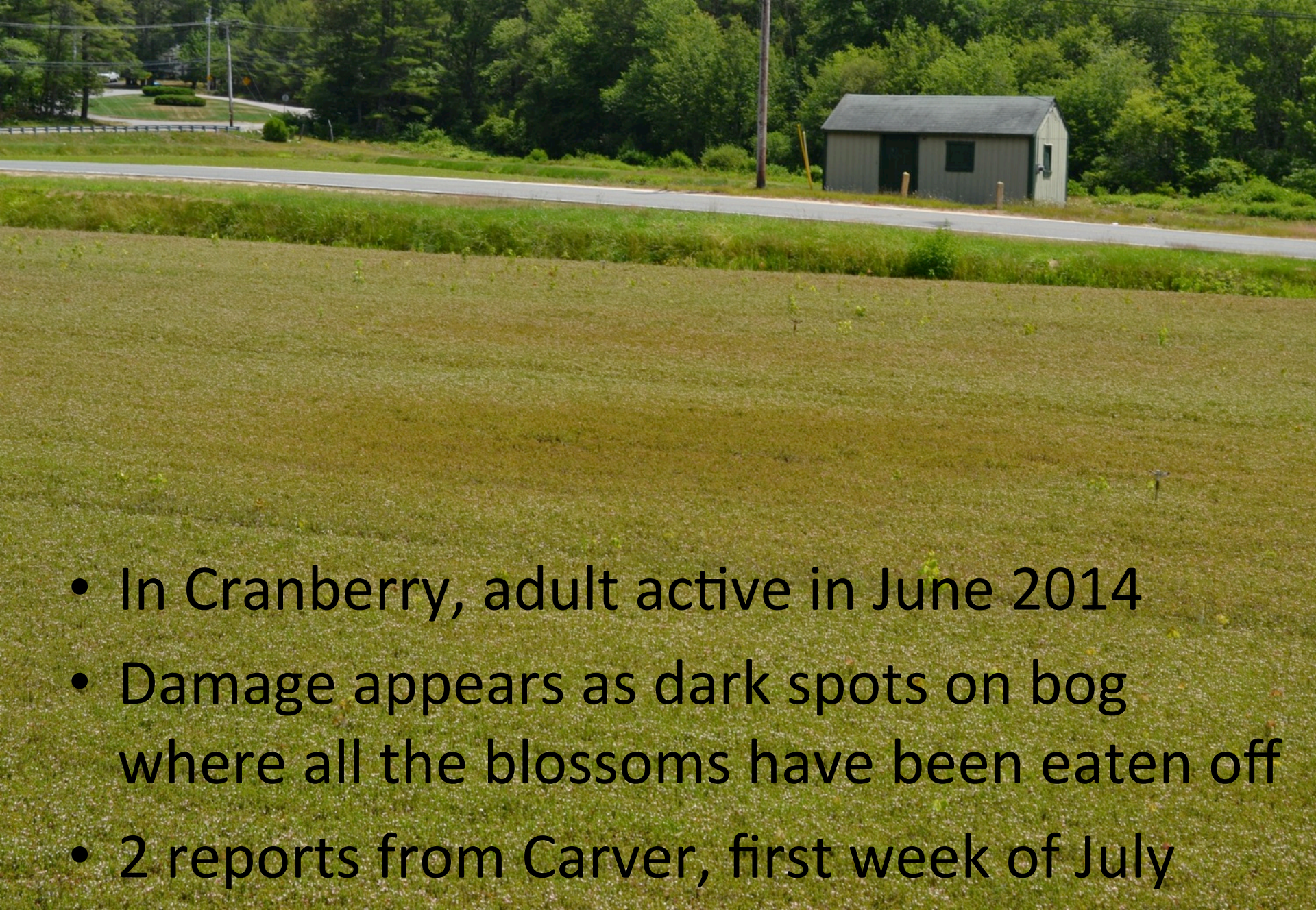
CRYPTOCEPHALID



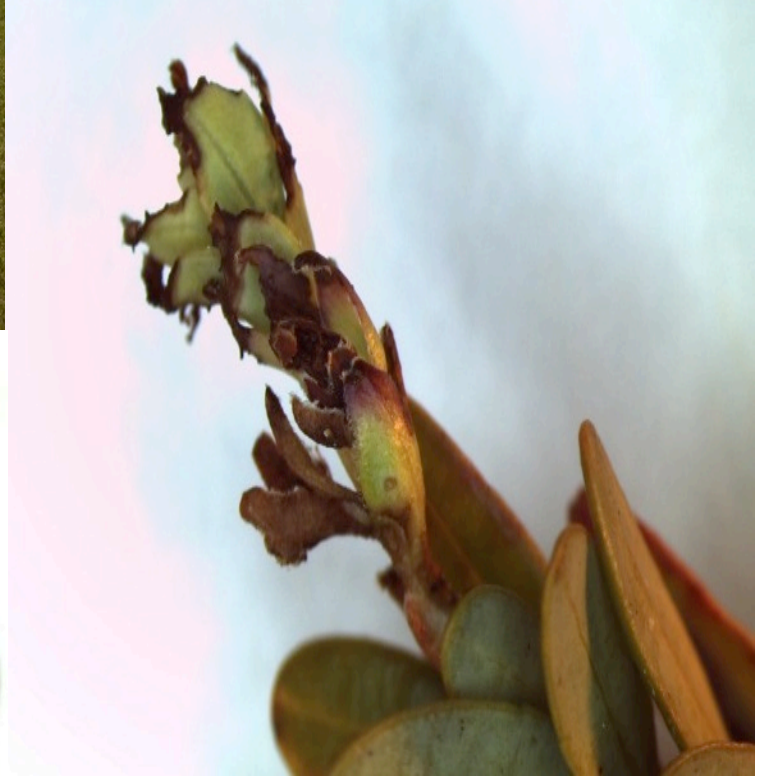
Golden Chrysomelid

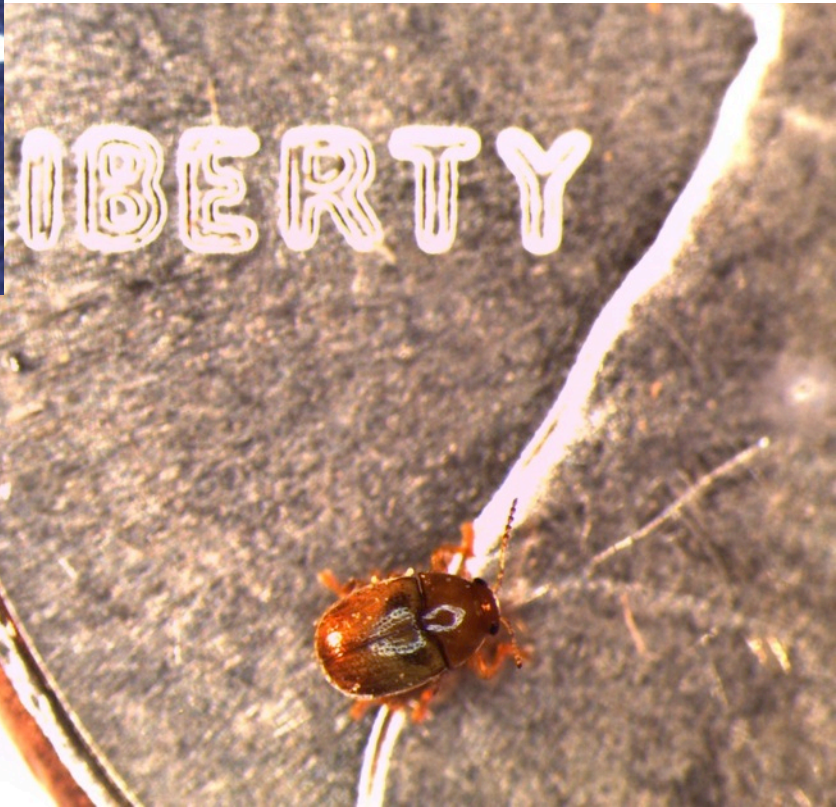
- a new pest, a leaf beetle
- a casebearing beetle
- **Order Coleoptera** (Beetles)
- **Family Chrysomelid** (Leaf Beetles)
- **Genus Cryptocephalid**
 - ~40 species in US
 - Over 300 species worldwide





- In Cranberry, adult active in June 2014
- Damage appears as dark spots on bog where all the blossoms have been eaten off
- 2 reports from Carver, first week of July





About 1 mm or
 $1/16^{\text{th}}$ of an inch



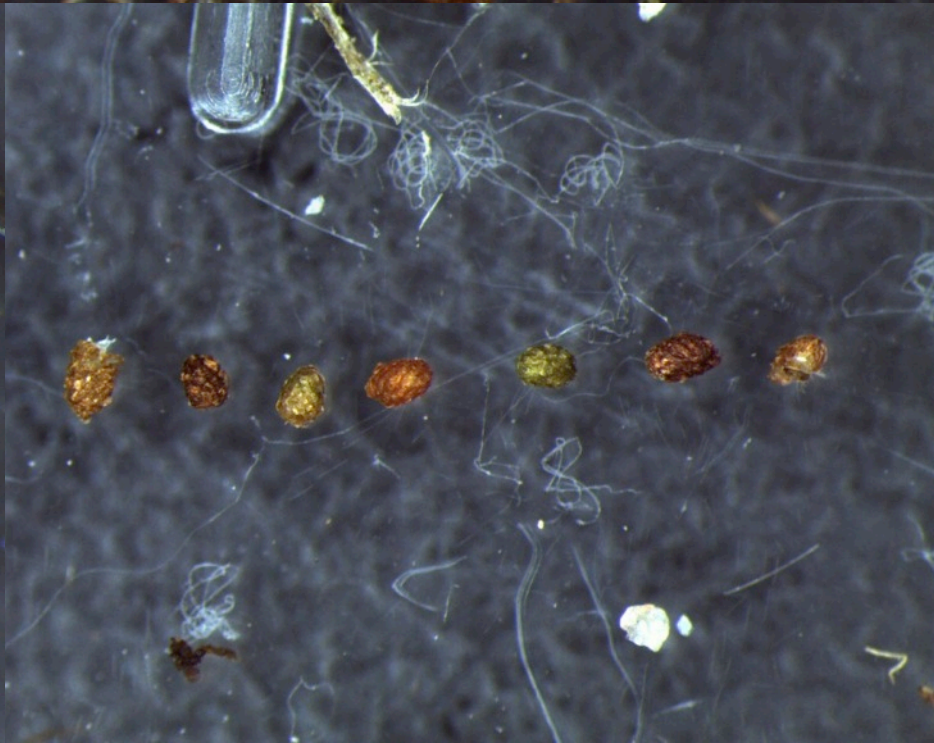
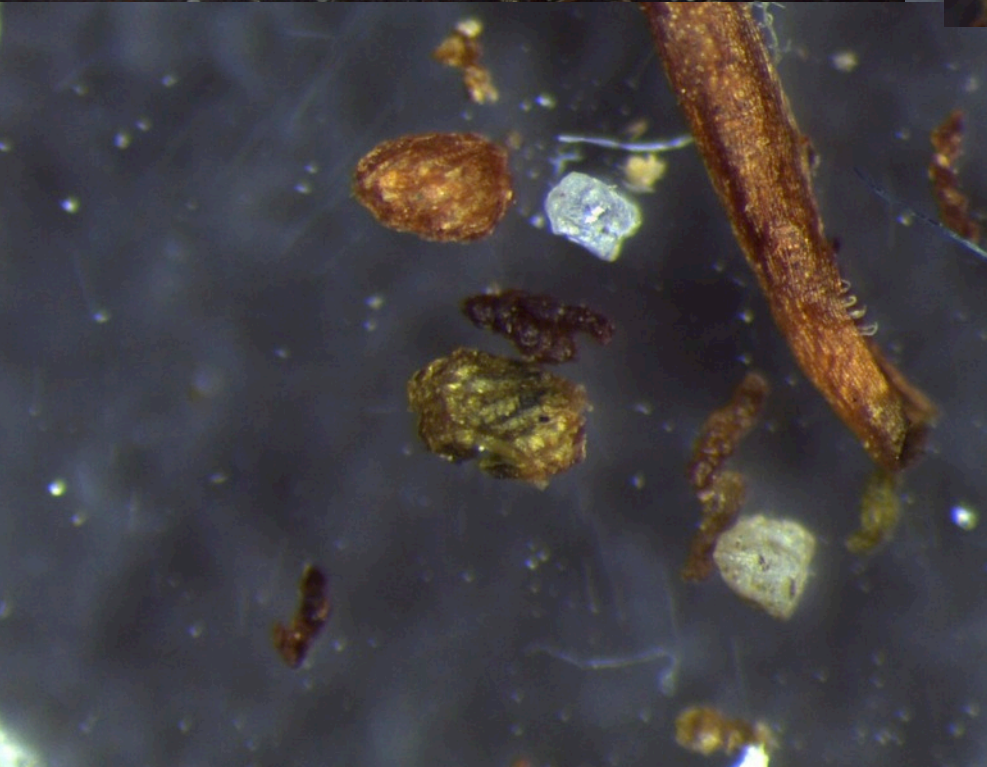
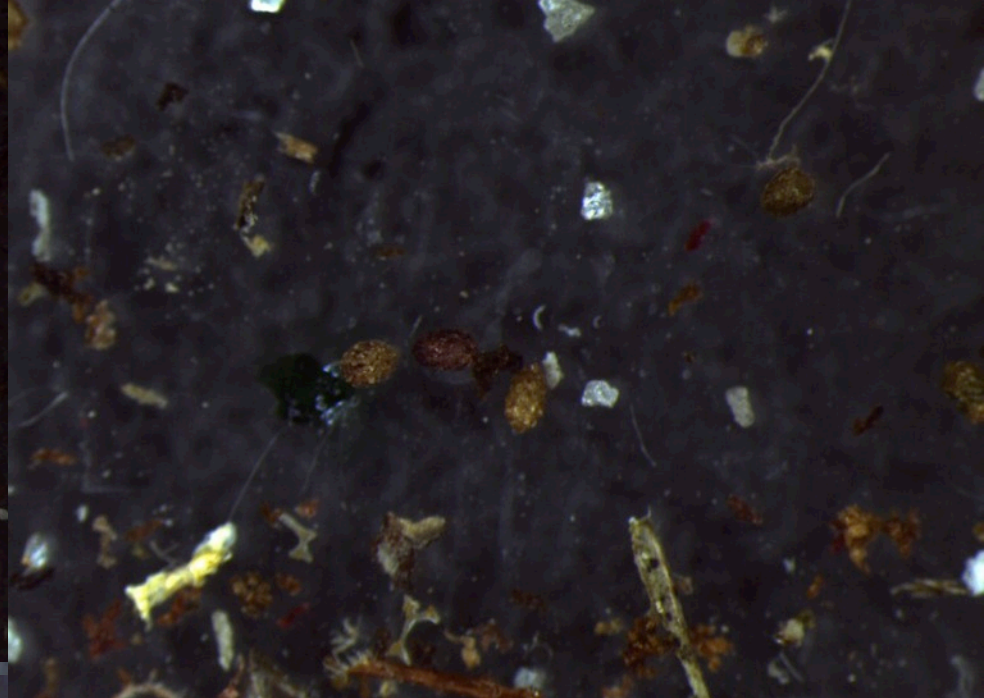
Cryptocephalus (Hidden Head)

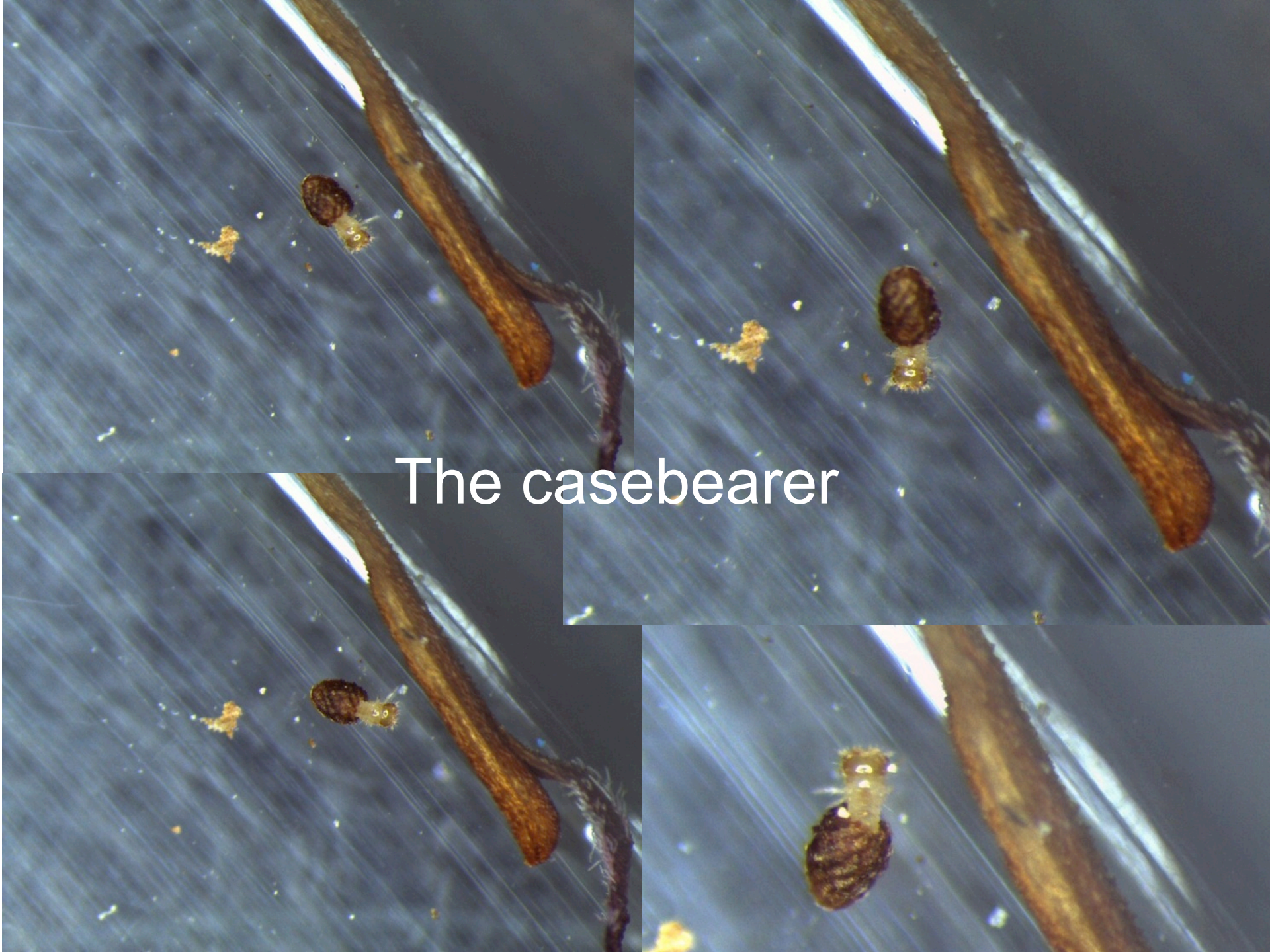


- Mother coats eggs with excrement (called a pot), and they are stuck onto stem and very hard to see



- female of *Cryptocephalus species* in the act of producing the pot by layering feces over the egg





The casebearer

