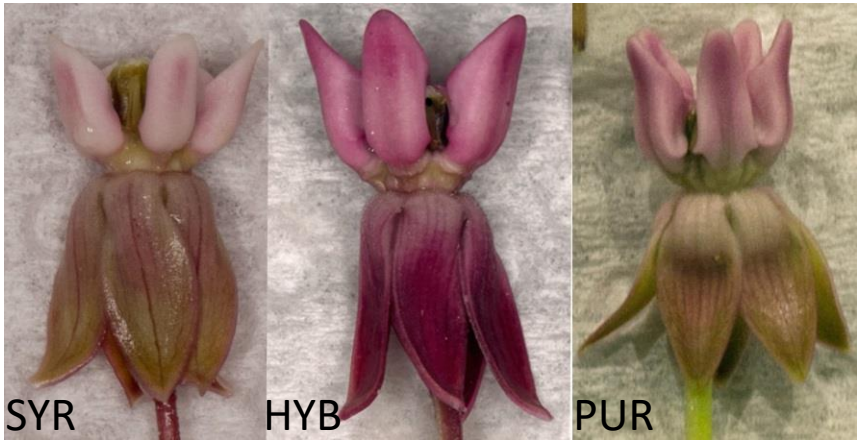
Value of Milkweed Hand-pollinations

- Study milkweed hybridization
- Understand milkweed genetics
- Investigate breeding system
- Increase population size of threatened or endangered populations
- Understand and appreciate the precision of natural pollination



Why should you trust Broyles and his technique?

- You shouldn't. See his technique and then decide what works best for you.

- You should. He has performed thousands of pollinations with a number of milkweed species and he has good success. His students get it to work too.

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Milkweed Floral Biology

(see Wyatt and Broyles, 1994)

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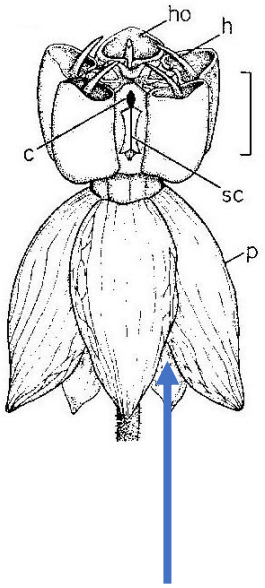

Ho = hood
H = horn
C = corpusculum
P = petal
SC = stigmatic chamber

Sepals are hidden underneath the petals

- Nectar collects in the five hoods that serve as little nectar buckets.

Corpusculum is a clip that attaches to an insect bristle or mouth part.

Horn may act as a wick to draw nectar upward or guide an insect proboscis.

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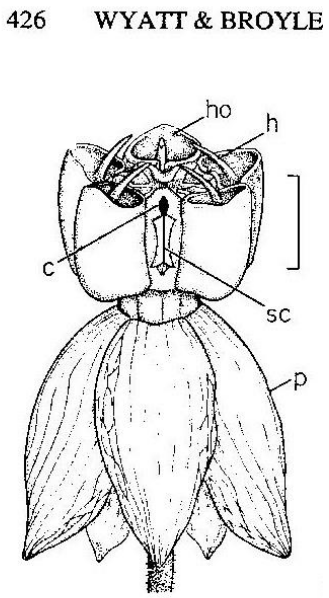
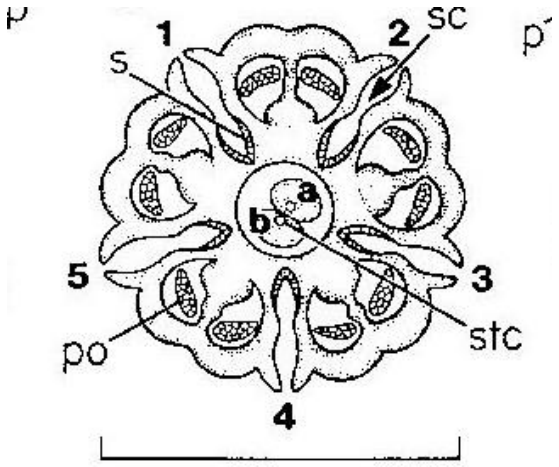
Milkweed Floral Biology





Milkweed flower cross-section
po = pollinium
S = stigma
The letters a & b represent tissues transmitting pollen tubes to the two milkweed ovaries.

Stigmatic chambers 1, 2, 3 transmit pollen tubes to ovary "a".

Stigmatic chambers 4 & 5 transmit pollen tubes to ovary "b".

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The Milkweed Flower Blueprint

Showy Milkweed
Asclepias speciosa

Butterfly Milkweed
Asclepias tuberosa

Common Milkweed
Asclepias syriaca

Swamp Milkweed
Asclepias incarnata
cvs Ice Ballet and Soulmate

Tropical Milkweed
Asclepias curassavica

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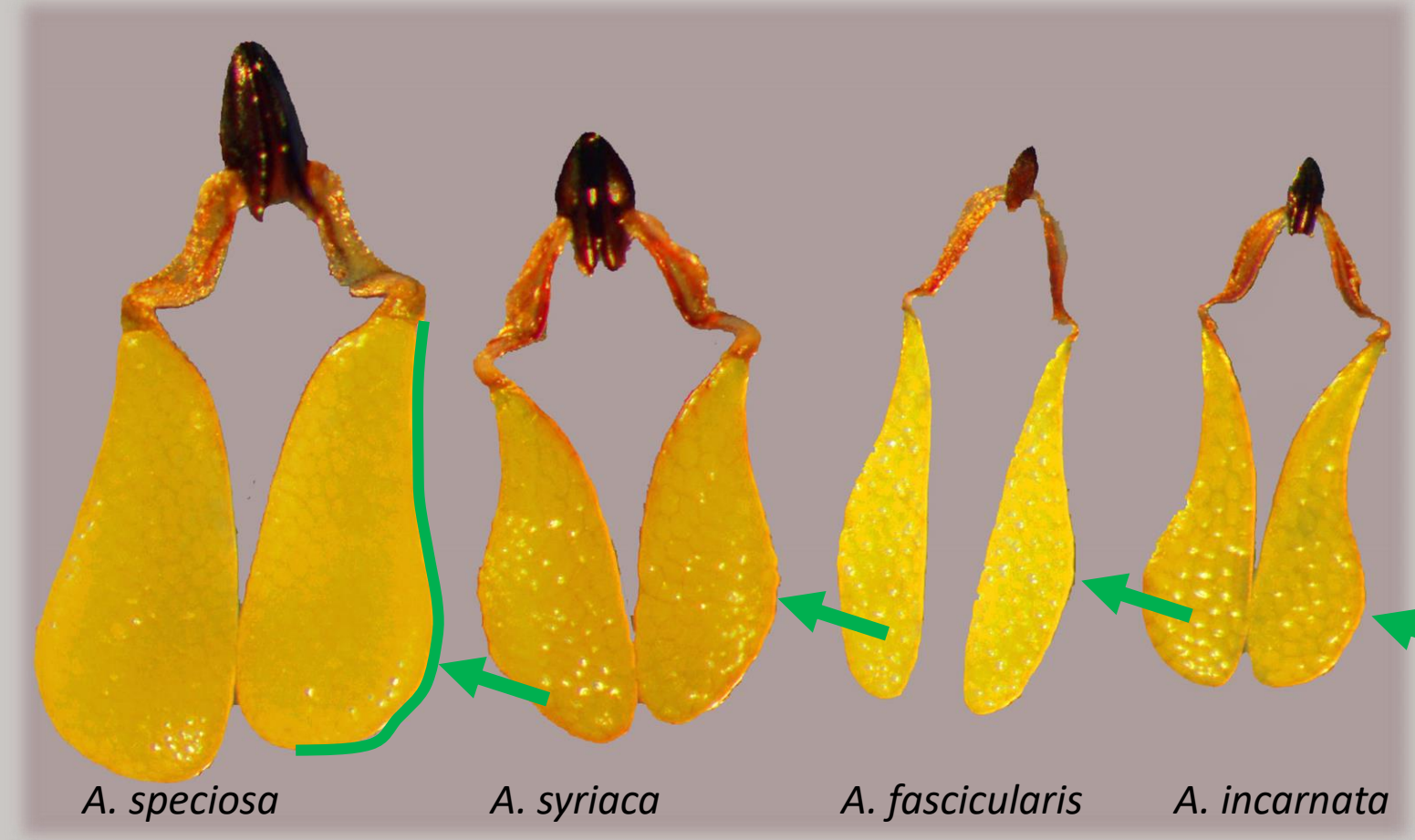
Pollinaria—concave surface has germination pore for pollen tubes



Concave surface with approximate location of germination pore

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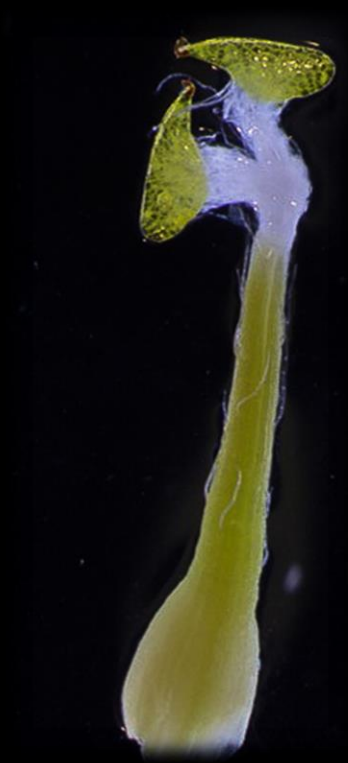
Pollen tubes emerge from pore on convex surface



Asclepias curassavica ovary with two pollinia and pollen tubes leading into style and ovary.

Pollen germinates in sucrose solution or nectar between 15-35%.

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Steve's Pollination Kit

Headband magnifiers

Assorted pipe cleaners
or jewelry tags

Dissecting needles or forceps

Sharpening stone and oil

Notebook & pencil

Plants

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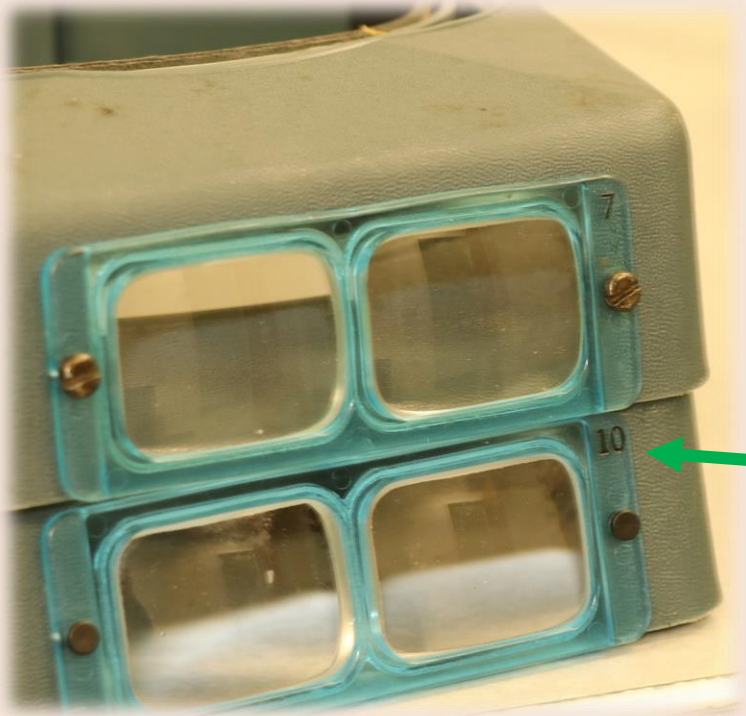
Headband Magnifiers

OptiVisors, Donegon



7 = 7 inch focal length
magnification 2.75X

10= 10 inch focal length
magnification 3.0X

Broyles Preferred

Forceps or sharp dissection needles

- Needles are a little more versatile and don't require finger pressure to hold pollinia or corpuscula.

- The extra point on forceps gets in the way.

Pipe cleaners are used to identify inflorescences with pollinated flowers.

Information on jewelry tags identifies the pollen donor and date of pollination that is recorded in field notebook.

Dates also help predict when fruits will mature and seeds can be harvested.

Pollination steps

- Push donor pollinia out of flower using needle.
- Place donor pollinia on thumb nail or hard surface.
- Break corpuscula in half with needle.

Broyles thumbnail.

This is where I store pollinia while working.

Prepare Stigmatic Chamber

- Remove pollinarium of the chamber you wish to pollinate
- Unzip stigmatic chamber by pushing top portions of chamber flaps apart with dissecting needle
- Chamber is ready for pollinium insertion

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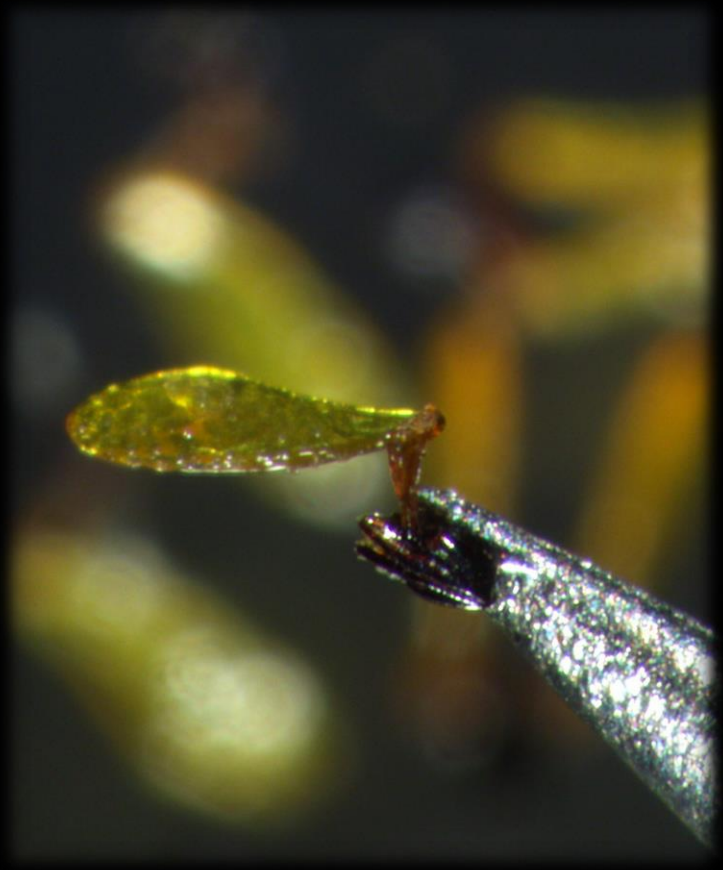
Position pollinium on end of needle

- Dab tip of needle into small amount of nectar.
- Use nectar to attach corpusculum half onto needle.



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Place concave surface with pollen tube exit point facing inward.

Push stigmatic chamber flaps back together.

Celebrate—have a beer.

What to do with rigid chambers?

A. eriocarpa

Push the chamber flaps apart forcibly.

If nectar flow is good, latex doesn't bleed into chamber, and pollinium is inserted deep into chamber, then all is well.

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Really stiff stigmatic chamber flaps?

- Remove one chamber flap with dissecting needles as was performed on this flower of *Calotropis gigantea.*
- Pollinium is inserted and nectar flow is good.

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A few final thoughts. . .

- Use a camp chair to sit comfortably in the field.
- Place something under potted plants to raise them to a comfortable level.
- Work with your elbows at your side, hands close to body.
- Use middle and third fingers to help support thumb and forefinger while working with flowers.
- Breath, relax, walk around to avoid frustration.
- Avoid excess caffeine, nicotine, or other stimulant that could cause hands to shake.
- Don't pollinate in the wind.
- Share your experience with me and others.

The number of pollen grains per pollinium is greater than the number of ovules per ovary. Therefore you only need one pollination per flower (Wyatt, Broyles, Lipow, 2000).

Species	Pollen per Pollinium	Ovules per Ovary
A. curassavica	160	116
A. exaltata	219	61
A. incarnata	98	52
A. purpurascens	243	167
A. speciosa	401	201
A. syriaca	445	208
A. tuberosa	88	71

Dr. Steven Broyles
Professor of Biological Sciences
SUNY Cortland
Cortland, NY 13045
broyles@cortland.edu

Dedicated to Dr. Robert Wyatt, UGA, Go Dawgs

Thank you for sharing your love of milkweeds

and inspiring others.

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Cited Literature

- Wyatt & Broyles. 1994. Ecology and Evolution of Reproduction in Milkweeds. *Annual Review of Ecology and Evolution* 25: 423-441.
- Wyatt, Broyles, & Lipow. 2000. Pollen-Ovule Ratios in Milkweeds (Asclepiadaceae): An Exception that Probes the Rule. *Systematic Botany* 25: 171-180