

Bees



Wasps



“Bugs” that Sting

Scorpions



Ants





Insects and other arthropods can bite with mouthparts, usually mouthparts designed to suck fluids



Insects sting with a modified ovipositor

Scorpions sting with a special structure on the tip of the abdomen



Scorpions



An adorable baby scorpion!



**Common
striped bark
scorpion**

Centruroides vittatus





Giant Desert
Hairy Scorpion

Some West Slope Scorpions

Northern Scorpion



Photograph by Bob Hammon



Pedipalps (**chela**e)
for prey capture



Scorpion **chelicerae** (jaws)

Stinger used for defense



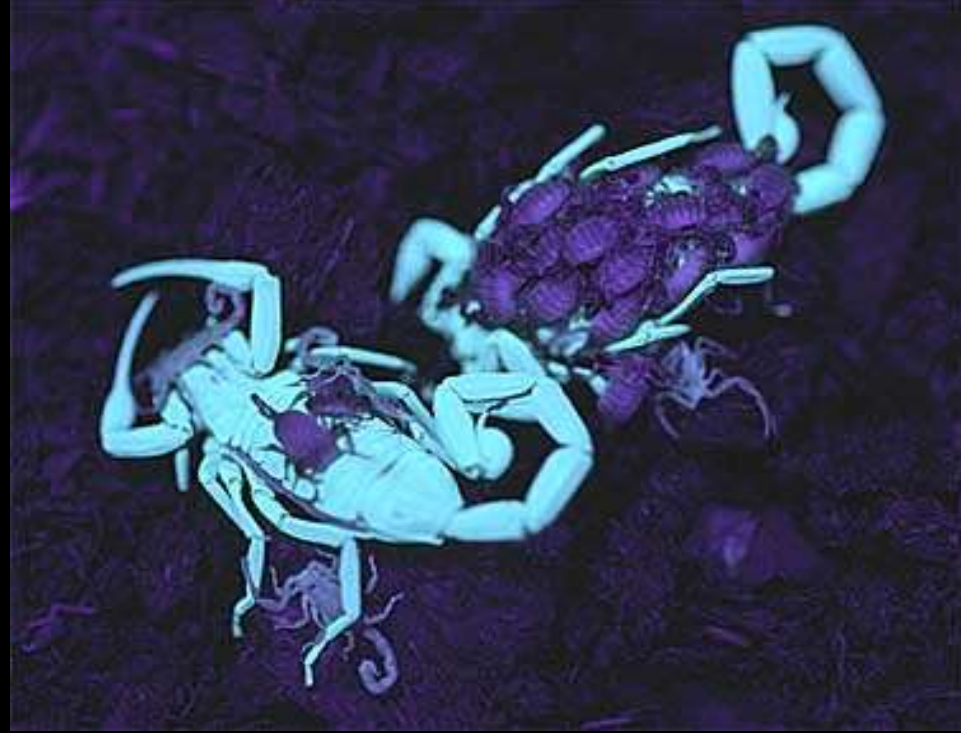
Natural light



**Ultraviolet
“black” light**



Scorpions fluorescing under black light







Scorpions found in Colorado are not considered to be medically important

Fat-tailed Scorpions of Northern Africa – The worlds most dangerous scorpions



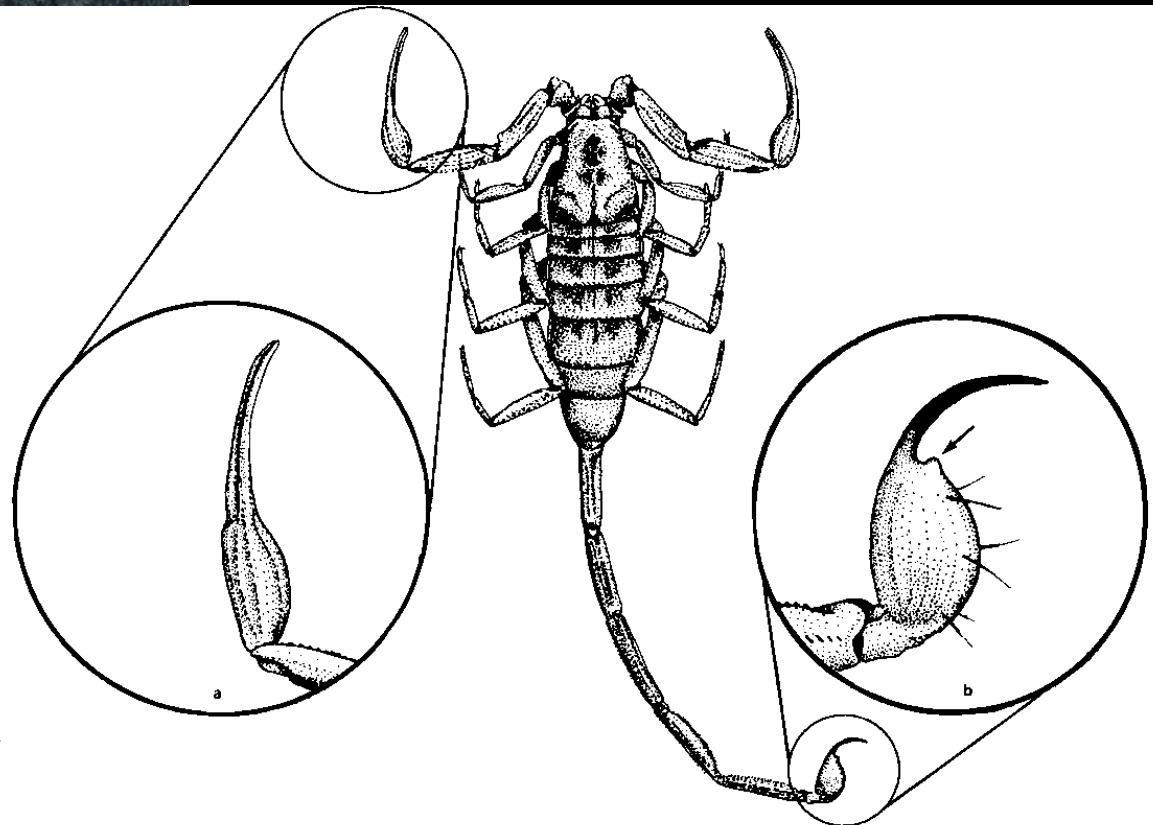
Arabian fat-tailed scorpion, *Androctonus crassicauda*

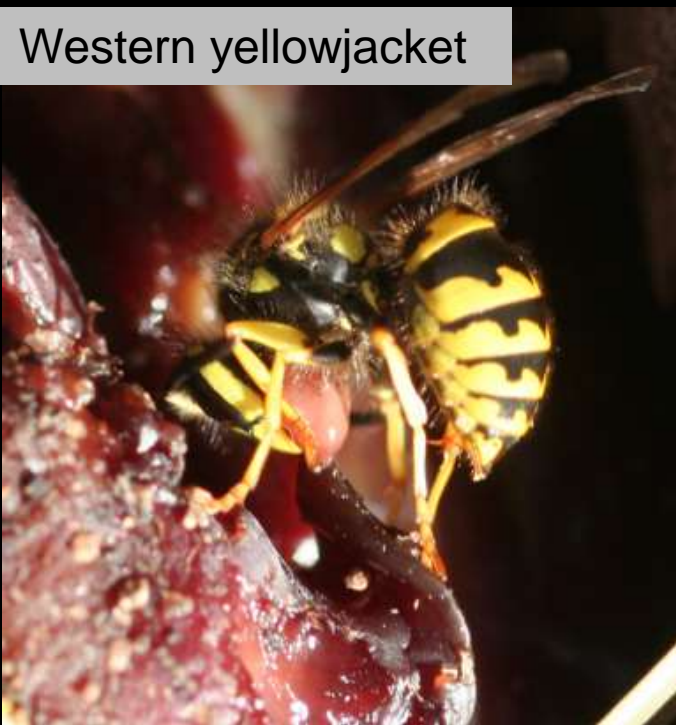


Arizona bark scorpion



Arizona Bark Scorpion

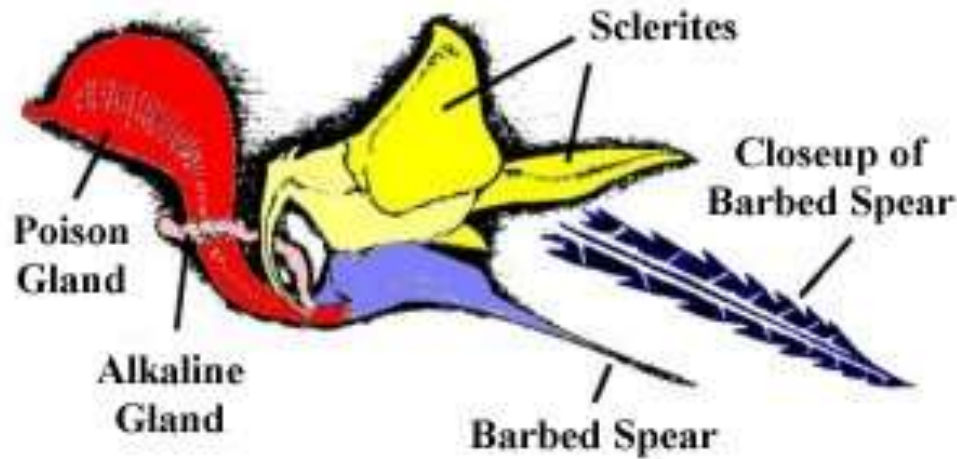




Most Common Insects that Sting



Honey Bee Sting



Bees, some wasps, and some ants have a stinger used for defense. The stinger is a modified ovipositor.





OVIPOSITOR

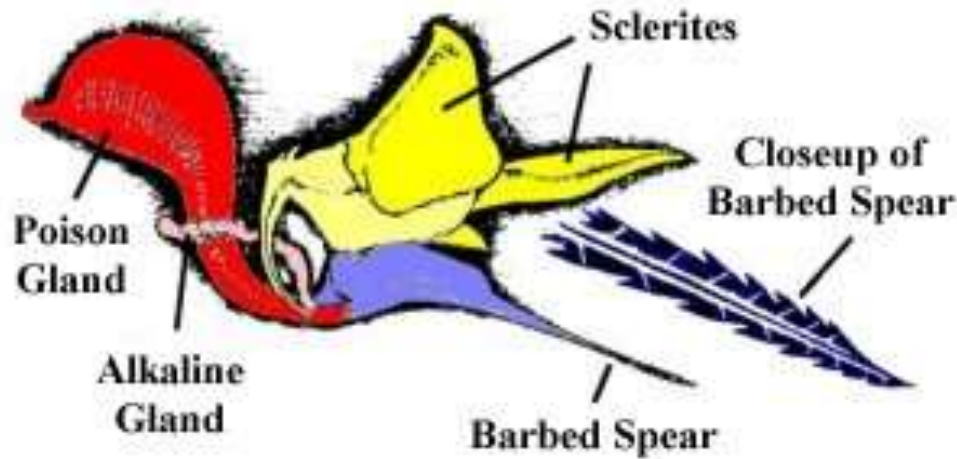
The ovipositor is the structure used by female insects to lay eggs.

Male and female house cricket



Ovipositor

Honey Bee Sting



Bees, some wasps, and some ants have a stinger used for defense. The stinger is a modified ovipositor.





Some ant (females) have a functional stinger and (most) can inject some type of venom

Ants do not have a barbed stinger





Ants in the subfamily Formicinae do not sting

Some will use **formic acid** or other chemicals in defense



From the Ammonite production Smalltalk Diaries

Harvester ants – *Pogonomyrmex* species



Harvester ants are seed
feeders



Harvester ants – *Pogonomyrmex* spp.



Plaster cast of a large *P. badius* harvester ant nest



©2009 John Hankla

Distinct nest made of tiny pieces of gravel, usually with a southeast oriented entrance





Harvester ants possess a blunt stinger and can produce one of the most painful stings of any ant species

RED HARVESTER ANT





Uncle Milton's Ant Farm

Harvester ants are the “ant of commerce” commonly sold to inhabit ant farms



How do flying insects find each other during mating swarms?

“hilltopping”

Winged reproductive males and females meet over prominent points in the landscape





Harvester ants and the 'hilltopping' phenomenon

1801 California Ave., Denver
(Century Link sign at top)

Harvester ants and the 'hilltopping' phenomenon



Hilltopping in Colorado

Up on the grain bin

Video courtesy of Wyatt Witt (BSPM102 student – Spring 2016)



What is a bee?



What is a wasp?



Common Families of Bees and Wasps

Bees

- **Apidae** (honey bees, bumble bees, digger bees, carpenter bees)
- **Megachilidae** (leafcutter bees, mason bees, sower bees)
- **Andrenidae** (ground-nesting bees)
- **Halictidae** (sweat bees)
- **Colletidae** (plasterer bees)

Wasps

- **Vespidae** (paper wasps, yellowjackets, hornets, potter wasps)
- **Sphecidae** (hunting wasps)
- **Pompilidae** (spider wasps)
- **Mutillidae** (velvet ants)
-other families of predatory Hymenoptera
-myriad families of parasitic Hymenoptera
- Gall wasps?

How many species of bees are known to occur in Colorado?

- **A. 37**
- **B. 124**
- **C. 946**
- **D. 1576**

How many species of bees are known to occur in Colorado?

- A. 37
- B. 124
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- D. 1576



Bees collect nectar and pollen

Pollen is used primarily for rearing young

Nectar is used primarily as an energy source for the adults



Wing muscle vibrations release pollen from poricidal anthers, creating a buzz distinct from flight.



**Wasps collect
animal matter to feed
their young**



Adults may feed on nectar as
an energy source.

Habits of Bees & Wasps

- **Bees**

- **Social bees**

- **Perennial colony (honey bee)**
 - **Annual colony (bumble bees)**

- **Solitary bees (leafcutter bees, digger bees)**

- **1-2 generations/year**

- **Wasps**

- **Social wasps (yellowjackets, hornets, paper wasps)**

- **Annual colony**

- **Solitary wasps (hunting wasps, parasitic wasps)**

- **1-2 generations/year**

**Some solitary bees and
some solitary wasps** nest
in stems and above-
ground cavities



**Some solitary bees and
some solitary wasps
nest in the soil**



Mud dauber nest



Resin/pebble nest of a *Dianthidium* bee



Potter wasp nests



Some solitary wasps and a few solitary bees will construct nest cells of mud, pebbles or other materials (e.g., leaf pieces)



Social bees use wax for nest construction



Social wasps use paper for nest construction





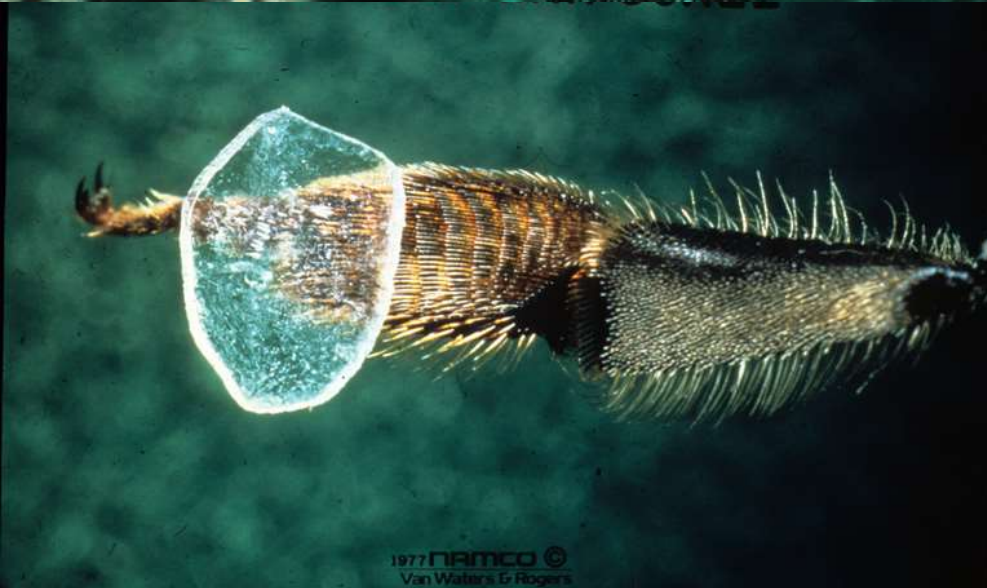
Hexagonal cells: Maximize space and minimize materials



HONEY BEE-WAX SCALES



1977 NAMCO ©
Van Watten & Rogers



1977 NAMCO ©
Van Watten & Rogers

Wax flakes are produced by special glands of the thorax, then are molded into comb

Bumble bees use wax to create roundish cell pots for rearing young and storing food





A paper envelope surrounds the nest of yellowjackets and “hornets”

Hexagonal cells for rearing brood





**Baldfaced hornet
chewing on weathered
wood**

Jim Kalisch, University of Nebraska

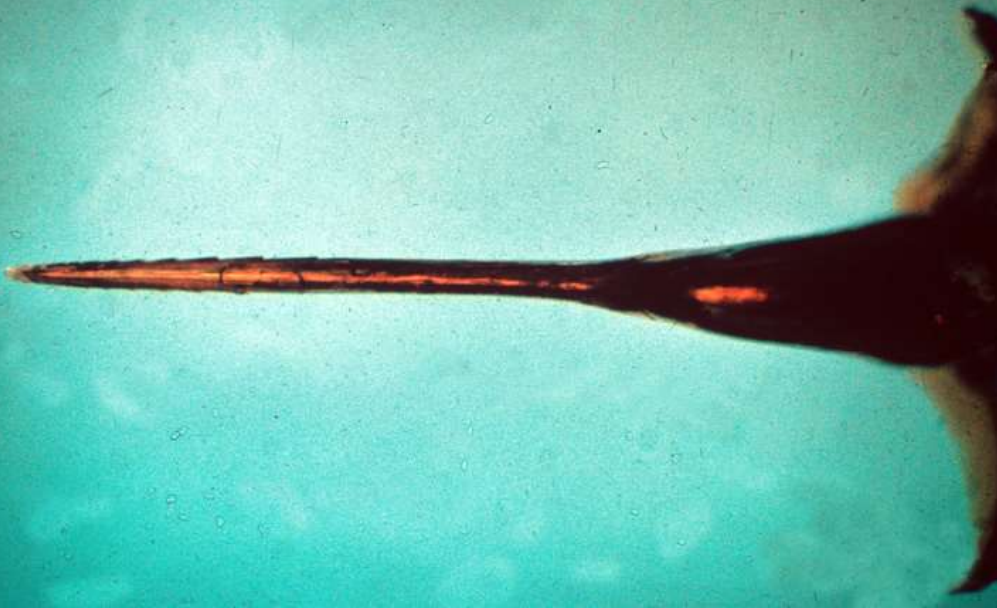
**Surface of a
baldfaced hornet
nest**



HONEY BEE-STING SHAFT- -TIP-BARBS-



HONEY BEE-STING SHAFT



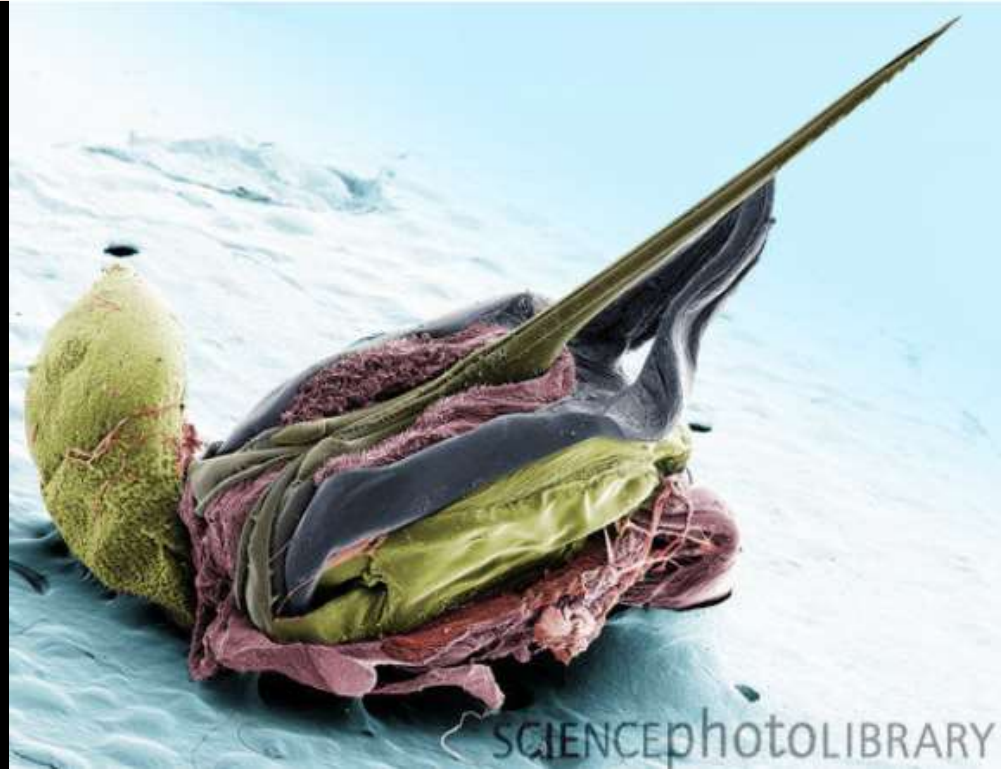
1977 NAMCO ©
Van Waters & Rogers

The stinger of a
worker honey bee is
barbed



Honey bee stinger and
poison sac detach and
remain embedded in skin

The only insect that
regularly leaves a stinger
in the skin is a worker
honey bee



SCIENCEPHOTOLIBRARY

Honey Bee Sting on Human Skin

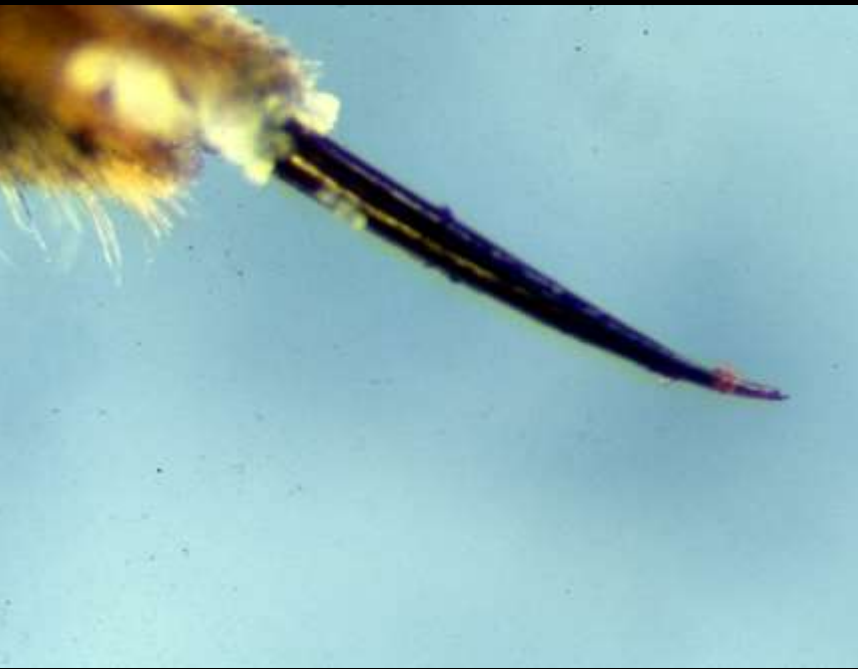
University of Florida - Entomology and Nematology



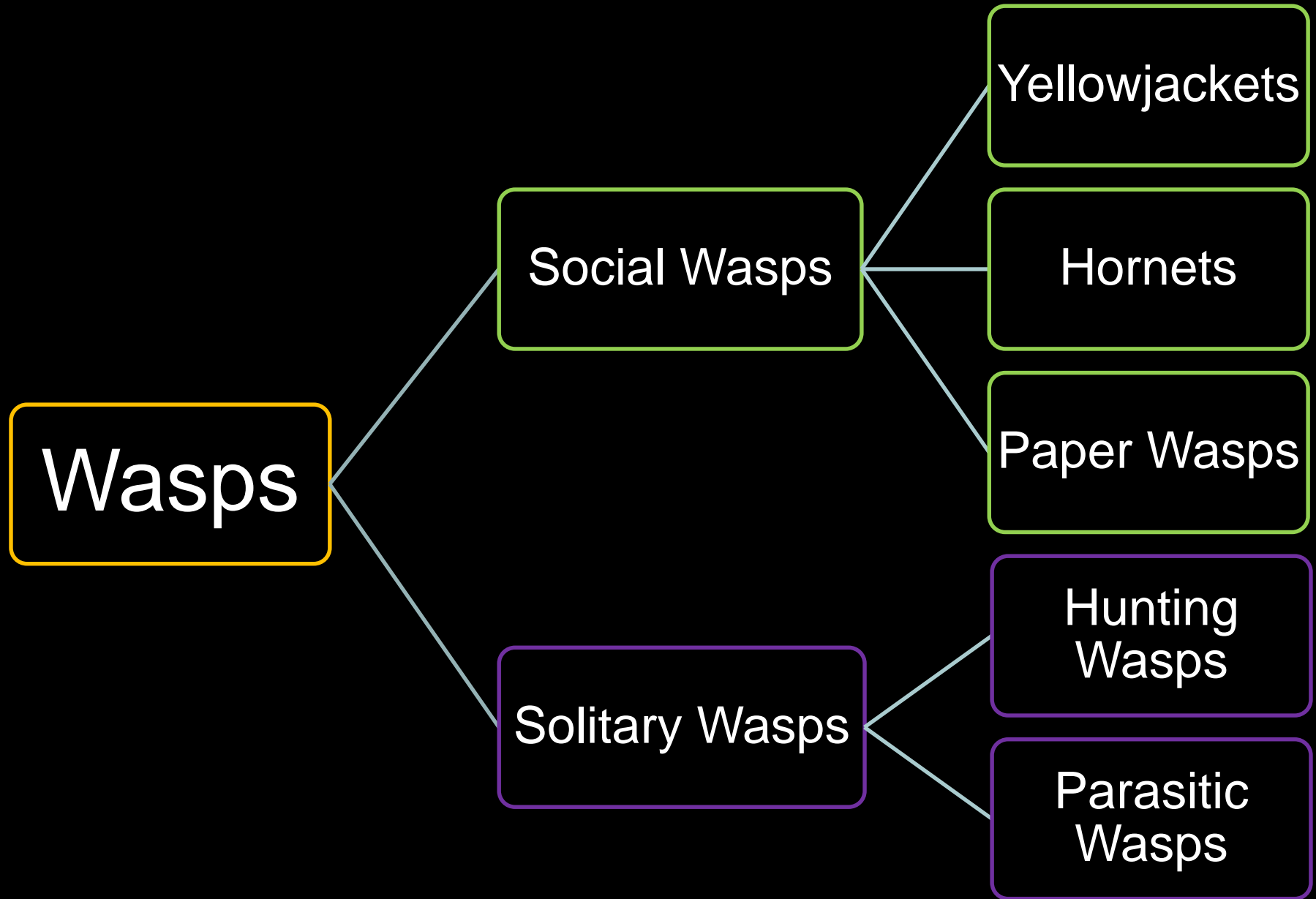
**Honey bee stinger
and poison sac
detach and remain
embedded in skin**



**The stinger of all
other bees – and all
wasps – is not barbed**

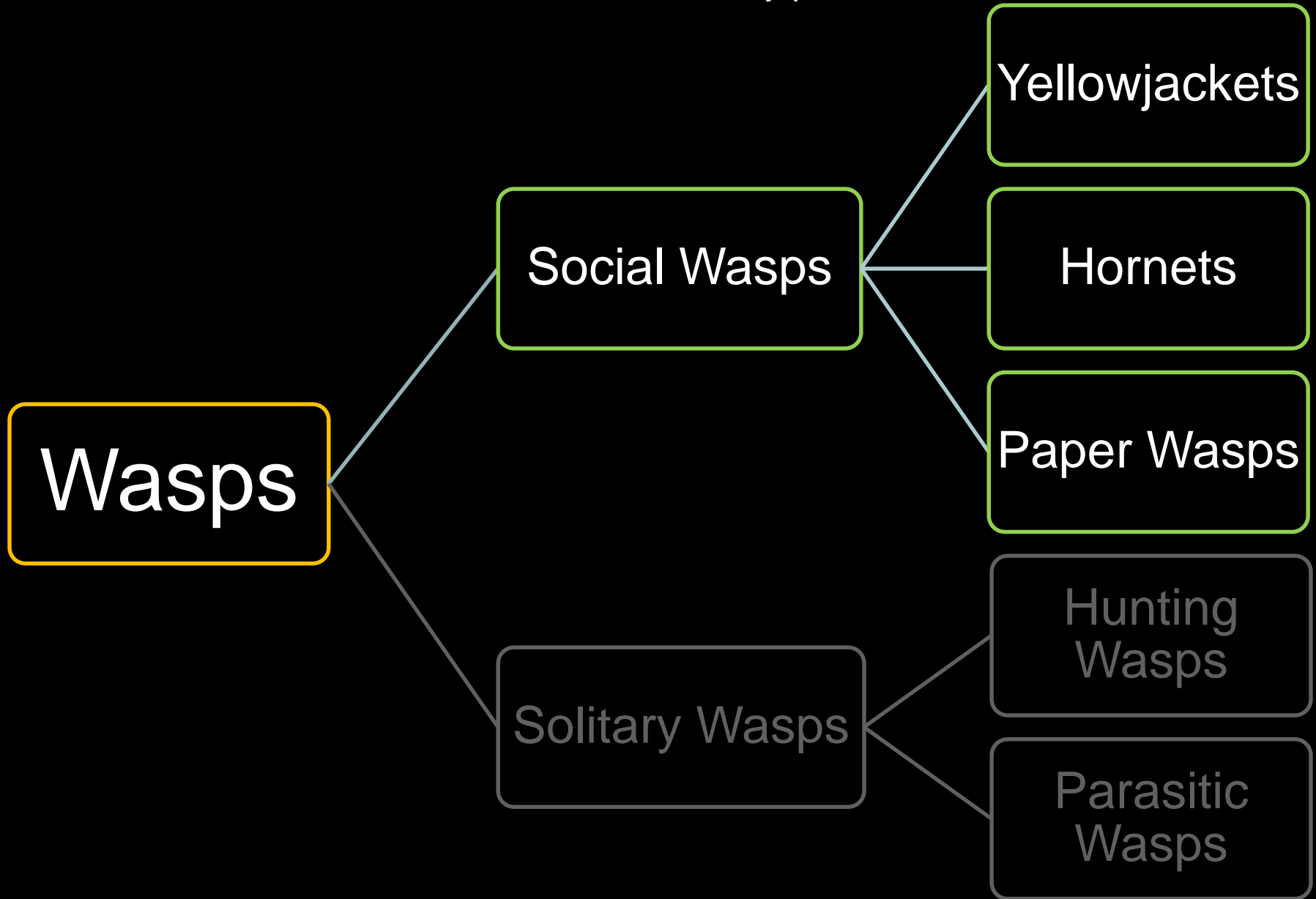


Social Structures of Wasps



Common Social Wasps

Note: All are annual colony producers





Yellowjackets

Vespula species

Western Yellowjacket (*Vespula pensylvanica*)



The most important stinging insect in western North America



The western yellowjacket feeds its young animal matter – usually carrion or dead insects



**Western yellowjacket scavenging
on meat (left), dead earthworm
(below, left) and splattered
insects on automobile**





**They will commonly
feed on meaty
materials in outdoor
dining areas**



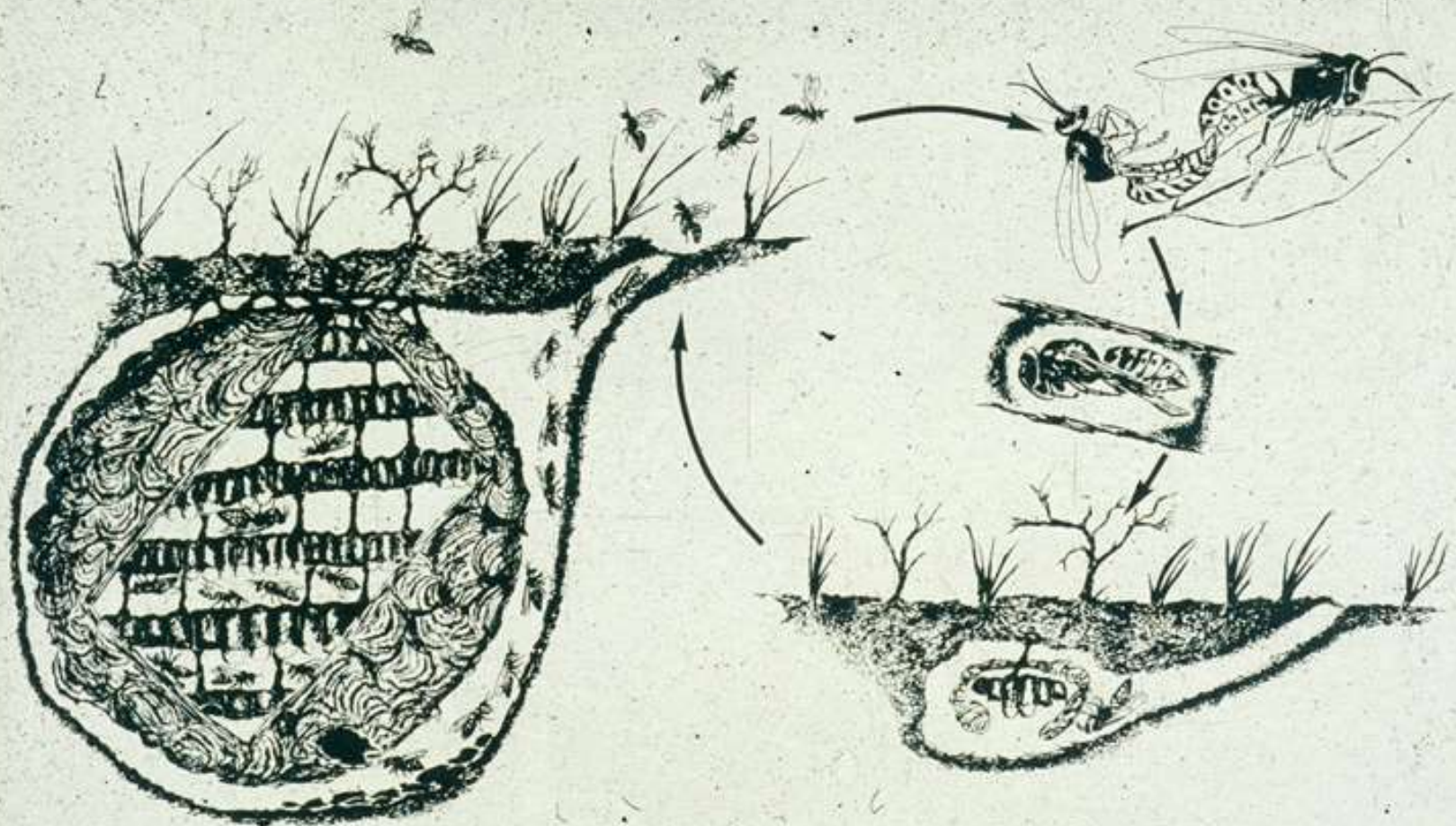


...and also take
sweets









Yellowjackets produce new nest every year.

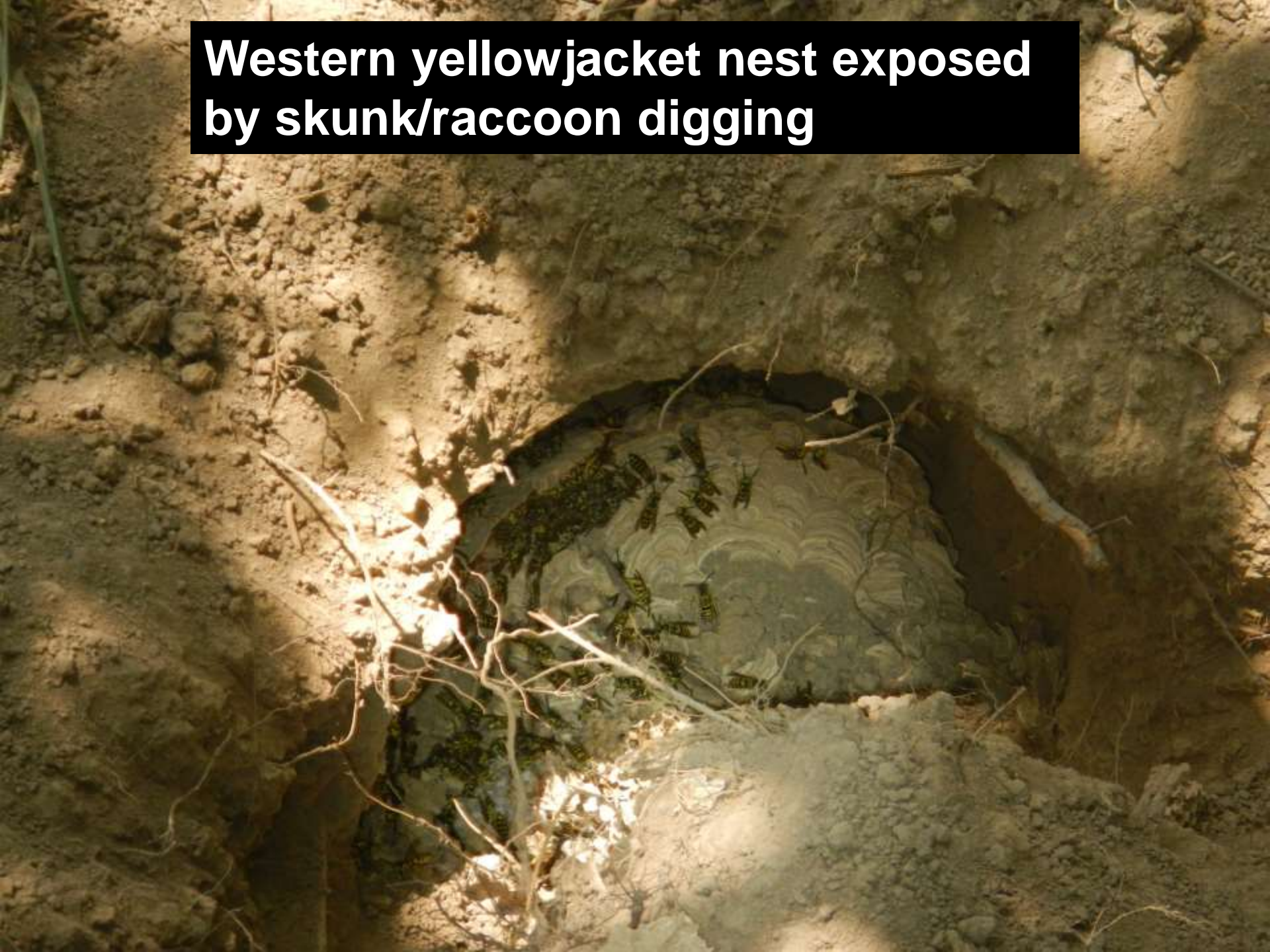
Nests are established in spring by a single queen.

Nest are abandoned at the end of the season. Fertilized females – queens – produced near the end of the year are the only stage that survives between seasons.

Yellowjacket nests are always hidden, usually underground



**Western yellowjacket nest exposed
by skunk/raccoon digging**





Nest form is a series of paper combs – used for rearing larvae – surrounded by a paper envelope

Yellowjacket adult wasp tending larvae

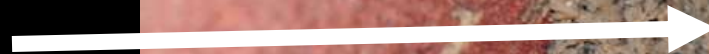
Van Waters & Rogers Inc.
1987 subsidiary of Univar





**Western yellowjacket
nest at base of wall and
spruce tree in my yard**

**Note mud at entrance
from excavations
during colony
expansion**



**Yellowjacket nest with
excavated mud piled
near nest entrance**



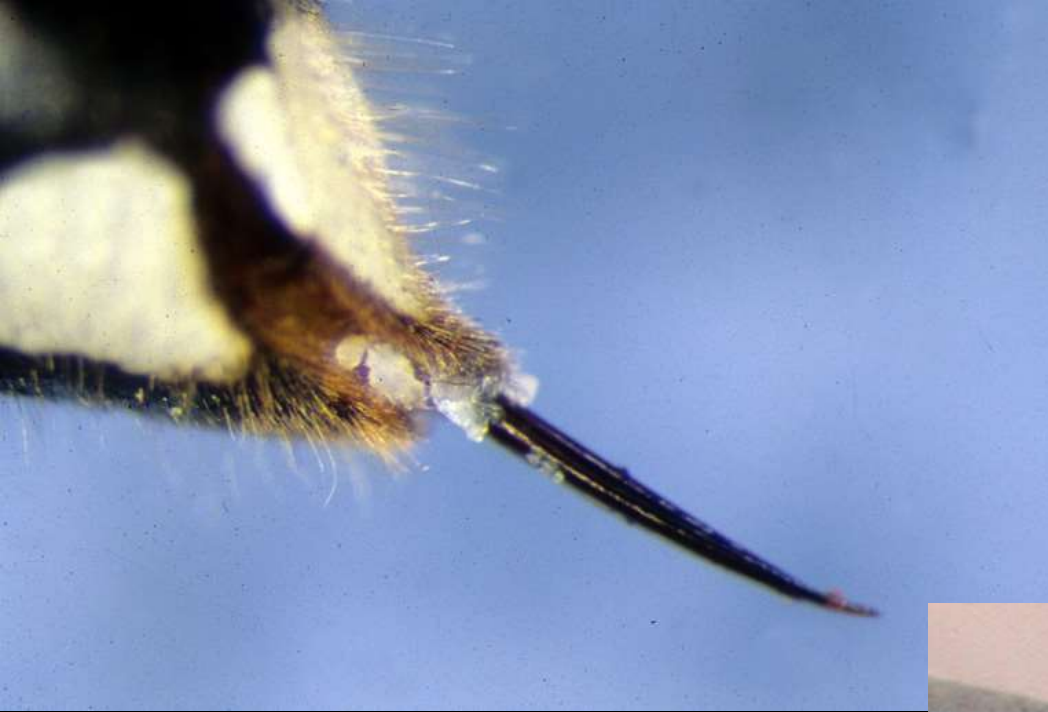
Nest entrances are often inconspicuous

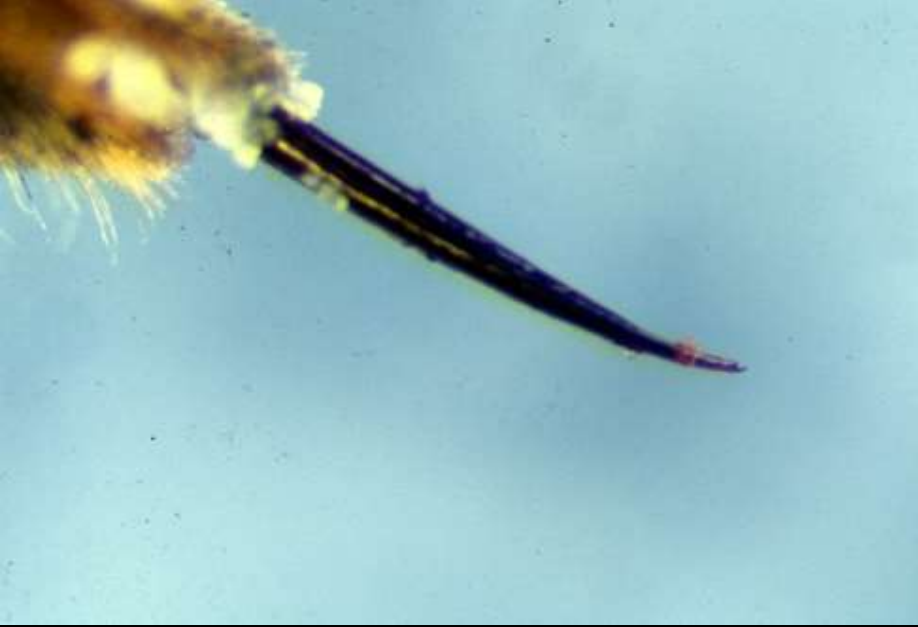


Nest entrances are usually guarded



Wasp stingers *are not* barbed





Most “bee stings” *are not*
produced by bees!!!!

Yellowjackets likely cause 90%+ of all
“bee stings” in Colorado



Yellowjackets as pollinators?
Marginal, at best.

Yellowjackets almost always nest below ground

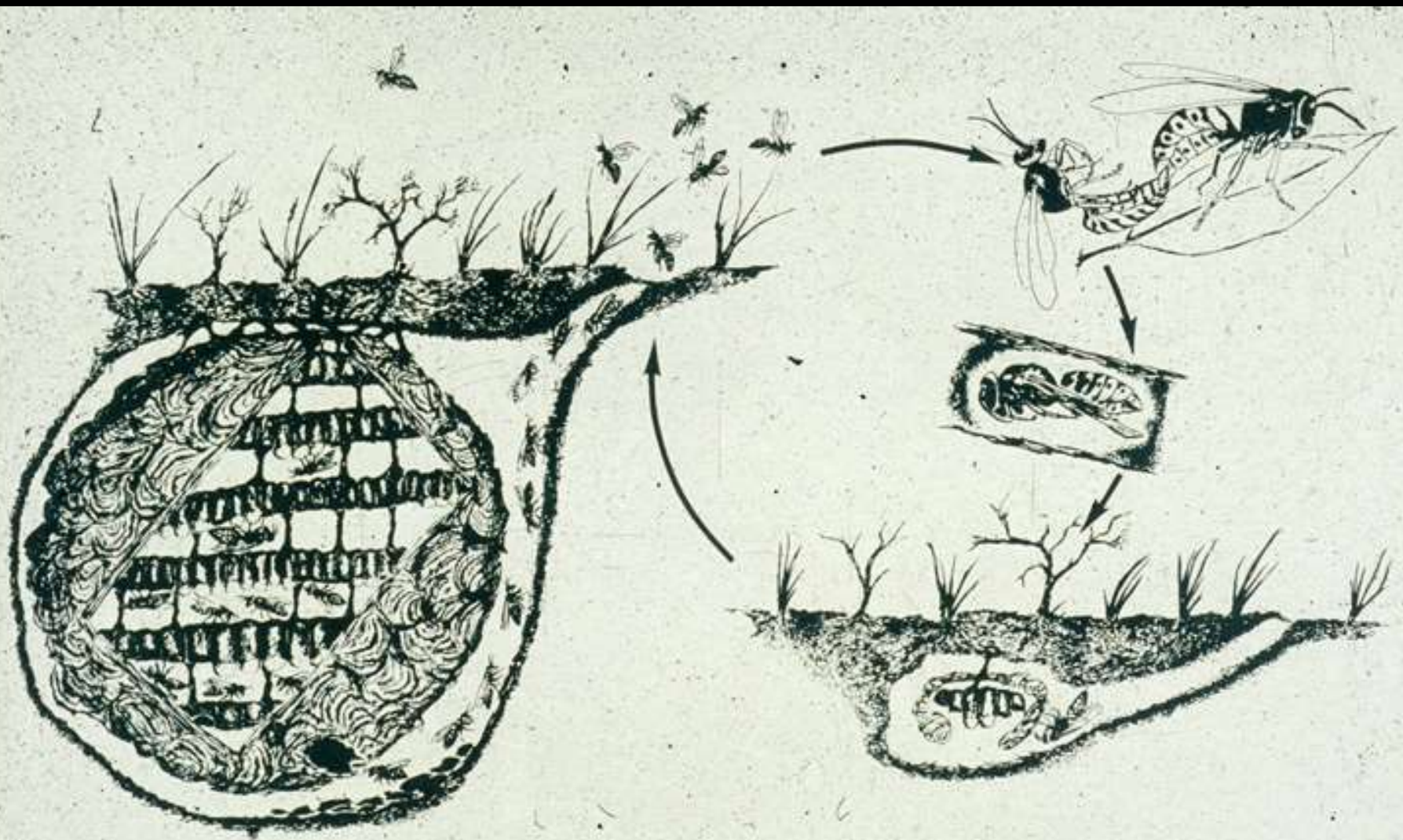


FIGURE 29 — Yellowjacket life cycle (*Vespula pensylvanica*): a, Mating; b, fertilized queen in diapause during winter months; c, queen nest beneath soil surface; d, nest at peak of colony development (J. Krispyn).

A photograph of a compost pile in a garden. The pile is made of wood chips and organic matter, partially covered by green grapevines on the left and some yellowing leaves on the right. A red arrow points from a text box to a small hole in the wood chips, identified as a nest entrance. A chain-link fence is visible in the background.

Nest
entrance

**Western yellowjacket nest located in an abandoned
compost pile. This was dissected on September 28, 2018**



**About a foot below the surface
the top of the nest was reached**

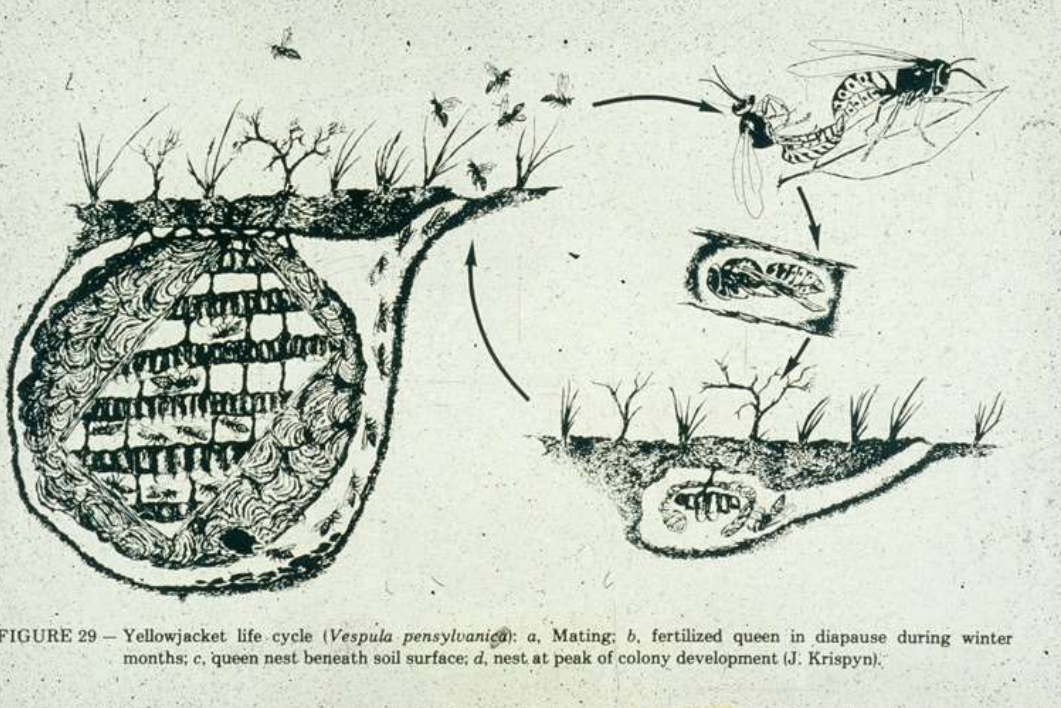


**More complete excavation of
the nest showed it to be about
a foot in diameter**



The entrance of the nest was about 18 inches from the opening to the outside of the compost pile

Nests are **annual**,
constructed
anew each year



The only stage surviving
between seasons are
fertilized queens,
produced in late summer
and early fall.





Ultimate colony size can be many hundreds by the end of summer.



The nest consisted of multiple layers of paper comb.

Developing brood were present – almost all of which were reproductive forms (future queens, males)



Only *a few* females, fertilized potential future queens will survive between seasons.



**A rough guesstimate of the
number of capped brood**

> 750!!!!!!



**Date of nest
dissection –
September 28**



Many traps are sold to capture yellowjacket wasps





2015 Yellowjacket Trapping Trials

Traps that caught the most western yellowjackets in 2015 trials

**Rescue! OrnamentTrap
(Liquid trap)**



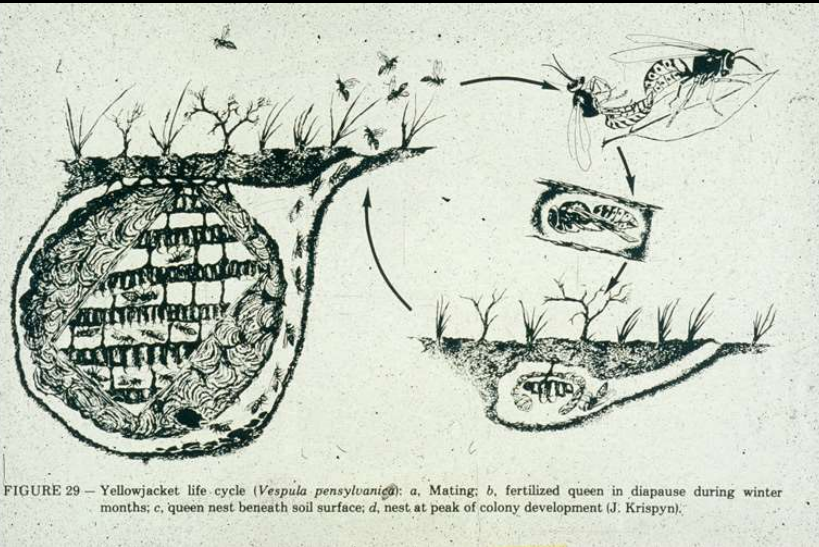
**SpringStar (Oak Stump)
Liquid Trap**

**AlphaScent Lure with
Yellow Card**



Traps that are *very poor* in capturing yellowjackets





**Most effective use of
yellowjacket traps?**

**Probably early in the
year targeting
overwintered queens**



**A rough guesstimate of the
number of capped brood**

> 750!!!!!!



**Date of nest
dissection –
September 28**





Hornets

Dolichovespula species

Two species in Colorado. **Both are predators of live insects.** Neither visits dining areas for food.



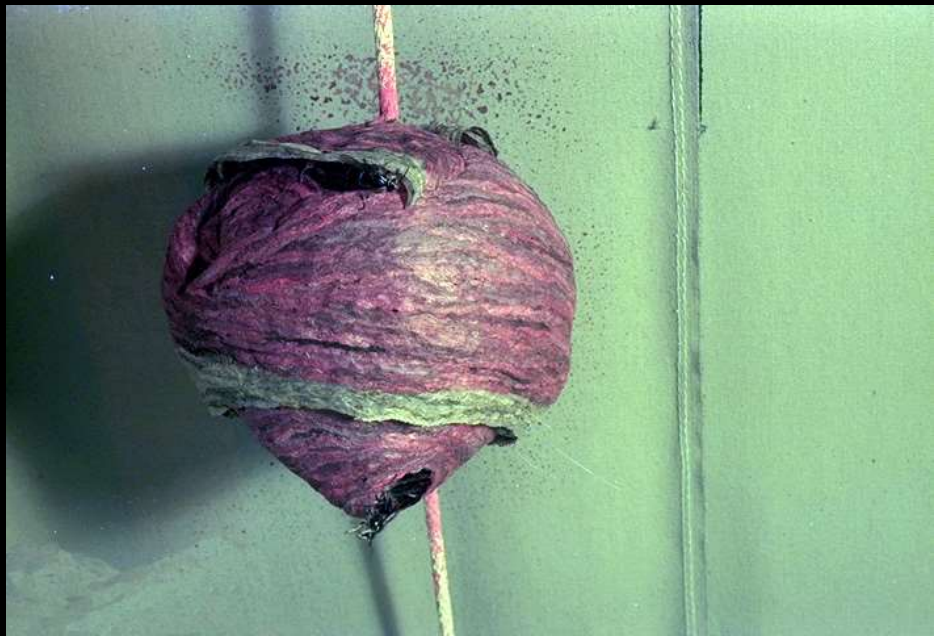
Baldfaced Hornet
Dolichovespula maculata



**Baldfaced hornet
usually nests in
trees and shrubs**











Aerial Yellowjacket

Dolichovespula arenaria





**Aerial yellowjacket
nests under eaves
and on sides of
buildings**



**The stinger of
baldfaced hornet and
aerial yellowjacket is
not barbed**





Paper Wasps

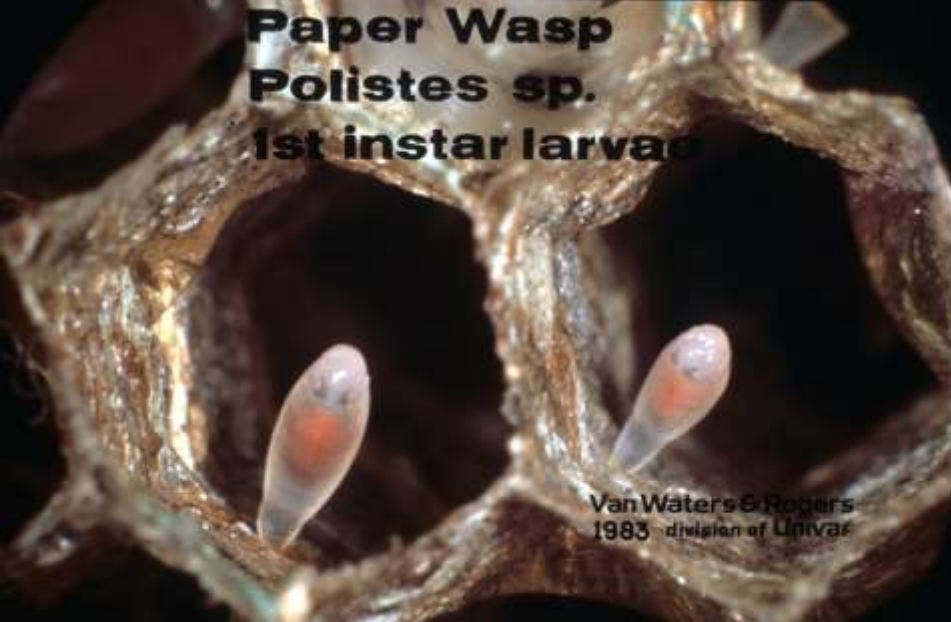
Polistes species, primarily

Paper wasp gnawing on weathered board for wood fibers





Paper Wasp
***Polistes* sp.**
1st instar larvae



Paper Wasp - Polistes sp.
larva in cell

Van Waters & Rogers
1983 division of Univar



The food fed to paper wasp larvae



Live insects chewed
into “bug burger”

Paper wasps native to Colorado





Nests produced by native species of paper wasps



European Paper Wasp

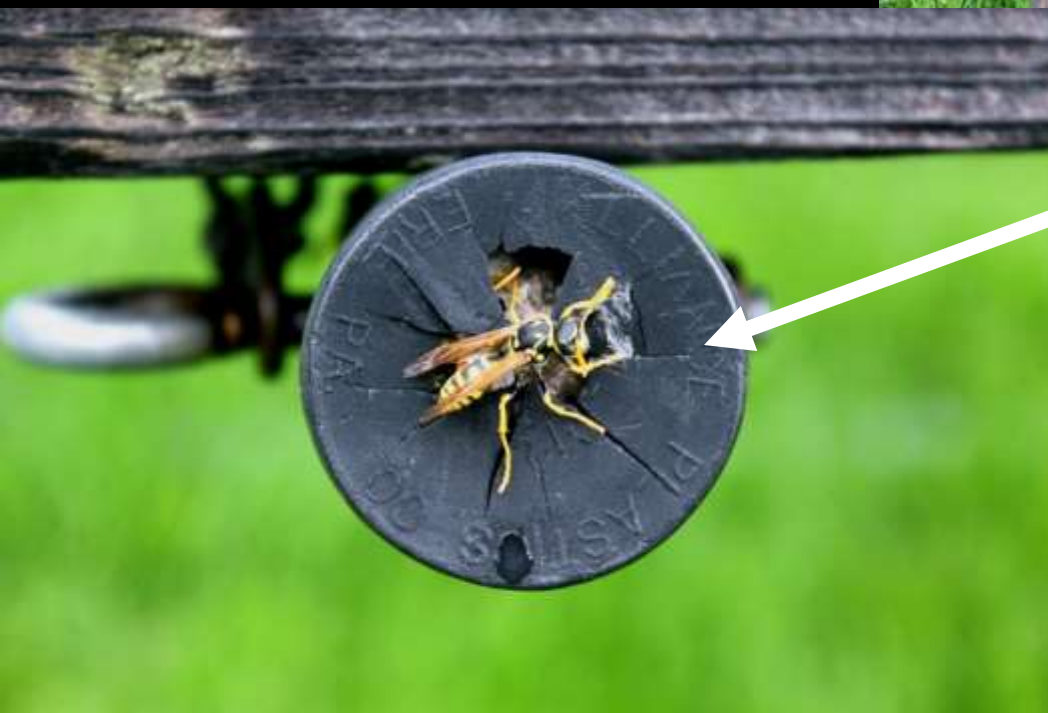
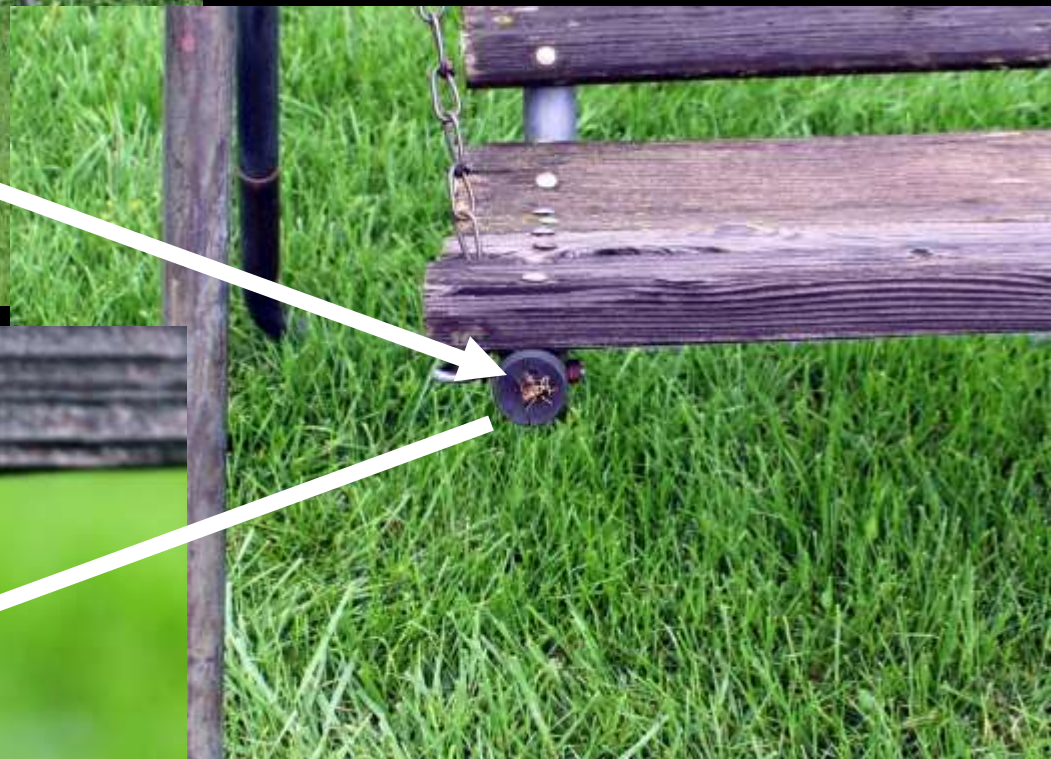
Polistes dominula

**A new species in Colorado (post 1998
in Western CO, 2001 Eastern CO)**



**European paper wasp
nesting in metal
building support**









European paper wasps in our clothes line







European paper wasp nest established on growing sweet corn!





UGA1386036

Photograph courtesy of Joseph Berger/BugWood.org

Large Nest of European Paper Wasp



Some Impacts of the European paper wasp on the Rocky Mountain West

- **Added a significant new stinging pest to region**
 - **Highly visible**
- **Impacts on yard/garden Lepidoptera**
- **Stimulates inappropriate purchases of wasp traps**



Nests are found everywhere and very frequently observed.

Stings are common, although not as common as by western yellowjacket.



Impacts on yard/garden Lepidoptera





European Paper Wasp



These two insects can be difficult to distinguish from each other

Western Yellowjacket





Western yellowjacket

Note trailing legs of European paper wasp



European Paper Wasp vs. Western Yellowjacket

European paper wasp

- **Predator of insects, primarily**
- **Produces open nests above ground**
- **Less likely to sting than most social wasps/bees**
- **Not attracted to wasp traps**

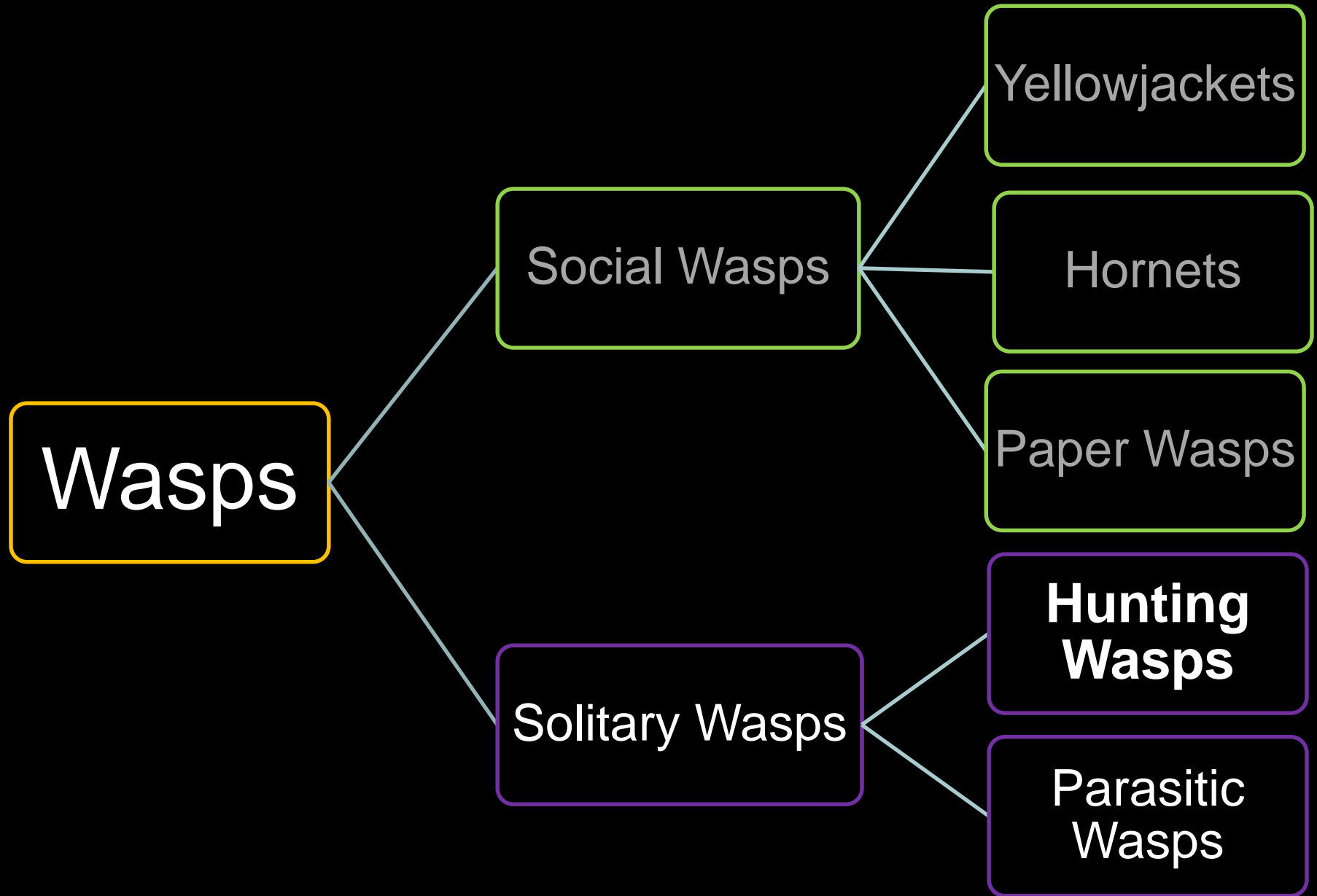
Western yellowjacket

- **Scavenger. Commonly visits food and garbage.**
- **Produces below-ground or hidden nest**
- **Readily stings when nest disturbed**
- **Attracted to wasp traps**



**Traps do not
capture the
European paper
wasp or any
other paper
wasps**

Social Structures of Wasps





Hunting Wasps

Families Sphecidae,
Crabronidae, Pompilidae

Hunting Wasp Habits

- **Solitary wasps – no colony structure**
- **Young are fed paralyzed prey**
- **Nests are produced to rear young**
 - Dug in soil, plant stems
 - Constructed of mud
 - Existing cavities
- **Adults can sting, but are not aggressive**
 - Sting of hunting wasps (Sphecidae) are mild
 - Sting of spider wasps (Pompilidae) are very painful



***Ammophila* wasp digging nest (left), carrying caterpillar prey (lower left), at nest entrance with prey (below)**



***Bembix* wasp digging while holding horse fly prey**





Golden Digger Wasp –
Predator of grasshoppers
and katydids



**Steel-blue
cricket
hunter with
prey**



Photograph by Bob Hammon



Cicada Killer –
Colorado's
largest hunting
wasp





Bicyrtes quadrifasciatus
– a hunting wasp that
nests in sandy soils



Stink bugs and leaffooted
bugs are prey for this insect

A sand nesting wasp – *Bicyrtes quadrifasciatus*

Host prey – “Stinky bugs” (stink bugs, leaffooted bugs)



**Insect prey collected from nests of sand wasps at
a Longmont playground**

Grass Carrying Wasps (*Isodontia* spp.)

Predators of tree
crickets





Steve Jacobs
PSU Entomology



Grass carrying wasps may nest in tracks of windows



Nest of *Isodontia mexicana* with cocoons and cells provisioned with tree crickets

Kevin O'Neill/MSU

Pseneo punctatus

A hunting wasp that preys on leafhoppers, and nests in soil cracks (often around the edges of flower pots)



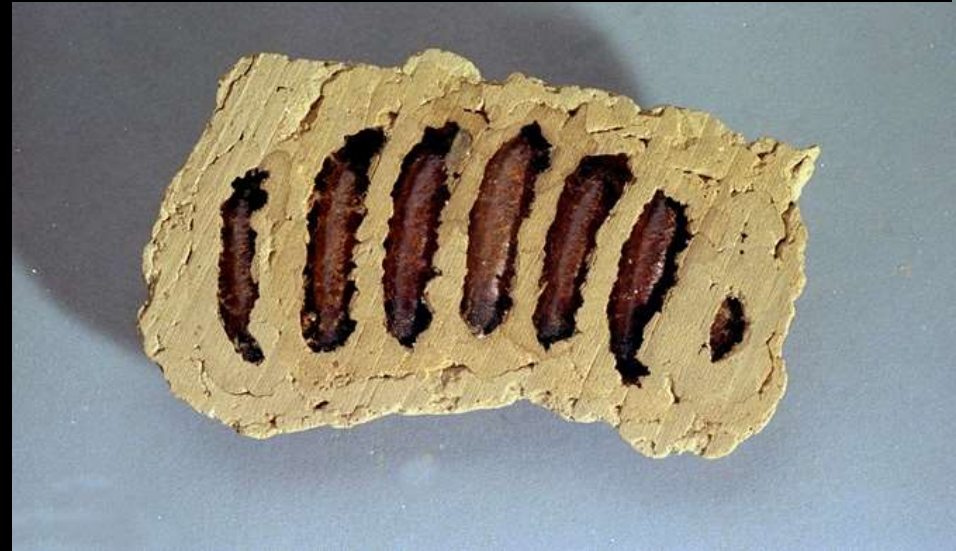


**Black and
Yellow Mud
Dauber**



Black and Yellow Mud Dauber (*Sceliphron caementarium*)

Nest (top left), crab spider prey cache (top right), larva feeding on spider prey (below left) and cocoons of pupae (below right) . Photographs courtesy of Ken Gray Collection, Oregon State University



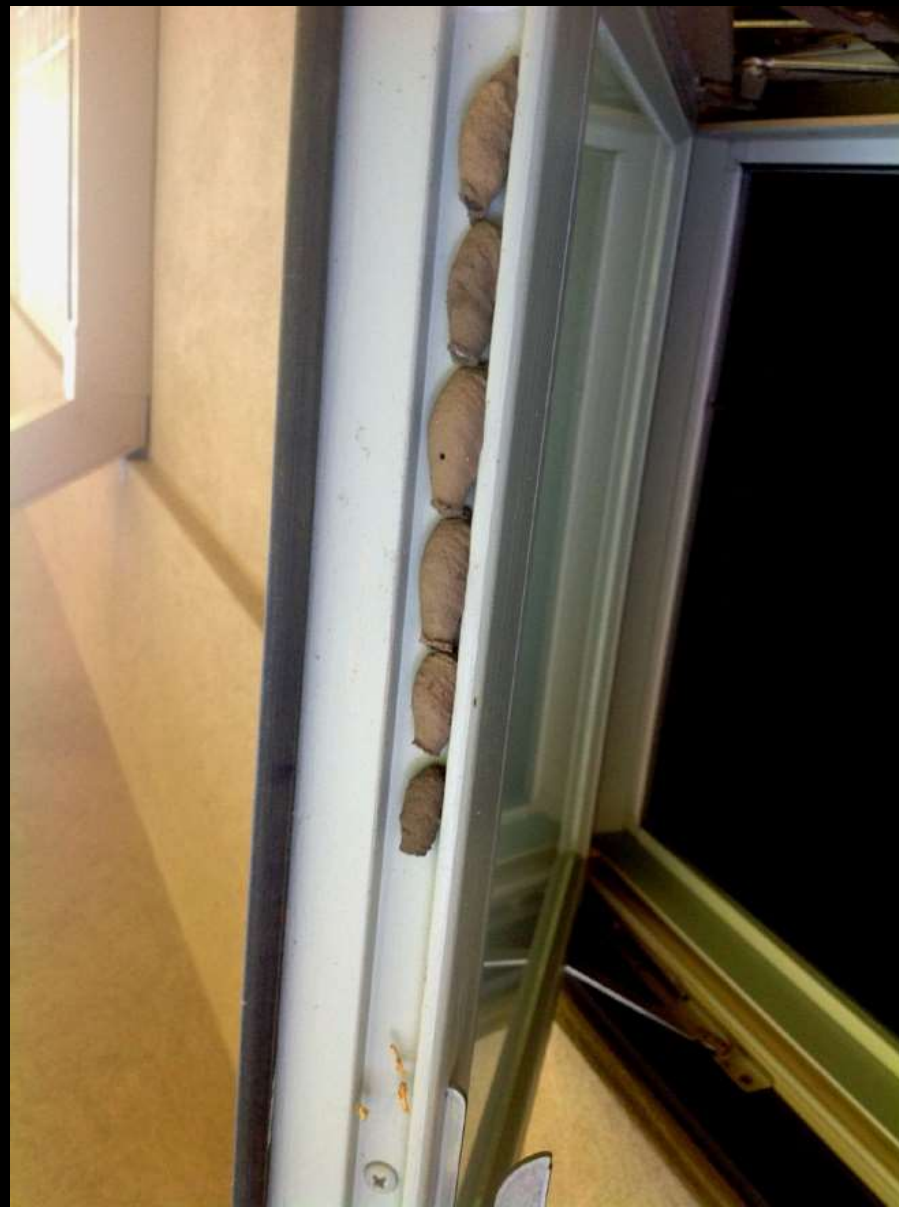
Colorado's Newest Mud Dauber!

Sceliphron curvatum



Photo by Eric R. Eaton

Present records from
El Paso, Denver, Larimer
and Mesa Counties



Adult collecting mud for
nest cells (Mesa County)



Photo credit: Fireundertheice BugGuide
(Mesa County)



Nest cells around windows
(Denver County)



Photos by Betty Cahill

Adult on nest cell



Full-grown larva



Spider prey extracted from one nest cell



Wanted!

Asian Mud Dauber Sightings

A new species of mud dauber wasp, *Sceliphron curvatum*, has begun to colonize Colorado and I would like to learn of sightings of this insect. A tentative proposed name for this insect is "Asian mud dauber" as it is native to areas of central/south Asia, including India, Pakistan, and Kazakhstan.

The most obvious evidence of this insect are the distinctive nest cells it forms from mud. These may be located along cavities around windows or other similar protected sites. Adults may be seen searching plants for spiders and visiting flowers for nectar/pollen.

The nest cells are distinctly different from those produced by the black-and-yellow mud dauber (*Sceliphron caementarium*),



Mud nest cells of the Asian mud dauber along the track of a window.



Adult female Asian mud dauber

which has long been a resident of the state. Cells of the black-and-yellow mud dauber are usually clumped together and typically constructed on under eaves or in outbuildings.

If you see evidence of this insect, please take a photo of it and send it to:
whitney.cranshaw@colostate.edu

whitney.cranshaw@colostate.edu

Spider Wasps

Hymenoptera: Pompilidae



“Tarantula Hawks”



**This presentation will be posted at the Insect
Information Web Site**

- **Housed at Department of
Bioagricultural Sciences and Pest
Management**
 - Search **BSPM CSU**
- **Within Extension and Outreach**
 - **Insect Information**
 - **Extension presentations for 2018 posted at bottom of page**

Insect Information

All materials needed in another accessible format can be made available upon request.

Arthropods of Colorado Fact Sheets

This is a listing of about 200 downloadable fact sheets related to insects and other "bugs" found in in Colorado. It contains fact sheets that are written for the Colorado Arthropods of Interest series and the Extension fact sheets that are related to insects.

Fact Sheets

Click here for
over 200 Fact
Sheets

- [Colorado Hemp Insect Website](#)
- [Western Colorado Entomology Website](#)
- [IPM Images/Bugwood \(Cranshaw\)](#)
- [IPM Images/Bugwood \(Peairs\)](#)
- [Entomology Resources List](#)
- [Honey Bee Swarm Hotlines](#)

Miscellaneous Insect Information

Master Gardener Information

This includes the handouts and PowerPoint presentations (as PDF) used in Master Gardener Entomology training. These will get updated annually at the end of the winter/spring training programs.

Handouts

PowerPoint Presentations Used in 2018

Recent Extension Presentations

This is a listing that provides the PowerPoint presentations (as PDF) of most Extension entomology programs conducted during the past 12 months.

PowerPoint Presentations/Webinars



**Click Here for the
powerpoint shown today**

**This presentation will be posted at the Insect
Information Web Site**

- **Housed at Department of
Bioagricultural Sciences and Pest
Management**
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bottom of page**

Colorado's Newest Mud Dauber!

Sceliphron curvatum



Photo by Eric R. Eaton

***We would like to hear
about other state records
of this insect!***



New State Record
(2017)

Elm Seed Bug

Arcocatus melanocephalus



A potentially
significant new
nuisance invader of
homes in summer





Develops on seeds of elm

No harm to trees

Moves into buildings in summer, early autumn

Nuisance issues, some associated odor

If you think you have seen either of these
please send a sample or photo of it to:

Whitney.Cranshaw@ColoState.EDU

