“Bugs” that Sting

Bees

Wasps

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*
Some West Slope Scorpions

Northern Scorpion

Giant Desert Hairy Scorpion

Photograph by Bob Hammon
Pedipalps (chelae) for prey capture

Scorpion chelicerae (jaws)
Stinger used for defense
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
Most Common Insects that Sting

Western yellowjacket

European paper wasp

Honey bee

Baldfaced hornet
Bees, some wasps, and some ants have a stinger used for defense. The stinger is a modified ovipositor.
The ovipositor is the structure used by female insects to lay eggs.
Male and female house cricket

Ovipositor
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.

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.
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
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Bees collect nectar and pollen

Pollen is used primarily for rearing young

Nectar is used primarily as an energy source for the adults
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.
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
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

Surface of a baldfaced hornet nest

Jim Kalisch, University of Nebraska
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.
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

- Social Wasps
  - Yellowjackets
  - Hornets
  - Paper Wasps
  - Hunting Wasps
  - Parasitic Wasps

- Solitary Wasps
Common Social Wasps
Note: All are annual colony producers

- Social Wasps
  - Yellowjackets
  - Hornets
  - Paper Wasps
    - Hunting Wasps
    - Parasitic Wasps

- Solitary Wasps

Wasps
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*): 

- Mating (a) 
- Fertilized queen in diapause during winter months (b) 
- Queen nest beneath soil surface (c) 
- Nest at peak of colony development (d) 

(J. Krispy)
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! OnamenTrap (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.*

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!
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
These two insects can be difficult to distinguish from each other.

**European Paper Wasp**

**Western Yellowjacket**
Note trailing legs of European paper wasp

Western yellowjacket
## European Paper Wasp vs. Western Yellowjacket

<table>
<thead>
<tr>
<th>European paper wasp</th>
<th>Western yellowjacket</th>
</tr>
</thead>
<tbody>
<tr>
<td>Predator of insects, primarily</td>
<td>Scavenger. Commonly visits food and garbage.</td>
</tr>
<tr>
<td>Produces open nests above ground</td>
<td>Produces below-ground or hidden nest</td>
</tr>
<tr>
<td>Less likely to sting than most social wasps/bees</td>
<td>Readily stings when nest disturbed</td>
</tr>
<tr>
<td>Not attracted to wasp traps</td>
<td>Attracted to wasp traps</td>
</tr>
</tbody>
</table>
Traps do not capture the European paper wasp or any other paper wasps
Social Structures of Wasps

Wasps

- Social Wasps
  - Yellowjackets
  - Hornets
  - Paper Wasps
  - Hunting Wasps
  - Parasitic Wasps
- Solitary 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 (Pomplilidae) 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
Grass carrying wasps may nest in tracks of windows
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 (*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*

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

Photo by Eric R. Eaton
Adult collecting mud for nest cells (Mesa County)

Nest cells around windows (Denver County)

Photo credit: Fireundertheice BugGuide (Mesa 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), 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
Spider Wasps

Hymenoptera: Pompilidae
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 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.

Miscellaneous Insect Information

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
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**
  - Search BSPM CSU

- **Within Extension and Outreach**

- **Insect Information**
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Colorado’s Newest Mud Dauber!

*Sceliphron curvatum*

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

Photo by Eric R. Eaton
A potentially significant new nuisance invader of homes in summer

New State Record (2017)

Elm Seed Bug
Arcocatus melanocephalus
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