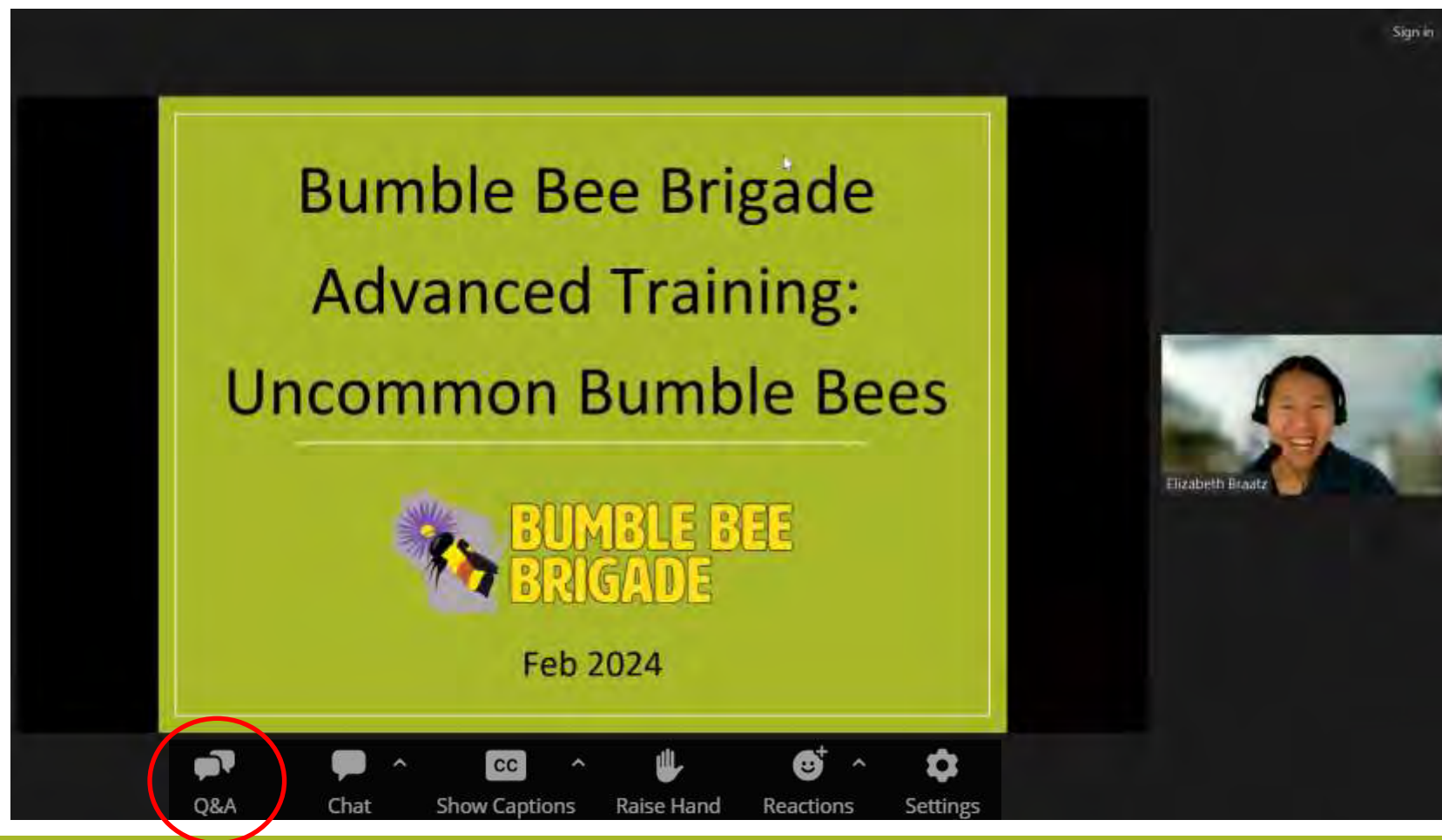


You can participate throughout the zoom meeting by sending questions through the zoom Q&A function.  
(Note: the window may be on the bottom or top of your screen)



# Bumble Bee Brigade

## Advanced Training:

### Uncommon Bumble Bees

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Feb 2024

# **Welcome!**

## **BBB Presenter Introductions**

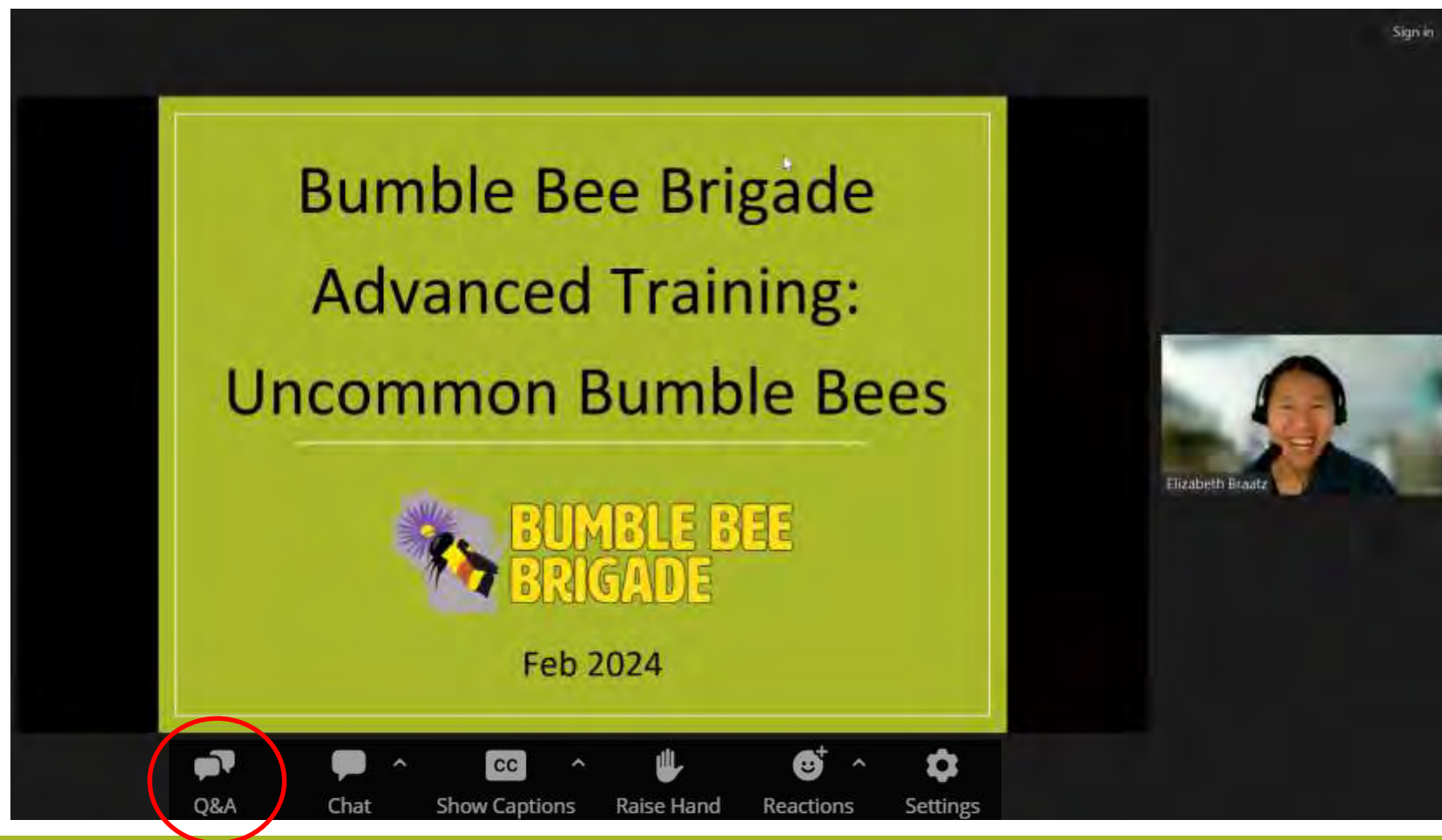
**Elizabeth Braatz- WI DNR BBB Coordinator**

**Jay Watson- WI DNR Terrestrial Insect Ecologist**

**Judy Cardin- BBB Verifier and Educator**

**Terrell Hyde- WI DNR Specialist**

You can participate throughout the zoom meeting by sending questions through the zoom Q&A function.  
(Note: the window may be on the bottom or top of your screen)



# **Plan for today**

**Presenter: Elizabeth Braatz**

**Bumble Bee Brigade ID Resources**

**Bee ID Characteristics and Terms**

**Photo Views to Help Identify Key Characteristics**

**Male Bumble Bee Traits**

# Uncommon Bumble Bee ID: Females

**Presenter: Judy Cardin**

Northern amber (*B. borealis*)

Yellowbanded (*B. terricola*)

Confusing (*B. perplexus*)

American (*B. pensylvanicus*)

Sanderson (*B. sandersoni*)

Southern plains (*B. fraternus*)

**Presenter: Jay Watson**

Lemon cuckoo (*B. citrinus*)

Indiscriminate cuckoo (*B. insularis*)

Fernald cuckoo (*B. flavidus*)

Ashton's (*B. bohemicus*)

Variable cuckoo (*B. variabilis*)

Frigid (*B. frigidus*)



**PARTICIPATORY  
SCIENCE:**

**WISCONSIN  
BUMBLE BEE  
BRIGADE**

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# Bumble Bee Brigade Mission

To improve our understanding, management, and conservation activities of Wisconsin bumble bees.





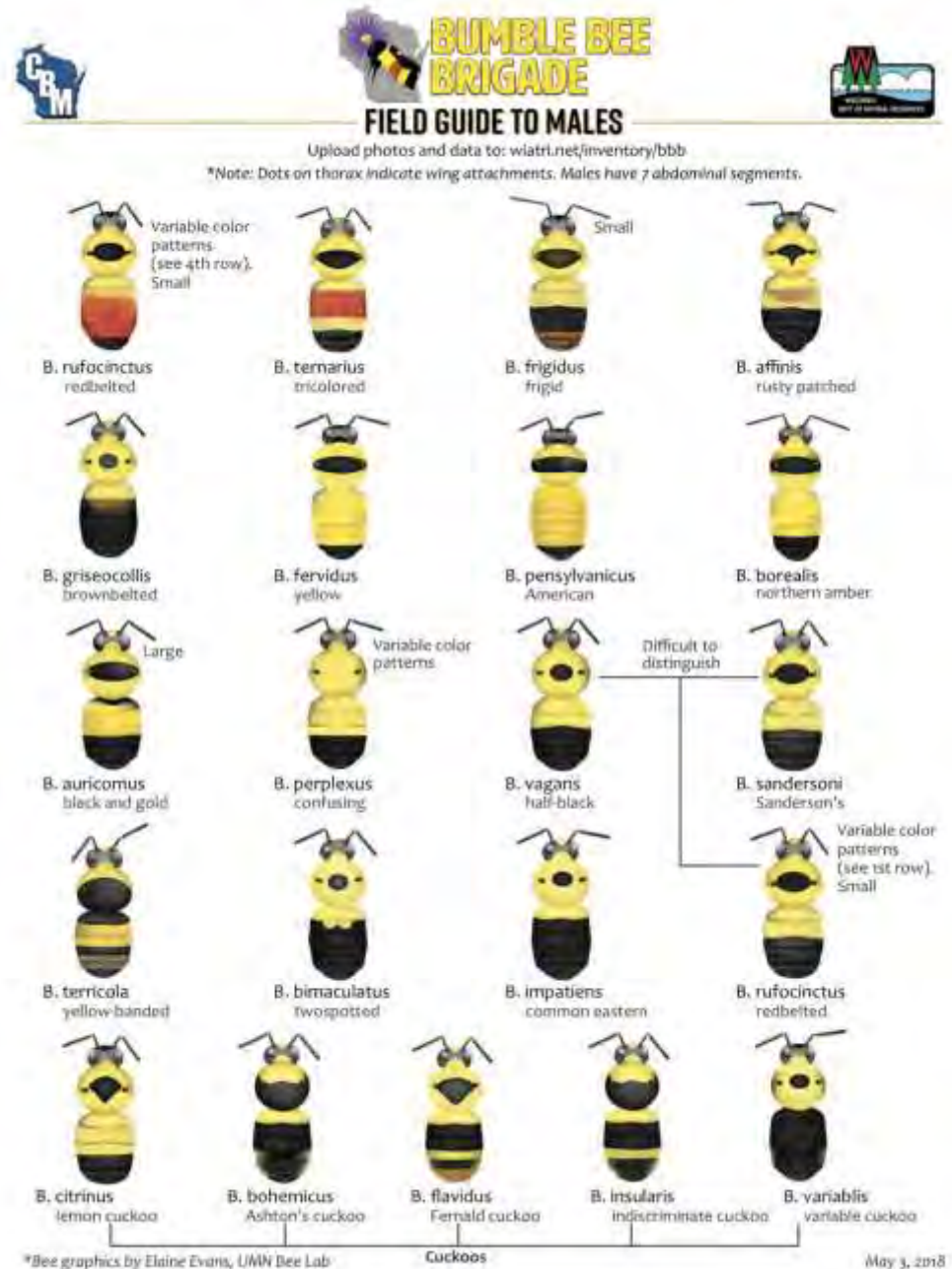
# Getting started in B3-visit our website



# ID Resources to Start With: BBB Field Guide

We are putting a link in chat to the Wisconsin Bumble Bee Brigade Resources page, where you will find this Field Guide and other training resources.

We are also including a link in chat to the Wisconsin Bumble Bee Observers Facebook page where you can get ID questions answered.





# Key ID Views

- **Dorsal view**- top of thorax and abdomen
- **Side view**- head, thorax and abdomen
- **Face view**- head, face and vertex

Dorsal(overhead) view



Side View



Face and head view





# BUMBLE BEE ID:

## CHARACTERISTICS AND TERMS

---



## Key ID Characteristics: Hair Color Patterns

- ❖ Face: Hair color on front of face
- ❖ Vertex: Hair color on top of head and nape of neck
- ❖ Thorax Patch: The size, shape and color of the patch between the wing pads
- ❖ Abdominal Sections: the color pattern of the ab sections, which are called terga, T1-6

# Cheek Length

Short Cheek

Medium Cheek

Long Cheek

Front View

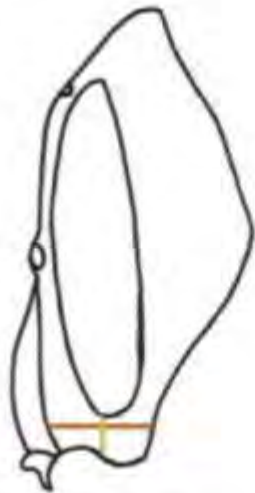


Side View

Length



Width



Length shorter  
than width



Length equal  
to width



Length longer  
than wide



# Cheek Length

**Short Cheek (*rufocinctus*)**



**Long Cheek (*vagans*)**



# Hair Length

**Short Hair (auricomus)**



**Long Hair (perplexus)**





Note:

All the bumble bees described today  
are females!

# Male Bumble Bee Traits

Male Rusty patched

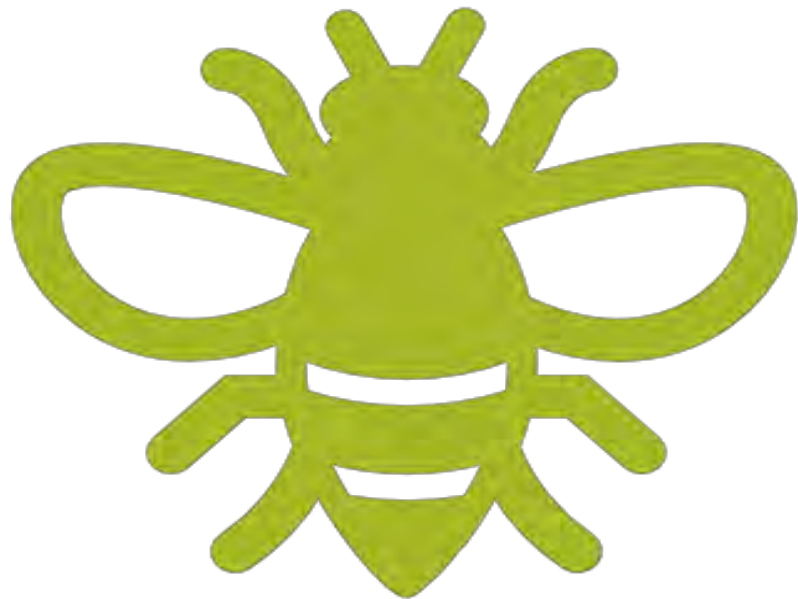


- Longer antennae
- Tends to have shaggier hair
- 7 ab sections
- No stinger point
- Larger eyes in three species
  - Black and gold / *auricomus*
  - Brownbelted / *griseocollis*
  - Redbelted / *rufocinctus*
  - Southern Plains / *fraternus*



**QUESTIONS?**  
**ENTER QUESTIONS**  
**INTO THE Q&A**  
**FUNCTION**

---



**BUMBLE BEE ID:  
UNCOMMON  
SPECIES**

---

# Uncommon Bumble Bee ID Training: Females

Presenter- Judy Cardin

1. Northern amber (*B. borealis*)
2. Yellowbanded (*B. terricola*)
3. Confusing (*B. perplexus*)
4. American (*B. pensylvanicus*)
5. Sanderson (*B. sandersoni*)
6. Southern plains (*B. fraternus*)

# NORTHERN AMBER

(*B. BOREALIS*)



Counties with current records = green (B3 records darker green); counties with historical-only records = gray. [Updated 4/8/2022]



1. Very long face

2. **Yellow face**, usually a dense patch of light yellow hair around antenna base.

3. **Yellow vertex**

4. **Broad black thorax band that extends down the sides of thorax and under the wing**

6. Medium length even hair that is often amber colored

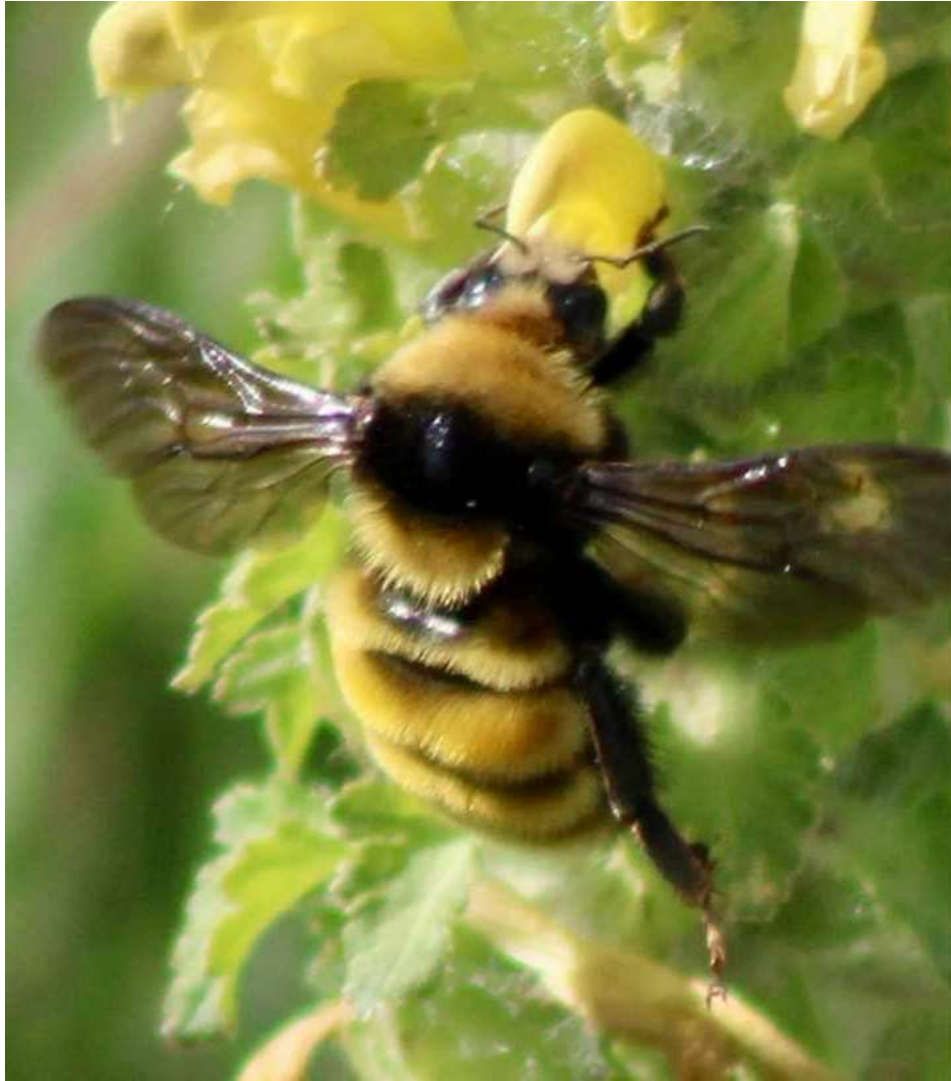
7. **T1-4 yellow**, usually amber and sometimes two tone with the top of the section yellow-brown, and rarely black.

8. T5 can be yellow, black or a yellow skirt

9. T6 black with stinger point

# NORTHERN AMBER





**1. Broad black thorax band that extends down the sides of the thorax**

**2. Yellow face and vertex**

**3. Amber hair color**

---

**NORTHERN  
AMBER**



# Key ID Trait Differences

## Northern amber (*B. borealis*)

- ❖ Yellow face and vertex
- ❖ Broad black thorax band
- ❖ Sides of thorax black under wings
- ❖ T1-T<sub>4</sub> yellow. Sometimes yellow on T<sub>5</sub>-6



## Yellow (*B. fervidus*)

- ❖ Dark face and vertex
- ❖ Narrow black thorax band
- ❖ Sides of thorax usually yellow under wings
- ❖ T<sub>1</sub>-4 yellow



Photo: Judy Cardin and Bob Plamann



Photo Jay Watson

**Which bee is a  
Northern amber,  
and which is a  
Yellow?**

# Quick Quiz

**Look for the key ID  
characteristics, and  
decide the species**



Photo Jay Watson



**This is the Yellow:**

- Black face and vertex
- Yellow on thorax side under wing



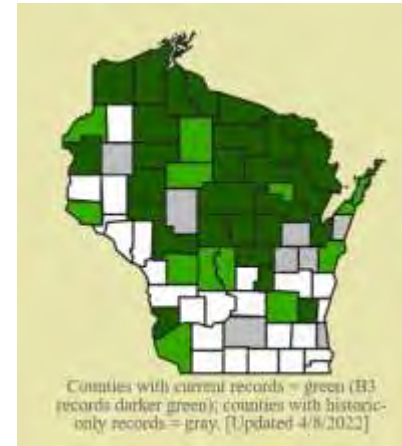
**This is the Northern amber:**

- Yellow face and vertex
- Broad thorax band that extends down thorax side

# YELLOW BANDED

*(B.TERRICOLA)*

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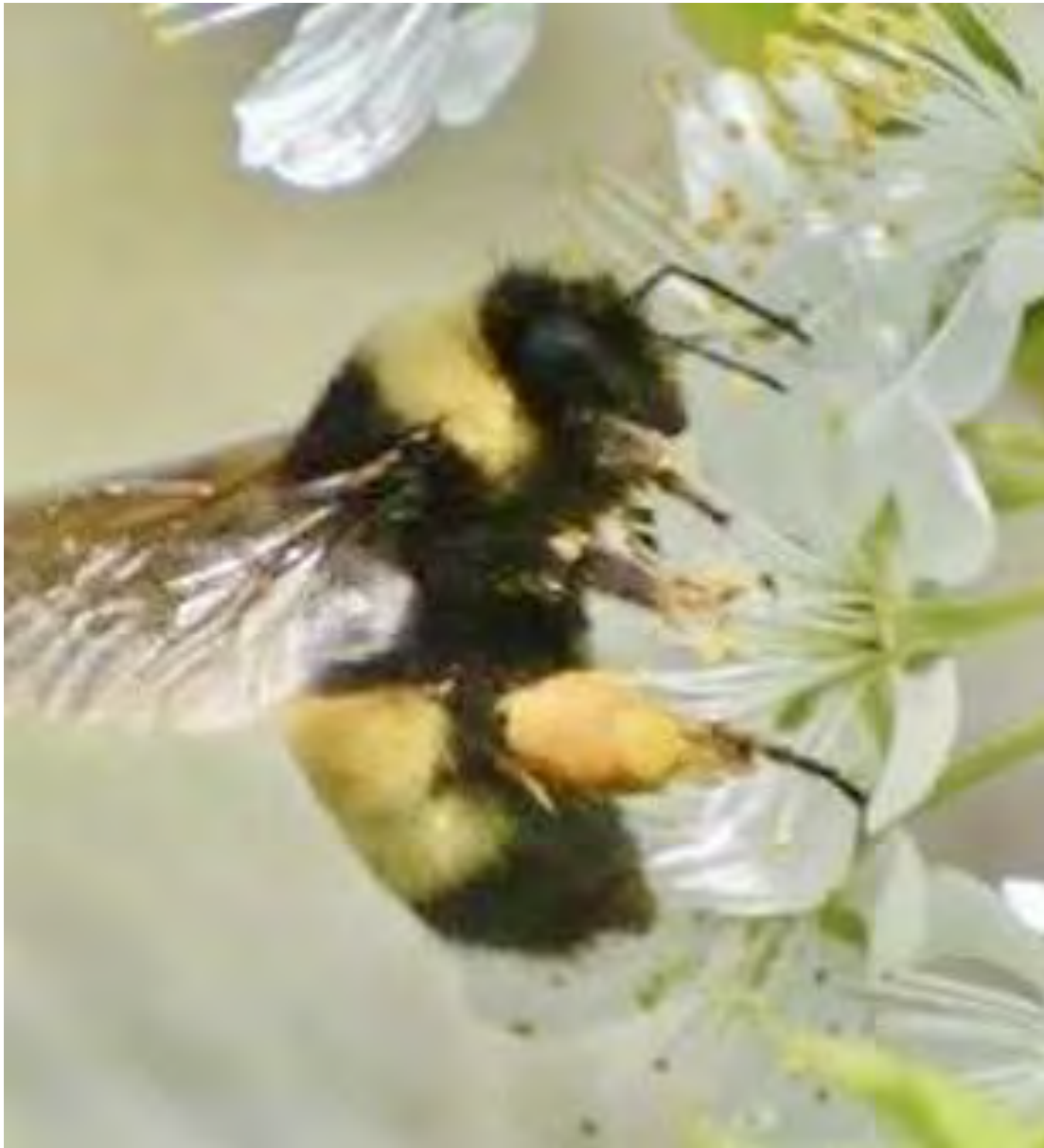


Photo Jay Watson

1. **Short usually black face**- can be intermixed
2. Usually dark vertex, can be lightly intermixed
3. Yellow "shoulders"
4. Hair short and even
5. **Broad thorax band that extends down thorax sides.** Band can be entirely black to abdomen, or sometimes have a strip of yellow before abdomen.
5. **T1 black**
6. **T2-3 yellow, yellow- brown**
7. **T4-6 black, or with a yellow or brown "skirt" on T5 or T4-5**
8. Medium sized bee
9. **Light colored wings**

---

# YELLOW BANDED



Photo Judy Cardin & Bob Plamann

1. Black thorax band extends to abdomen.
2. T2-3 yellow
3. Yellow skirt on T5
4. Light colored wings

---

**YELLOW  
BANDED**

# Key ID Trait Differences

## Yellow banded (*B. terricola*)

- ❖ Dark or lightly intermixed face and vertex
- ❖ Short face
- ❖ Medium sized bee
- ❖ Light colored wings
- ❖ Often a yellow skirt on T<sub>5</sub>



## Black and gold (*B. auricomus*)

- ❖ Dark face and yellow vertex
- ❖ Long face
- ❖ Very large bee
- ❖ Black wings on a fresh bee
- ❖ T<sub>4</sub>-6 black





Photo Judy Cardin and Bob Plamann

**Which bee is a Yellow banded and which is a Black and gold?**

# Quick Quiz

**Look for the key ID characteristics, and decide the species**



Photo Jay Watson





**This is the Black and gold:**

- Yellow vertex
- Long face
- Black wings



**This is the Yellow banded:**

- Light colored wings
- Yellow skirt on T<sub>5</sub>

# CONFUSING

(*B. PERPLEXUS*)





Photo Dan Jackson

1. Medium length face can be intermixed or black
  2. Vertex yellow
  3. **Thorax very yellowed over on back- very small or no black thorax patch**
  4. **Often black behind wings on the sides of thorax**
  5. Abdominal pattern can vary. A common pattern for a worker is T<sub>1-2</sub> yellow and T<sub>3</sub> centrally yellow. Intermixed brown occurs
  6. **Long hair that can be bright or medium yellow**
  7. Medium sized bee
- 

# CONFUSING



Photo Angus Mossman.

1. Yellow vertex
2. Yellow thorax
3. T1-2 yellow
4. Medium yellow long hair

---

# CONFUSING





Photo Ryan Brady

1. Bright yellow thorax

2. T<sub>1</sub>-2 yellow with intermixed brown hair

3. T<sub>3</sub> centrally yellow

4. Long hair

---

**CONFUSING**

# AMERICAN

(*B. PENNSYLVANICUS*)



Counties with current records = green (BA records darker green); counties with historic-only records = gray. (Updated 4/8/2022)

# American Bumble Bee (*B. pensylvanicus*)

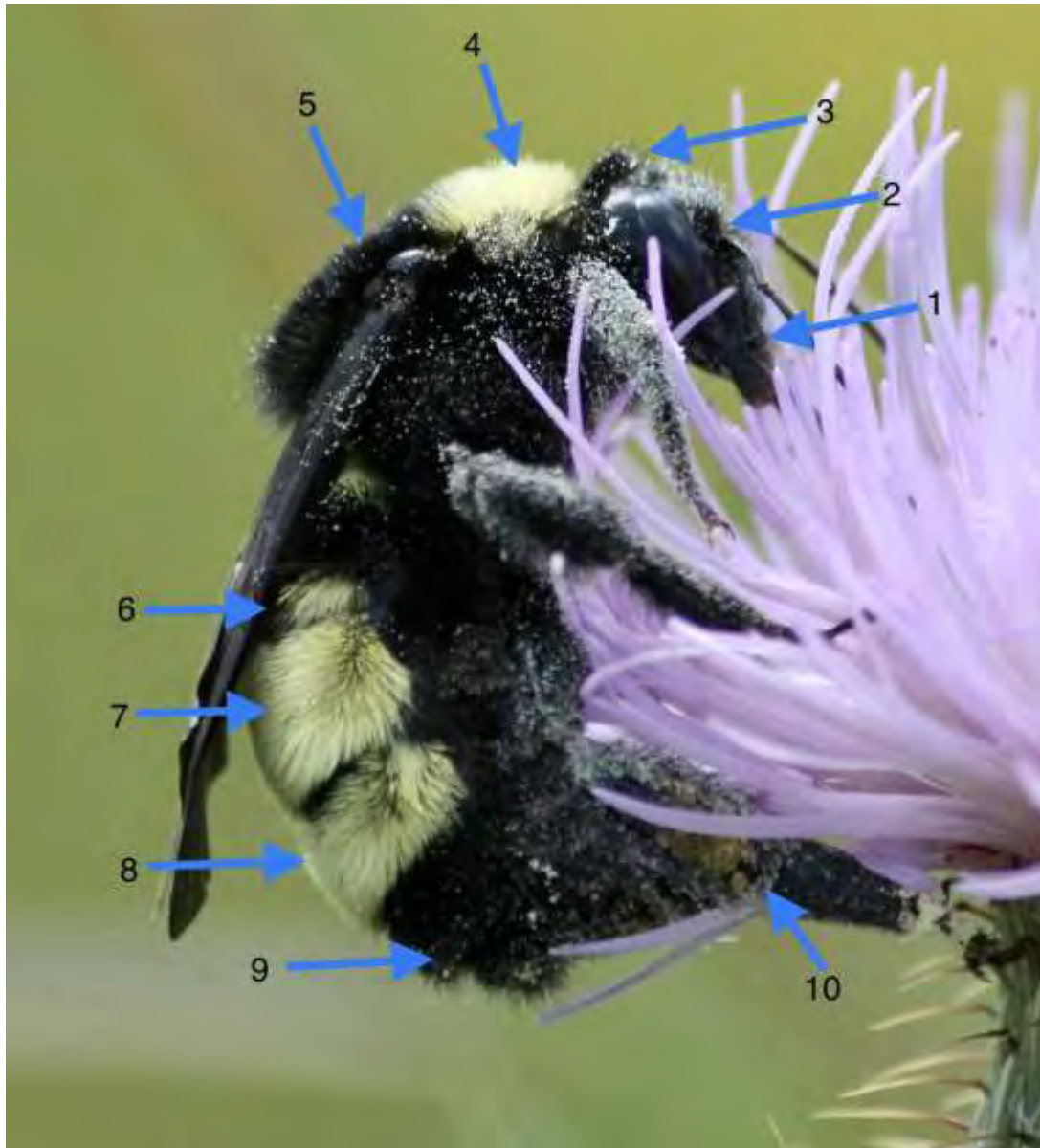


Photo: Judy Cardin and Bob Plamann

1. Long face
2. **Face completely black, no yellow hairs**
3. **Vertex completely black, no yellow hairs**
4. Short even hair
5. Large black thorax band that often extends completely to abdomen. Sometimes has a yellow border at bottom
6. **T1 usually all or partially yellow. Yellow increases centrally. Rarely, T1 is completely black**
7. **T2 yellow**
8. **T3 yellow**
9. **T4-6 black**
10. Pollen in corbiculum

American  
Bumble Bee (*B.  
pennsylvanicus*)



- Long black face
- Ocelli located between the top edges of the eyes
- Black vertex





Photo: Judy Cardin and Bob Plamann

## American Bumble Bee (*B. pensylvanicus*)

### **Black vertex**

Thorax band extends  
completely to  
abdomen

**T1 yellow on bottom  
half, yellow  
increases centrally**

T2-3 yellow

T4-6 black, stinger  
point on T6

# Key ID Trait Differences

## American (*Pensylvanicus*) face

- ❖ Ocelli located between the eyes at the top edge of eyes
- ❖ Black vertex



Photo: Judy Cardin and Bob Plamann

## Black and gold (*Auricomus*) face

- ❖ Ocelli located below the top of eyes
- ❖ Yellow vertex. Yellow “eyebrows” can be very faint”



# Key ID Trait Differences

## American(*Pensylvanicus*) - body

- ❖ Black vertex
- ❖ Black thorax band more commonly extends to abdomen
- ❖ T1 partial yellow increases centrally



## Black and gold(*Auricomus*) - body

- ❖ Yellow vertex
- ❖ Black thorax band more commonly bordered by yellow on bottom
- ❖ T1 partial yellow decreases centrally





# Quick Quiz

Look for the key ID characteristics, and decide the species

**Which bee is an American, and which is a Black and gold?**

Photos: Judy Cardin and Bob Plamann







**This is the Black and gold:**

- Yellow vertex
- Yellow decreases medially on T<sub>1</sub>



**This is the American:**

- Black vertex
- Yellow increases medially on T<sub>1</sub>



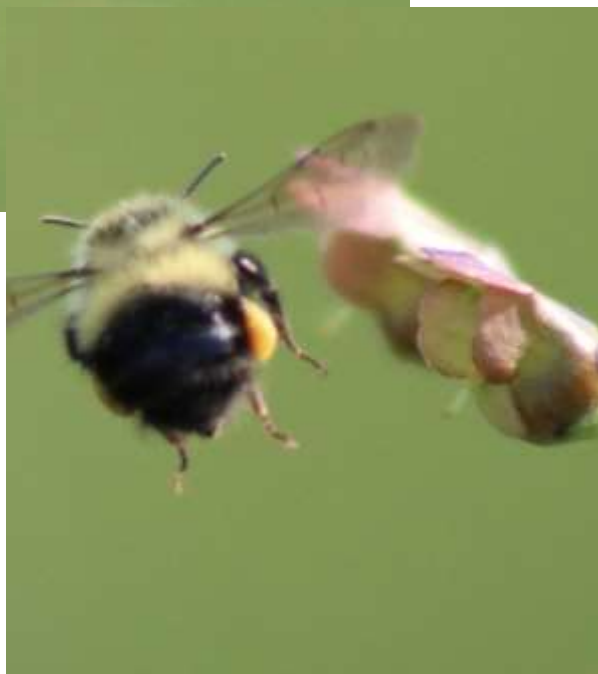
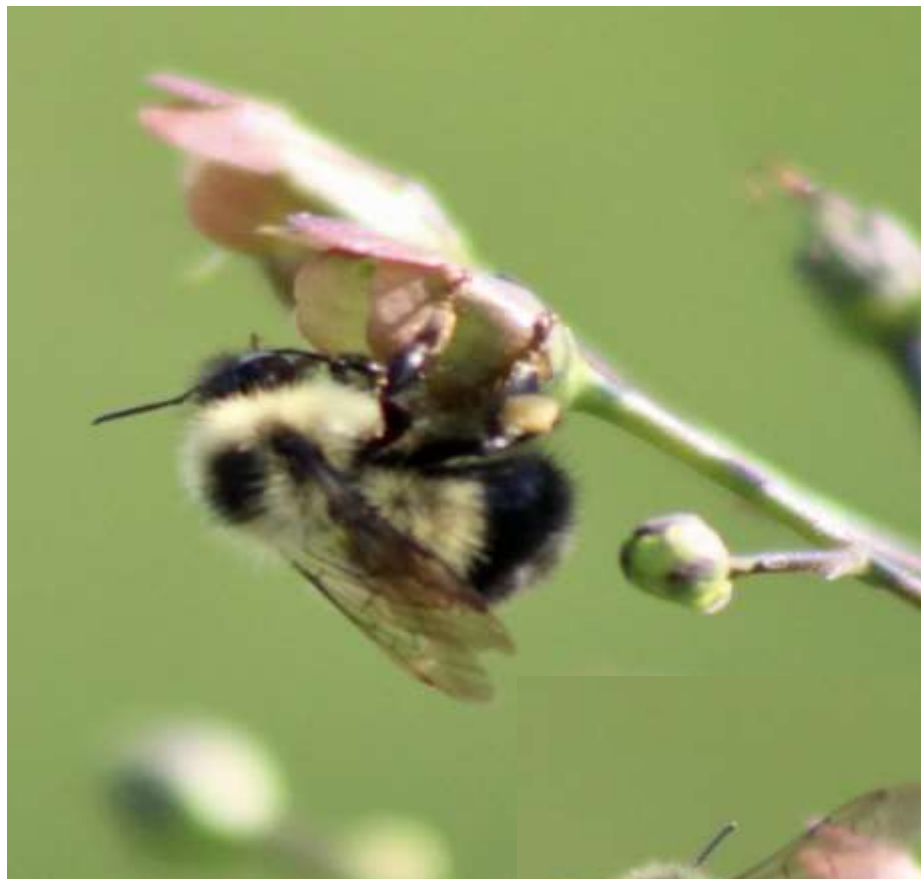
# SANDERSON

(*B. SANDERSONI*)



Counties with current records = green (B3 records darker green); counties with historical-only records = gray. [Updated 4/8/2022]





1. Shorter black face
  2. Black or intermixed vertex
  2. Large thorax patch/band
  3. T1-2 yellow
  4. T5 often yellow skirt
  5. Hair short
  6. Small size
- 

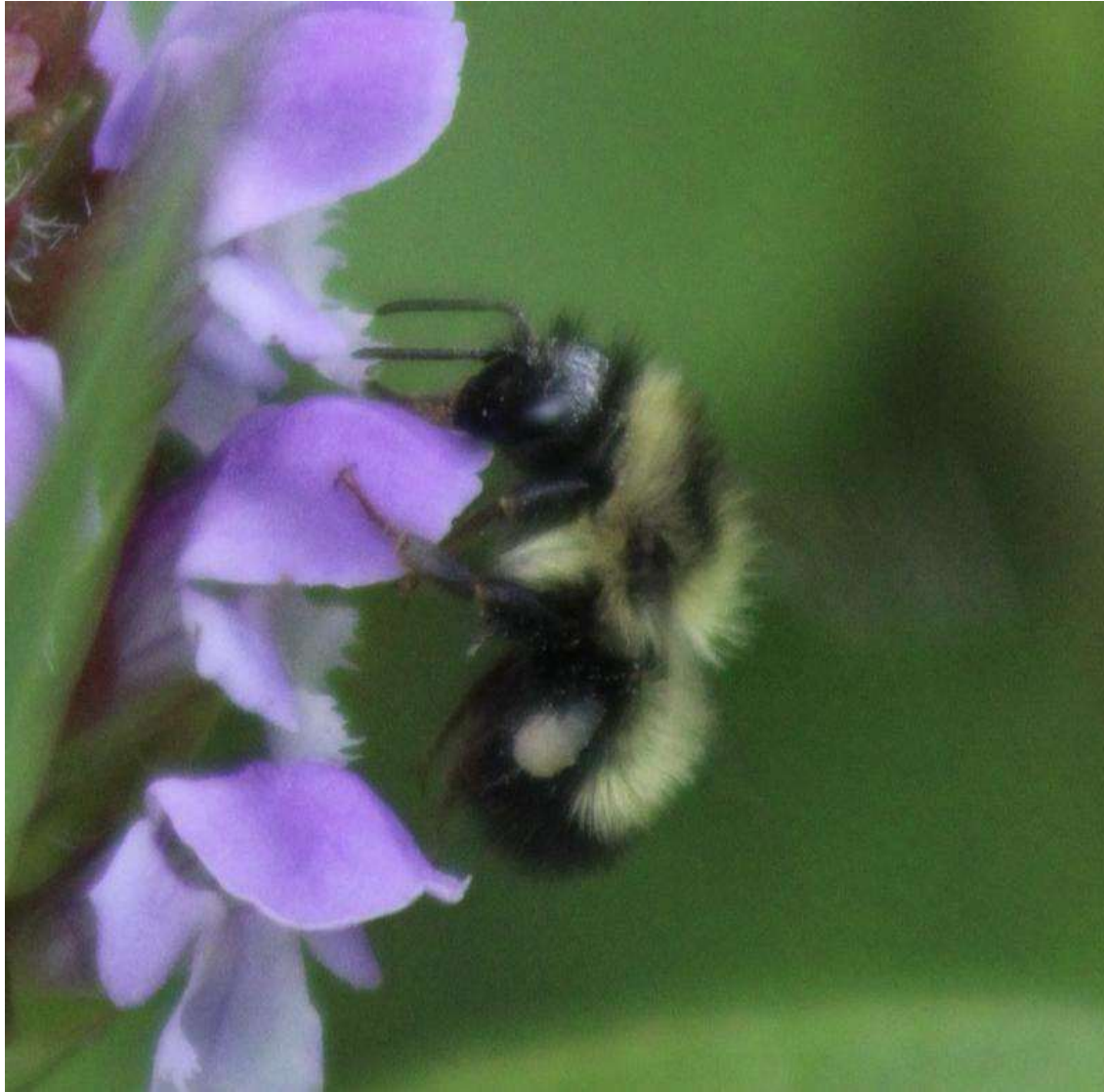
**SANDERSON**



1. Shorter black face
2. Black vertex
3. Large thorax patch
4. T1-2 yellow
5. Hair short
6. Small size

---

**SANDERSON**



1. Shorter black face
  2. Black vertex
  3. Large thorax patch
  4. T1-2 yellow
  5. Hair short
  6. Small size
- 

**SANDERSON**

# Key ID Differences

## Sanderson (*B. Sandersoni*)



## Half black (*B. vagans*)



Trait	Sanderson	Half-black
<b>Size</b>	Small	Medium
<b>Face length</b>	Short	Long
<b>Face color</b>	Black	Black or intermixed
<b>Vertex</b>	Intermixed or black	Intermixed or centrally yellow
<b>Hair length</b>	Short and even	Long, uneven, shaggy
<b>Thorax patch</b>	Generally larger patch or bar	Generally small, arrow-shaped patch
<b>T1</b>	Yellow	Yellow
<b>T2</b>	Yellow. Often has scattered intermixed black hairs at sides and front	Yellow
<b>T3-4</b>	Black	Black, but can have yellow on side edges of T3-5 (rare)
<b>T5</b>	Black, but can have yellow/brown on T5 (somewhat common)	Black, but can have yellow/brown T5, (very rare)





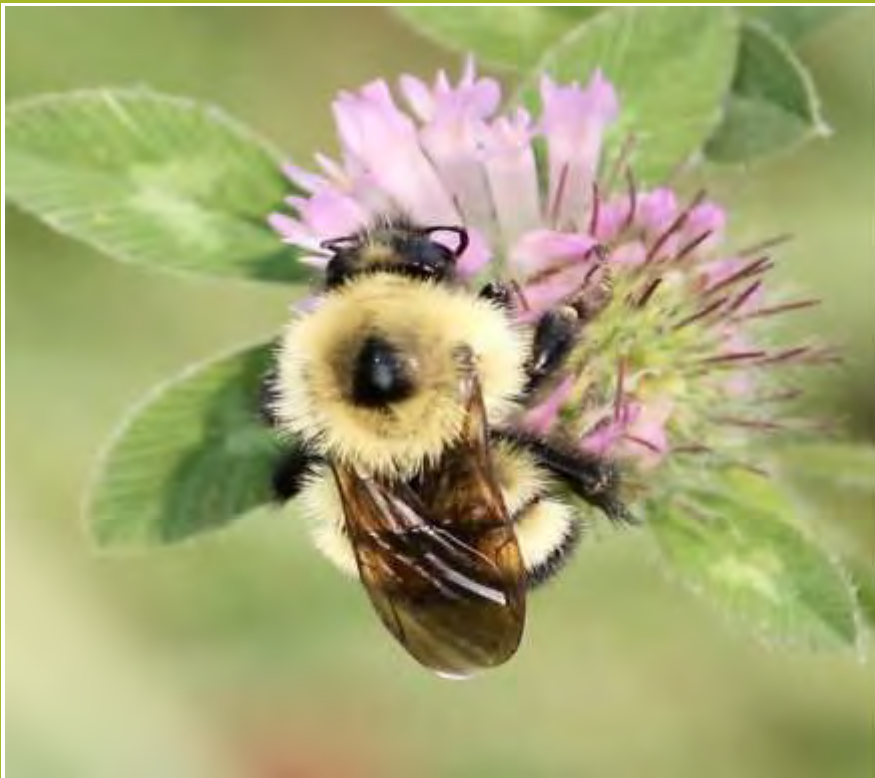
# Quick Quiz

Look for the key ID characteristics, and decide the species

**Which bee is a Sanderson, and which is a Half black?**







**This is the Half black:**

- **Yellow vertex**
- **Small arrowhead shaped thorax patch**
- **Fully yellow T2**



**This is the Sanderson**

- **Black vertex**
- **Larger thorax patch/band**
- **T2 intermixed black hairs**
- **Yellow skirt on T5**

# SOUTHERN PLAINS

(*B. FRATERNUS*)

First observed in  
Wisconsin in 2023: Green  
Lake and Walworth  
County.





Photo: Ben Grady



1. **Short black face**
2. Black vertex
3. Thorax band
4. Usually dark on sides of thorax under wing
5. T1-2 yellow
6. T3-6 black
7. **Abdomen has flattened rectangular appearance**
8. Hair very short and even
9. Large size

---

# SOUTHERN PLAINS



Photo: Paul Williams

1. Thorax band
  2. Usually dark on sides of thorax under wing
  3. T<sub>1-2</sub> yellow
  4. T<sub>3-6</sub> black
  - 5. Abdomen has flattened rectangular appearance**
  6. Hair very short and even
  7. Large size
- 

## SOUTHERN PLAINS



**QUESTIONS?**  
**ENTER QUESTIONS**  
**INTO THE Q&A**  
**FUNCTION**

---



# Uncommon Bumble Bee ID Training: Females

**Presenter- Jay Watson**

1. Lemon cuckoo (*B. citrinus*)
2. Indiscriminate cuckoo (*B. insularis*)
3. Fernald cuckoo (*B. flavidus*)
4. Ashton's cuckoo (*B. bohemicus*)
5. Variable cuckoo (*B. variabilis*)
6. Frigid (*B. frigidus*)

# What are Cuckoo Bumble Bees?

- Cuckoo Bumble Bees are nest parasites
  - They invade host bumble bees' nests and make the host workers raise their young
- Cuckoo bumble bees do not have corbicula
- Historically Wisconsin had five cuckoo species.
- Each cuckoo species is likely only able to parasitize certain species of other bumble bees

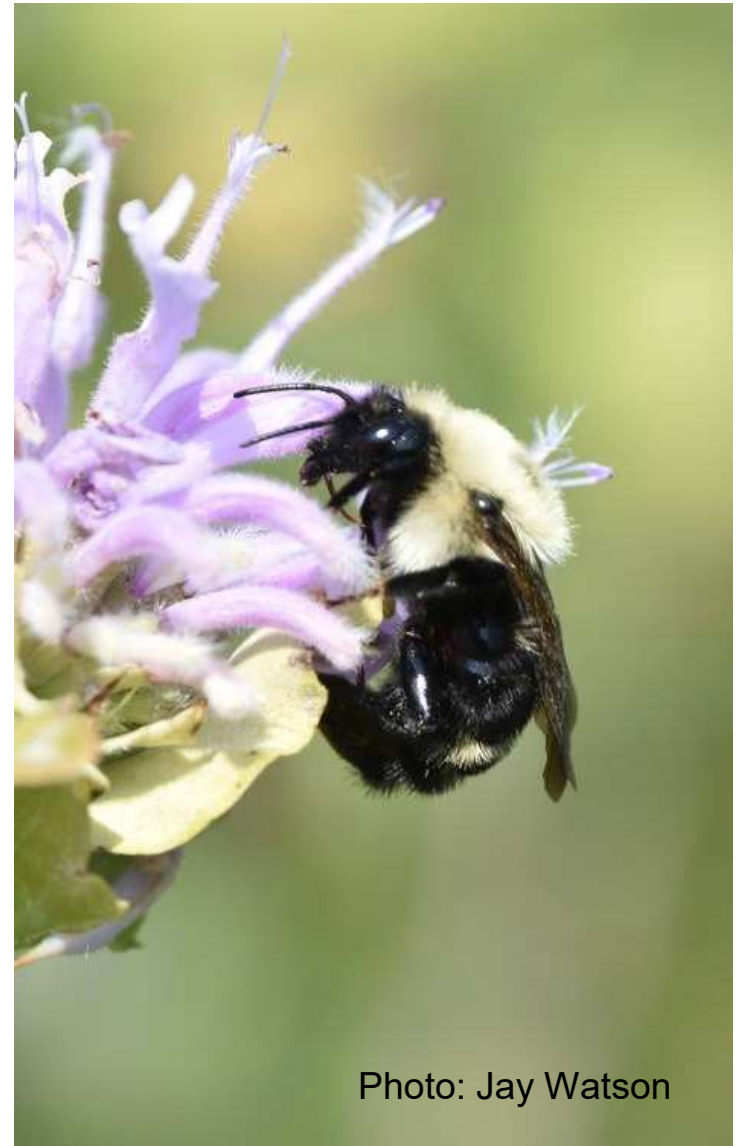


Photo: Jay Watson

# LEMON CUCKOO

(*B. CITRINUS*)

The lemon cuckoo is believed to be a nest parasite of the common eastern bumble bee (*B. impatiens*), the twospotted bumble bee (*B. bimaculatus*), and the half-black bumble bee (*B. vagans*) (Williams et al. 2014).

Wisconsin status: S3



# LEMON CUCKOO



1. Dark face
2. Yellow vertex
3. Small thorax patch, sometimes yellowed over
4. Abdominal pattern varies:
  - T1 black or yellow, if black often shiny
  - T2 black, sometimes with yellow on sides
  - T3 yellow on sides or across entire section**
  - T4 black, sometimes with yellow on sides
  - T5-6 black
6. Short hair
7. Medium sized bee
8. No corbicula
9. Light brown wings



1. T1 shiny black
2. Small amount of yellow on T<sub>3</sub>
3. Rest of abdomen black
4. No corbicula

---

**LEMON  
CUCKOO**





Photo add stuff

1. Thorax nearly yellow
2. T1 shiny black
3. T2 yellow on sides
4. **T3 yellow**
5. T4 yellow on sides

---

## LEMON CUCKOO

# INDISCRIMINATE CUCKOO

(*B. INSULARIS*)

The indiscriminate cuckoo bumble bee is believed to be a nest parasite of the redbelted bumble bee (*B. rufocinctus*), American bumble bee (*B. pensylvanicus*), tricolored bumble bee (*B. ternarius*), and the yellowbanded bumble bee (*B. terricola*) (Colla et al. 2011). Wisconsin: S1S2





1. Face black with dense patch of yellow above antenna base
2. Yellow vertex
3. Large thorax patch
4. Abdomen can vary. This bee has **central yellow on T1**. Typically yellow on sides of T4-5, or T4 completely yellow and T5 yellow on sides
5. T6 black

**INDISCRIMINATE  
CUCKOO**



1. Face black with dense patch of yellow above antenna base
2. Yellow vertex
3. Large thorax patch
4. Yellow on sides of T<sub>4-5</sub>
5. T<sub>6</sub> black

---

**INDISCRIMINATE  
CUCKOO**





1. Face black with dense patch of yellow above antenna base

2. Yellow vertex

3. Large typically shaped thorax patch

4. Yellow on sides of T<sub>4-5</sub>

---

**INDISCRIMINATE  
CUCKOO**

# FERNALD CUCKOO

*B. FLAVIDUS*

The Fernald cuckoo has been found in the nests of the redbelted bumble bee (*B. rufocinctus*) and the confusing bumble bee (*B. perplexus*) (Colla et al. 2011).  
Wisconsin: SNR





1. **Dark face**

2. Yellow vertex

3. Large thorax patch or band that can extend to abdomen.

4. Abdominal pattern varies:

T<sub>1</sub> yellow, black or black with intermixed side

T<sub>2</sub> black

T<sub>3</sub> usually black, can be yellow

**T<sub>4</sub> yellow, can be dark at the center of T<sub>4</sub>**

T<sub>5-6</sub> black

5. Small bee with medium length hair

# FERNALD CUCKOO

Photos Ryan Brady



Photos Ryan Brady

1. Dark face
2. Yellow vertex
3. Large thorax patch
4. T<sub>1</sub> yellow, black or black with intermixed side
5. T<sub>2-3</sub> black
6. T<sub>4</sub> yellow, dark at front center of T<sub>4</sub>

---

# FERNALD CUCKOO



# Key ID Trait Differences

## Fernald

- ❖ Dark face
- ❖ Yellow vertex
- ❖ Large thorax patch
- ❖ T<sub>4</sub> yellow, may be dark at front center



Photo: Ryan Brady

## Indiscriminate

- ❖ Dark face, dense yellow patch above antenna
- ❖ Yellow vertex
- ❖ T<sub>4-5</sub> yellow on sides



Photo: Judy Cardin and Bob Plamann

## Lemon

- ❖ Dark face
- ❖ Heavy yellow vertex
- ❖ Small thorax patch
- ❖ T<sub>3</sub> strongest yellow of lower abdominal sections



Photo: Judy Cardin and Bob Plamann

# ASHTON'S CUCKOO

*(B. BOHEMICUS)*

Wisconsin has a handful of historic observation records from northern and northeastern counties. The species was last reported in Wisconsin in 1991. The Ashton cuckoo is a nest parasite of the rusty patched bumble bee (*B. affinis*) and the yellowbanded bumble bee (*B. terricola*) (Williams et al. 2014).





Photos Sheila Colla

1. Dark face and vertex
2. Large thorax patch or band that can extend to abdomen
3. Thorax sides black behind wings
4. T1-2 black
5. T3 black with yellow on sides
6. **T4-5 white**
7. T6 black
8. Medium length hair

---

# ASHTON'S CUCKOO

# VARIABLE CUCKOO

(*B. VARIABILIS*)

There are only three historic observation records, all from Waukesha County. It was last observed in 1930. Wisconsin SNR

The variable cuckoo bumble bee is a nest parasite of the American bumble bee (*Bombus pensylvanicus*) (Colla et al. 2011 and Williams et al. 2014).







1. Dark face
2. Yellow or intermixed vertex
2. Thorax patch points down towards abdomen
3. Thorax sides black below wing pads
4. **T1-6 black**
5. Short hair and dark brown wings

---

**VARIABLE  
CUCKOO**

# FRIGID

*(B. FRIGIDUS)*

---





1. Face black or intermixed
2. Vertex yellow or intermixed
3. Large thorax band
- 4 Thorax sides usually yellow
5. T1-2 yellow
6. T3 black
7. T4-5 orange. Top half of T4 may be black
8. T6 black
9. Medium sized bee with long hair

---

# FRIGID



1. Large thorax band
2. Thorax sides usually yellow
3. T1-2 yellow
4. T3 black
5. T4-5 orange. Top half of T4 black
6. T6 black

---

# FRIGID

**Any questions?**  
Put your questions in Q&A please



**Thank you!**