Connecticut Bumble Bee Guide

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Please report sightings of rare and state-listed species to the Connecticut Department of Energy and Environmental Protection: Laura Saucier (laura.saucier@ct.gov) and Karen Zyko (karen.zyko@ct.gov)
Here is the form with all the details needed for reporting :
http://www.ct.gov/deep/lib/deep/endangered_species/general_information/InvertebrateForm.pdf

Sources:

Bumble bees of Eastern United States, by Sheila Colla, Leif Richardson and Paul Williams
http://www.fs.fed.us/wildflowers/pollinators/documents/BumbleBeeGuideEast2011.pdf

DiscoverLife Bumble Bee Guide
http://www.discoverlife.org/mp/20q?guide=Bumblebees

Terence M. Laverty and Lawrence D. Harder (1988). THE BUMBLE BEES OF EASTERN CANADA. The Canadian Entomologist, 120, pp 965-987. doi:10.4039/Ent120965-11.

Xerces Bumble Bee Identification http://www.xerces.org/bumble-bee-identification/
Illustrations by Elaine Evans.

Pollinators play a critical role in natural and agricultural ecosystems, both for the reproduction of native plants and for crop production. Animal pollinators (mainly bees and other insects) are essential to the fruit set or seed production of about 2/3 of human crop plants. Bees are the most important pollinators of many crops and a broad range of other flowering plants.

The decline of several species of wild bumble bees in the United States, Canada, Europe, South America, and China is well documented and cause for concern. Pathogens, parasites, disease and pesticides play a role in bumble bee decline, and there is evidence to support the theory that pathogen spillover from commercially raised bumble bees has caused the decline of four sister species of *Bombus* in the same subgenus. Two of those species, the rusty-patched bumble bee (*Bombus affinis*) and yellow-banded bumble bee (*Bombus terricola*), used to be common in Connecticut. Today *Bombus affinis* is listed as a species of special concern (likely extirpated), and *Bombus terricola* is listed as threatened. Their social parasite, B*ombus ashtoni*, is also listed as being a species of special concern (likely extirpated).

There have been 16 species of *Bombus* recorded in Connecticut since the early 1900's. The table below shows the population status for each of these 16 species in the Northeastern United States, as well as the first and last documented Connecticut record up until 2014.

Species	Status in Northeast	First and last CT record
Bombus borealis Kirby	Declining	1932 (1 record in CT)
Bombus auricomus (Robertson)	Declining	1905-1919 (3 records in CT)
Bombus ashtoni (Cresson)	Declining ★	1905-1992 (extirpated in CT???)
Bombus affinis Cresson	Declining ★	1904-1997 (special concern in CT)
Bombus terricola Kirby	Declining ★	1904-2009 (threatened in CT)
Bombus pensylvanicus (DeGeer)	Declining ★	1902-2006
Bombus ternarius Say	Declining	1914-2010 (seen, not collected in 2013)
Bombus fervidus (Fabricius)	Declining	1902-2012
Bombus vagans Smith	Declining	1904-2013
Bombus sandersoni Franklin	Stable	1905-2012
Bombus fernaldae (Franklin)	Too few to tell	1911-2011
Bombus citrinus (Smith)	Increasing	1904-2010
Bombus perplexus Cresson	Increasing	1913-2013
Bombus griseocollis (DeGeer)	Increasing	1903-2013
Bombus bimaculatus Cresson	Increasing	1902-2013
Bombus impatiens Cresson	Increasing	1902-2013

Bartomeus, I., Ascher, J. S., Gibbs, J., Danforth, B. N., Wagner, D. L., Hedtke, S. M., & Winfree, R. (2013). Historical changes in northeastern US bee pollinators related to shared ecological traits. *Proceedings of the National Academy of Sciences*, *110*(12), 4656-4660.

Planetary Biodiversity Inventory Database, maintained by The Museum of Natural History, New York City, information accessed February 2014.

Bombus impatiens

FEMALE

1. **Malar space**: the space between the mid-point of attachment of mandible and very bottom of eye is clearly SHORTER than the width of mandible base
2. **Abdomen hair color pattern**: T1 YELLOW or OFF-WHITE; T2, T3, T4, T5 BLACK (although a few specimens show a FEW light colored hairs on T2—when in doubt, check the malar space)

MALE

1. **Malar space:** VARIABLE**,** can be longer, shorter, or equal
2. **Abdomen hair color pattern:** T1 YELLOW or OFF-WHITE; T2, T3, T4, T5 BLACK (although a few specimens show a FEW light colored hairs on T2)

Can be confused with *Bombus bimaculatus*, check the malar space! *B. bimaculatus* has a LONG malar space, while *B. impatiens* is SHORT

Bombus affinis

DECLINING (last CT record 1997) Please report all sightings to CT-DEEP (see details on first page for how to report)

FEMALE

1. **Malar space:** the space between the mid-point of attachment of mandible and very bottom of eye is SHORTER or EQUAL to the width of base of mandible.
2. **Facial hair color:** all BLACK with no specimens showing yellow hairs
3. **Thorax hair color pattern:** scutum has YELLOW WITH A PATCH OF BLACK or NO HAIR in center
4. **Pleura hair color:** YELLOW
5. **Abdomen hair color pattern:** T2 all YELLOW with patches of BROWN, RED, or ORANGE, light hairs extend to apical margin creating a distinct edge between T2 and T3

MALE

1. **Malar space:** clearly and often very much SHORTER than width of mandible base
2. **Facial hair color:** hair above ocelli, around antennae, and on cheeks all BLACK, with only a FEW yellow hairs
3. **Abdomen hair color pattern:** T1-T2 yellow or yellow tinged with brown medially; T3-T6 all BLACK

Can be confused with *Bombus griseocoliis, B. vagans, B. bimaculatus and B. impatiens*—see links below for details on how to distinguish these species

http://www.xerces.org/rusty-patched-bumble-bee/
http://www.xerces.org/wp-content/uploads/2009/02/affinis_pocketid.pdf

Bombus bimaculatus

FEMALE

1. **Malar space:** the space between the mid-point of attachment of mandible and very bottom of eye is clearly LONGER than width of mandible base
2. **Ocelli:** in line with top of compound eyes
3. **Vertex hair color:** yellow
4. **Thorax hair color pattern:** black hairs on scutum are largely restricted to the center, creating a small patch of black surrounded by yellow (interalar band ABSENT); hair length long
5. **Pleura hair color:** yellow
6. **Abdomen hair color pattern:** T1 YELLOW**,** T2 BLACK WITH YELLOW PATCH IN CENTER, (yellow patch usually does not reach the rim); T3, T4, T5 BLACK
7. **T2 Integument:** appears SHINY and reflective, composed of many slight indents

MALE

1. **Malar space:** LONGER or EQUAL TO width of mandible base
2. **Facial hair color:** YELLOW hairs throughout
3. **Abdomen hair color pattern:** T1 YELLOW, T2 most often BLACK WITH YELLOW PATCH IN CENTER, but sometimes all yellow OR with mixed light and dark hairs, T3 usually all BLACK, but can be yellow with some black hairs intermixed (never pure yellow), T4-6 all black or can have extensive amounts of yellow mixed in

Females can be confused with *Bombus griseocollis* and *Bombus impatiens*– look for:

- **Malar space is long in *B. bimaculatus* and short in *B. griseocollis* and *B. impatiens***
- The shininess (*B. bimaculatus*) vs. dullness (*B. griseocollis*) of the integument under the hairs on T2
- The position of ocelli in relation to compound eyes….in line with top of compound eyes (*B. bimaculatus*) vs. slightly below top of compound eyes (*B. griseocollis*)

Males can be confused with *Bombus perplexus* – look for:

- Hair on T3 usually all black in *B. bimaculatus*, giving the appearance of a band, or yellow with black hairs intermixed; T3 in *B. perplexus* is always completely yellow with NO black hairs

Bombus griseocollis

FEMALE

1. **Malar space:** the space between the mid-point of attachment of mandible and very bottom of eye is clearly SHORTER than width of mandible base
2. **Ocelli:** upper edges slightly BELOW the imaginary line that crosses between the top of compound eyes
3. **Facial hair color:** ALL BLACK with insignificant amounts of light hair mixed in, however some specimens showing equal amounts of light and dark hairs mixed; vertex is mostly BLACK
4. **Thorax hair color:** yellow, with a DISTINCT CIRCULAR PATCH OF BLACK or no hair in center of scutum; pile is short, trim and dense
5. **Abdomen hair color pattern**: T1 YELLOW; T2 BROWNISH-RED or BURNT ORANGE which does NOT extend to apical margin; T3, T4, T5 ALL BLACK
6. **T2 integument**: DULL and NON-REFLECTIVE

MALE

1. **Malar space:** SHORTER than width of mandible base
2. **Eyes:** compound eyes large and bulging; ocelli clearly BELOW the imaginary line going across the tops of compound eyes
3. **Facial hair color:** mostly YELLOW with very few black hairs mixed in
4. **Thorax hair color:** rear half of scutum all YELLOW
5. **Abdomen hair color:** T2 BLACK with YELLOW/ORANGE/BROWN in the center of the segment, or yellow hairs along the front of the rim of the segment

Females can be confused with *Bombus bimaculatus* – look for:

- **Malar space is long in *B. bimaculatus* and short in *B. griseocollis***
- The shininess (*B. bimaculatus*) vs. dullness (*B. griseocollis*) of the integument under the hairs on T2
- The position of ocelli in relation to compound eyes….in line with top of compound eyes (*B. bimaculatus*) vs. slightly below top of compound eyes (*B. griseocollis*)

Can also be confused with *Bombus affinis*—see links below for information on how to distinguish these species.

hhttp://www.xerces.org/rusty-patched-bumble-bee/

http://www.xerces.org/wp-content/uploads/2009/02/affinis_pocketid.pdf

Bombus fervidus

FEMALE

1. **Malar space**: the space between the mid-point of attachment of mandible and very bottom of eye is clearly LONGER than width of mandible base
2. **Facial hair color**: BLACK
3. **Pleura hair color**: mostly YELLOW, with darker hairs in lower 1/3
4. **Thorax hair color**: rear half of scutum has a DISTINCT BAND OF BLACK (interalar band)
5. **Abdomen hair color pattern**: T1-T4 uniformly YELLOW

MALE

1. **Malar space:** Longer than width of mandible base
2. **Facial hair color:** BLACK, with a few yellow hairs at most
3. **Pleura hair color:** YELLOW
4. **Thorax hair color:** Black interalar band present
5. **Abdomen hair color:** T1-T4 uniformly YELLOW; T7 completely BLACK

Females can be confused with *Bombus borealis*. Check color of pile on pleura: *B. fervidus* has mostly yellow hairs, while *B. borealis* has black hairs

Males can be confused with *Bombus pensylvanicus.* Check color of pile on pleura: *B. pensylvanicus* has black hairs, while *B. fervidus* has yellow hairs; also, *B. pensylvanicus* has some orange hairs intermixed on T7

Bombus borealis

(Northern distribution – only 1 CT record from 1932) Please report all sightings to CT-DEEP (see details on first page for how to report)

FEMALE

1. **Malar space**: Long
2. **Facial hair color**: mostly YELLOW
3. **Pleura hair color**: mostly BLACK
4. **Thorax hair color**: rear half of scutum has a DISTINCT BAND OF BLACK (interalar band)
5. **Abdomen hair color pattern**: T1-T4 uniformly TAWNY YELLOW

MALE

1. **Facial hair color:** predominately YELLOW
2. **Pleura hair color:** BLACK
3. **Abdomen hair color pattern:** T1-T4 tawny YELLOW

Females can be confused with *Bombus fervidus*. Check color of pile on pleura: *B. fervidus* has mostly yellow hairs, while *B. borealis* has black hairs

Bombus terricola

DECLINING (last CT record 2009) Please report all sightings to CT-DEEP (see details on first page for how to report)

FEMALE

1. **Malar space**: the space between the mid-point of attachment of mandible and very bottom of eye is clearly SHORTER than width of mandible base
2. **Thorax hair color**: lower 2/3 of scutum is BLACK, scutellum is BLACK
3. **Pleura hair color**: BLACK
4. **Abdomen hair color pattern**: T1 BLACK, T2-T3 completely YELLOW; T6 often with some orange

MALE

1. **Malar space**: the space between the mid-point of attachment of mandible and very bottom of eye is clearly SHORTER than width of mandible base
2. **Thorax hair color**: lower 2/3 of scutum is BLACK, scutellum is BLACK
3. **Abdomen hair color pattern:** T2-T3 are YELLOW; T1, T5 and T6 mostly BLACK

Can be confused with *B. auricomus* and *B. pensylvanicus.* See links below for details on how to distinguish these species.

http://www.xerces.org/yellow-banded-bumble-bee/

Bombus perplexus

FEMALE

1. **Facial hair color:** color varies above antennae, with some specimens showing all light, all dark, or a mix of light and dark hair; vertex is LIGHT with insignificant amounts of dark hairs mixed in
2. **Malar space:** VARIABLE, from being distinctly short, roughly equal, or clearly longer than width of mandible
3. **Thorax hair color:** scutum and scutellum all YELLOW; interalar band ABSENT
4. **Pleura hair color:** upper area YELLOW, transitioning to BLACK pile, though can look like a washed out grey
5. **Abdomen hair color pattern:** T1-T2 completely covered with YELLOW pile; T3-T4 are BLACK; apical end of T6 has a few LIGHT colored long hairs along the edge

MALE

1. **Malar space:** space between bottom of eye and mid-point of attachment of mandible slightly LONGER than width of base of mandible
2. **Facial hair color:** vertex is YELLOW, facial hair in general has copious amounts of YELLOW
3. **Thorax hair color:** scutum is ALL YELLOW
4. **Pleura hair color:** Yellow
5. **Abdominal hair color pattern:** T1-T3 completely YELLOW

Females can be confused with *Bombus vagans*, look for: black hairs on pleura of *B. perplexus*, and a completely yellow pleura on *B. vagans*; *B. perplexus* also has light colored long hairs at the apical end of T6, while *B. vagans* has dark colored long hairs at end of T6

Males can be confused with *Bombus bimaculatus,* look for:
Hair on T3 usually all black in *B. bimaculatus*, giving the appearance of a band, or yellow with black hairs intermixed; T3 in *B. perplexus* is always completely yellow with NO black hairs

Bombus vagans

FEMALE

1. **Malar space:** Space between bottom of eye and mid-point of attachment to mandible LONGER than width of base of mandible, appearing "horsey"
2. **Facial hair color:** vertex has extensive amounts of YELLOW, apparently never all black
3. **Thorax hair color:** interalar band is ABSENT; the black hairs on the scutum are largely restricted to the center, creating only a small patch of black amidst a largely yellow-haired scutum
4. **Pleura hair color:** all YELLOW
6. **Abdomen hair color pattern:** T1-T2 YELLOW, T3-T6 Black; apical end of T6 has scattered DARK colored longer hairs along the edge

MALE

1. **Malar space:** space between bottom of eye and mid-point of attachment to mandible LONGER than width of base of mandible
2. **Facial hair color:** variable, can be all black, or with extensive amounts of yellow
3. **Thorax hair color:** rear half of scutum YELLOW, but can have some black hairs mixed in
4. **Abdomen hair color pattern:** T1-T2 YELLOW, T5-T6 all black or often with a few yellow hairs on the far sides

Males can be confused with *Bombus sandersoni.* Look at the length vs. width ratio of the 3rd antennal segment (F3): *B. vagans* F3 is 1.5x width, with all segments having a straight edge, while *B. sandersoni* is 2x width with all segments having a curved edge. Females can be distinguished from *B. sandersoni* and *B. perplexus* by the following characters: *B. vagans* has a long malar space, yellow pleura and black T5. *B. perplexus* has a shorter malar space, but more noticeable is that the pleura always has a considerable amount of black hairs. *B. sandersoni* has a shorter malar space, and sometimes T5 has yellow hairs. It is very tricky to separate *B. vagans* from *B. sandersoni* – expect some specimens to not resolve.

Bombus citrinus

FEMALE- parasitic (pollen basket absent)

1. **Malar space:** space between bottom of eye and mid-point of attachment to mandible SHORTER or EQUAL TO width of base of mandible
2. **Facial hair color:** vertex YELLOW
3. **Thorax hair color:** Completely YELLOW, interalar band absent
4. **Pleura hair color:** YELLOW, however can become dark ventrally
5. **Abdomen hair color pattern:** T1-T2 black or light and dark hairs mixed, never completely yellow; T4-T5 BLACK

MALE

1. **Malar space:** space between bottom of eye and mid-point of attachment to mandible SHORTER than width of base of mandible
2. **Facial hair color:** BLACK with few yellow hairs at most
3. **Thorax hair color:** lower 2/3 scutum mostly BLACK, scutellum YELLOW with V-SHAPED patch of dark hair in center
4. **Pleura hair color:** pile on lower half YELLOW, can become dark ventrally
5. **Abdomen hair color pattern:** T1-T2 all yellow or dark and light hairs intermixed, T4 completely black

Parasite of *B. impatiens* and *B. vagans*

Males can be confused with *Bombus fernaldae* – look for: T4 in *B. citrinus* is BLACK, and T4 in *B. fernaldae* is YELLOW

Bombus fernaldae

FEMALE – parasitic (pollen basket absent)

1. **Facial hair color:** vertex BLACK
2. **Pleura hair color:** YELLOW
3. **Abdomen hair color pattern:** T1 black with lateral tufts of Yellow; T4 predominantly yellow
4. S6 extends beyond T6, with tip of abdomen being recurved

MALE

1. **Malar space**: space between midpoint of attachment of mandible and bottom of eye compared to width of base of mandible LONG, with an occasional specimen being about equal in length
2. **Facial hair color:** vertex YELLOW
3. **Thorax hair color:** scutellum hair dark or yellow with a V-SHAPED patch of BLACK hair
4. **Pleura hair color:** YELLOW
5. **Abdomen hair color:** T2 mostly BLACK, T3 with BLACK pile on ANTERIOR MEDIAL area, T4 YELLOW, T7 YELLOW

Recorded from nests of *B. perplexus* and *B. rufocinctus*

Males can be confused with *Bombus citrinus* – look for: T4 in *B. citrinus* is BLACK, and T4 in *B. fernaldae* is YELLOW

Bombus pensylvanicus

DECLINING (last CT record 2006) Please report all sightings to CT-DEEP (see details on first page for how to report)

FEMALE

1. **Malar space:** space between midpoint of attachment of mandible and bottom of eye LONGER or EQUAL TO width of base of mandible
2. **Ocelli:** slightly below the imaginary line that runs between the tops of the compound eyes
3. **Thorax hair color:** scutellum usually all BLACK but can have short branched yellow hairs intermixed with the long black ones along the rim
4. **Pleura hair color:** BLACK
5. **Abdomen hair color pattern:** T1 mixed yellow and black hairs, usually with yellow at the rear edge, although exact patterns and amount varies; T2-T3 YELLOW, T4-T5 BLACK

MALE

1. **Malar space:** space between midpoint of attachment of mandible and bottom of eye LONGER or EQUAL TO width of base of mandible
2. **Thorax hair color:** Interalar band present
3. **Pleura hair color:** broad upper part always with some regularly spaced long black hairs (on some individuals this can be extensive and the entire region can appear dark)
4. **Abdomen hair color:** T1-T4 YELLOW; T5 VARIES-yellow, black or mixed light and dark hairs; T6-T7 BLACK on disc, but fringed laterally and on T7 fringed apically with yellowish hairs

Can be confused with *B. auricomus* and *B. pensylvanicus.* See link below for details on how to distinguish these species.

http://www.xerces.org/yellow-banded-bumble-bee/

Bombus sandersoni

FEMALE

1. **Malar space:** space between bottom of eye and mid-point of attachment of mandible EQUAL TO or LONGER than width of base of mandible
2. **Facial hair color:** hair above ocelli black with scattered yellow hairs
3. **Thorax hair color:** posterior half of the scutum BLACK, with yellow hairs bordering the junction with the scutellum and near the tegulae
4. **Pleura hair color:** Yellow
5. **Abdomen hair color:** T1-T2 entirely YELLOW (though some individuals may show black hairs mixed in with the yellow in the middle of T2) ******Diagnostic is the presence of pale yellow to off-white hairs on T5 but this can vary from completely pale to completely black; usually there is at least a little yellow on the far sides, and at times there is yellow on the far sides of T4**

MALE

1. **Malar space:** space between bottom of eye and mid-point of attachment of mandible EQUAL to width of base of mandible
2. **Thorax hair color:** Scutum YELLOW, with a few black hairs at most, black patch not wider than 1/3 interalar width
3. **Abdomen hair color pattern:** T1-T2 YELLOW, T5-T7 usually with completely BLACK hair, though yellow present in some specimens

Males can be confused with *Bombus vagans.* Look at the length vs. width ratio of the 3rd antennal segment (F3): *vagans* F3 is 1.5x width, with all segments having a straight edge, while *sandersoni* is 2x width with all segments having a curved edge. Females can be distinguished from *B. vagans* and *B. perplexus* by the following characters: *B. vagans* has a long malar space, yellow pleura and black T5. *B. perplexus* has a shorter malar space, but more noticeable is that the pleura always has a considerable amount of black hairs. *B. sandersoni* has a shorter malar space, and sometimes T5 has yellow hairs. It is very tricky to separate *B. vagans* from *B. sandersoni* – expect some specimens to not resolve.

Bombus ternarius

FEMALE

1. **Malar space:** space between bottom of eye and mid-point of attachment to mandible SHORTER than width of base of mandible
2. **Facial hair color:** vertex predominantly BLACK
3. **Thorax hair color:** scutum hair color YELLOW in front of interalar band, scutellum hair color YELLOW with a DISTINCT TRIANGLE OF BLACK hair pointing toward the abdomen
4. **Abdomen hair color pattern:** T1 YELLOW, T2-3 RED, T5 BLACK

MALE

1. **Malar space:** space between bottom of eye and mid-point of attachment of mandible SHORTER than width of base of mandible
2. **Facial hair color:** predominately YELLOW
3. **Thorax hair color:** pile in front of interalar band completely yellow
4. **Abdomen hair color:** T1 YELLOW, T2-T3 RED, T5-T7 BLACK

Bombus auricomus

(Last CT record 1919) Please report all sightings to CT-DEEP (see details on first page for how to report)

FEMALE

1. **Facial hair color:** vertex YELLOW
2. **Ocelli:** set well below the imaginary line that runs between the tops of the compound eyes
3. **Malar space:** space between bottom of eye and mid-point of attachment to mandible LONGER than width of base of mandible
4. **Thorax hair color:** Interalar band present; Scutellum usually lined along the rim with LONG YELLOW hairs intermixed with the usually long black ones
5. **Abdomen hair color pattern:** T1 BLACK but often with some yellow hairs at the sides; T2-T3 YELLOW; T4-T6 BLACK

MALE

1. **Compound eyes:** LARGE and BULGING, extending over at least half the frontal width of face at broadest point
2. **Ocelli:** set well below the imaginary line that runs between the tops of the compound eyes
3. **Malar space:** space between bottom of eye and mid-point of attachment to mandible SHORTER or EQUAL to width of base of mandible
4. **Thorax hair color:** scutum with black central spot, having YELLOW along the rear half of thorax
5. **Abdomen hair color pattern:** T1-T3 YELLOW; T4-T7 BLACK

Can be confused with *B. auricomus* and *B. pensylvanicus.* See link below for details on how to distinguish these species.

http://www.xerces.org/yellow-banded-bumble-bee/

Bombus ashtoni

DECLINING (last CT record 1992) Please report all sightings to CT-DEEP (see details on first page for how to report)

FEMALE – parasitic (pollen basket absent)

1. **Malar space:** space between bottom of eye and mid-point of attachment to mandible SHORTER or EQUAL to width of mandible base
2. **Facial hair color:** BLACK
3. **Pleura hair color:** all BLACK or with a small amount of yellow at the top (covering not more than ¼ of the segment)
4. **Abdomen hair color pattern:** T1-T2 all black or light/dark mixed; T3 variable; T4 completely PALLID YELLOW; T5 black or light/dark mixed

MALE

1. **Malar space:** space between bottom of eye and mid-point of attachment to mandible SHORTER or EQUAL to width of mandible base
2. **Facial hair color:** BLACK
3. **Pleura hair color:** lower half BLACK
4. **Abdomen hair color pattern:** T1 all yellow or light/dark mixed; T2-T3 variable; T4 all yellow or light/dark mixed; T5 variable

Parasite of *B. affinis* and *B. terricola*

Xerces Bumble bee guide, illustrations by Elaine Evans (used by permission)

Distinguishing *B. affinis* from *B. griseocollis*

Bombus affinis (left) and Bombus griseocollis (right)

Bombus griseocollis can be distinguished from *B. affinis* by several key features. *B. affinis* have a stripe of black hairs that extends between the wings on the thorax. *B. griseocollis* have a central bare black spot with only a few black hairs at the edges of this spot. The hair on the thorax of *B. griseocollis* workers is predominately yellow. *B. affinis* have yellow hairs extending to the lateral margins of the second abdominal segment. *B. griseocollis* have black hairs along the sides of the second abdominal segment. *B. griseocollis* does have a rusty brownish patch in the middle of its second abdominal segment but this patch is flanked by black hairs along the rear and the sides of the segment.

Male *B. griseocollis* are easily distinguished from *B. affinis* by their large eyes and a prominent patch of dense yellow hairs on the front of their faces.

Distinguishing *B. affinis* from *B. vagans*

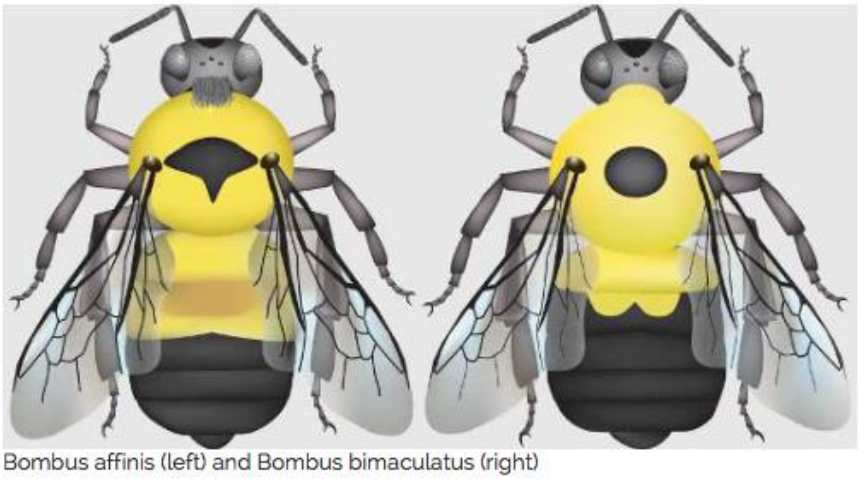
Bombus affinis (left) and Bombus vagans (right)

B. vagans have a longer face than *B. affinis*. *B. vagans* workers and queens have yellow hair on the first two abdominal segments and black on the rest of the abdominal segments. There is no rusty patch on their abdomen. *B. vagans* have a patch of yellow hair the top of their heads in contrast with *B. affinis* patch of black hairs.

In addition to the lack of the rusty patch, male *B. vagans* can be distinguished from *B. affinis* by yellow hairs along the margins of their abdominal segments and some yellow hairs mixed in among the black hair of the more apical abdominal segments.

Xerces Bumble bee guide, illustrations by Elaine Evans (used by permission)

Distinguishing *B. affinis* from *B. bimaculatus*



Bombus affinis (left) and Bombus bimaculatus (right)

B. bimaculatus have longer faces than *B. affinis*. *B. bimaculatus* queens, males, and workers have black along the sides of their second abdominal segment, whereas *B. affinis* have yellow hairs that extend to the sides. *B. bimaculatus* have yellow hairs in a central notched pattern on the second abdominal segment. Workers of *B. bimaculatus* also have a bare patch in the middle of the thorax surrounded by predominately yellow hair, as opposed to *B. affinis* with their patch of predominately black hair extending between the wing bases. Male *B. bimaculatus* have a prominent patch of yellow hair on the front of their face, as opposed to *B. affinis* with mostly black hair on the front of the face.

Distinguishing *B. affinis* from *B. impatiens*

Bombus affinis (left) and Bombus impatiens (right)

B. impatiens queens, workers, and males have yellow on only the first abdominal segment, with the rest of the segments black, whereas *B. affinis* have yellow on the first and second abdominal segments. Also, *B. impatiens* have a bare patch in the middle of the thorax surrounded by yellow hair, as opposed to *B. affinis* with their patch of black hair extending between the wing bases. Male *B. impatiens* have a prominent patch of yellow hair on the front of their face, as opposed to *B. affinis* with mostly black hair on the front of the face.

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Identifying *Bombus terricola*

Worker Queen

Workers and queens have yellow on the front of the thorax as well as on abdominal segments two and three. The head and other abdominal segments are black with the exception of a fringe of brownish yellow hair on the far edge of the fifth abdominal segment. Queens are similar to workers except they are larger in size. There is variation in coloration across its range.

Male

Male coloration is similar to females, except for patches of long pale yellow hair on the top of their heads and the front of their faces.

Similar bumble bees

Females

Bombus auricomus *Bombus pensylvanicus*

B. auricomus have yellow hair on top of their head. *B. pensylvanicus* have yellow at the rear edge of their first abdominal segment. B. auricomus and *B. pensylvanicus* lack the fringe of brown hair on the fifth abdominal segment present on *B. terricola*.

Males

Bombus auricomus *Bombus pensylvanicus*

Male *B. auricomus* and *B. pensylvanicus* have yellow hair along the rear of the thorax while *B. terricola* males have black hair.