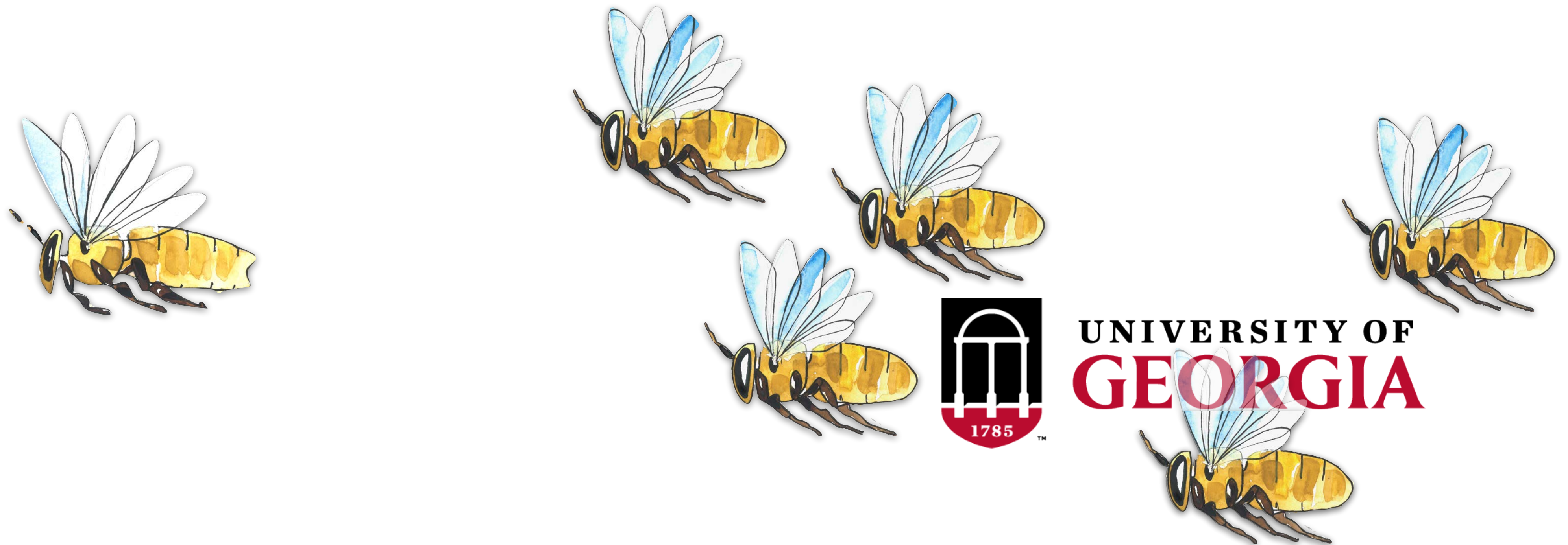


Bees and non-bee relatives

Keith Delaplane, Professor and Walter B. Hill Fellow



Honey Bee Program



BEES, BEEKEEPING & PROTECTING POLLINATORS

GRADUATE PROGRAM

PUBLICATIONS

YOUNG HARRIS INSTITUTE

MASTER BEEKEEPER PROGRAM

BEEKEEPING RESOURCES

ABOUT

GIVE

SEARCH

Locally responsive, globally relevant

Our research addresses sustainable bee health management issues and more basic questions on bee pollination and foraging ecology. We aim to develop research, teaching and extension initiatives that are locally responsive while globally relevant.

About the program

Contact us

Certification Levels & Related Requirements

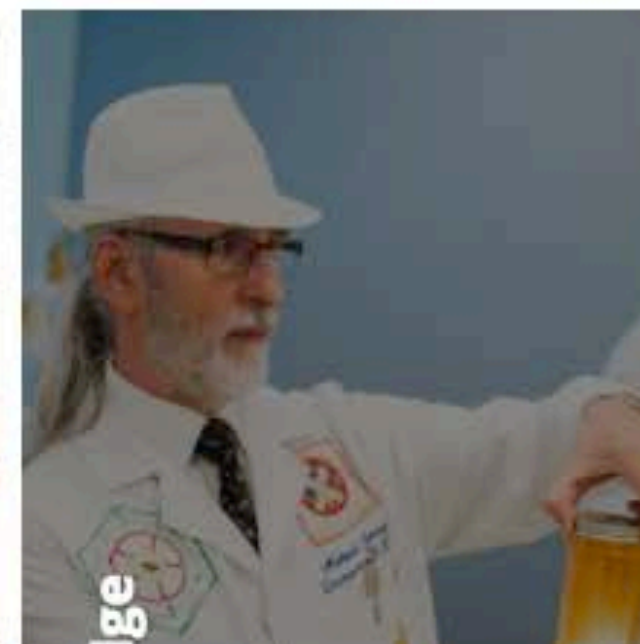
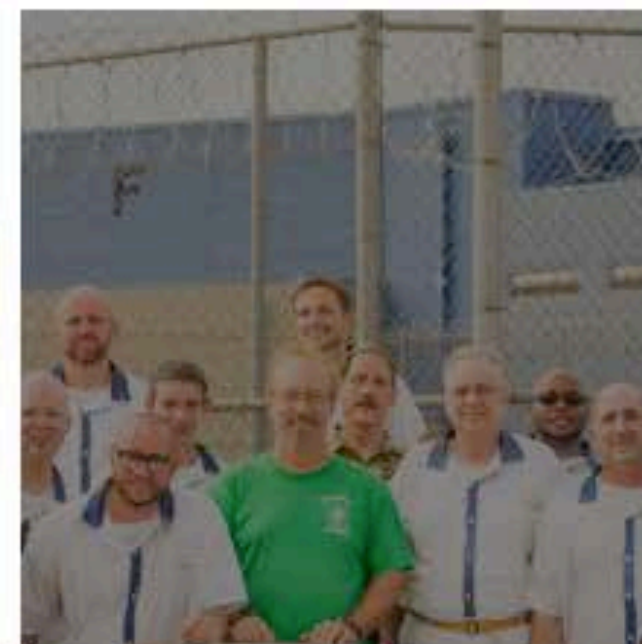
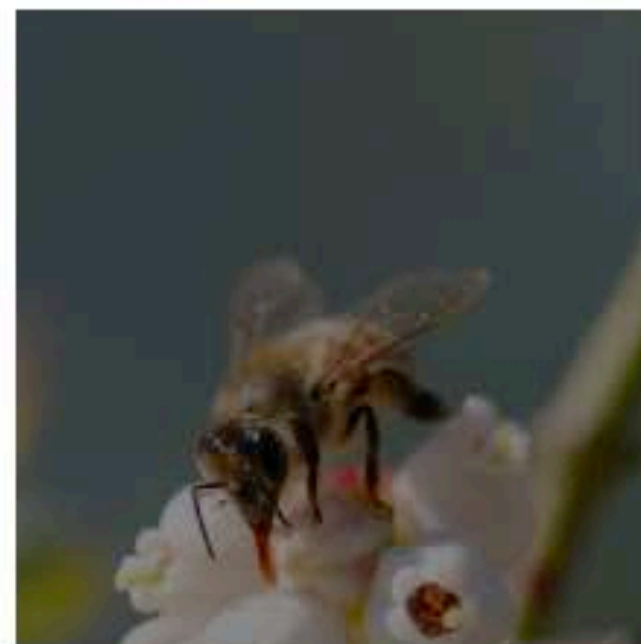
Public Service Requirements

Guidelines for Regionalized Administration of Master Beekeeper Exams

Master Beekeepers

Master Craftsman Beekeepers

Certification Levels Journeyman Study Guide



2021 Young Harris Beekeeping Institute and Certified Testing

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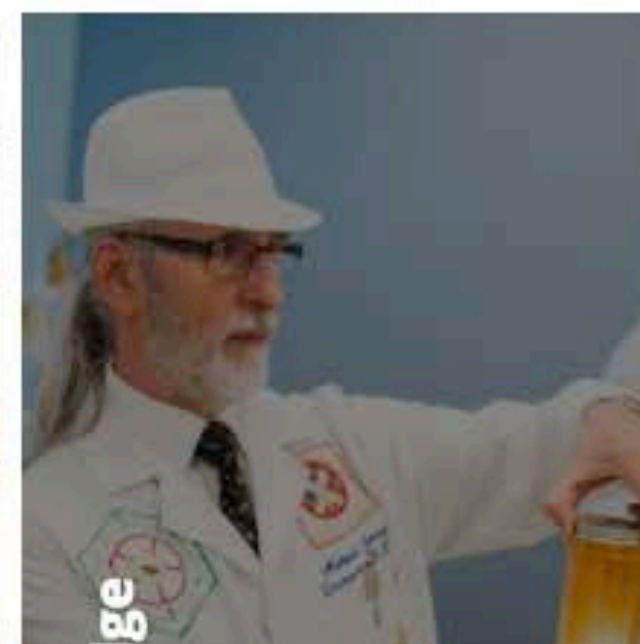
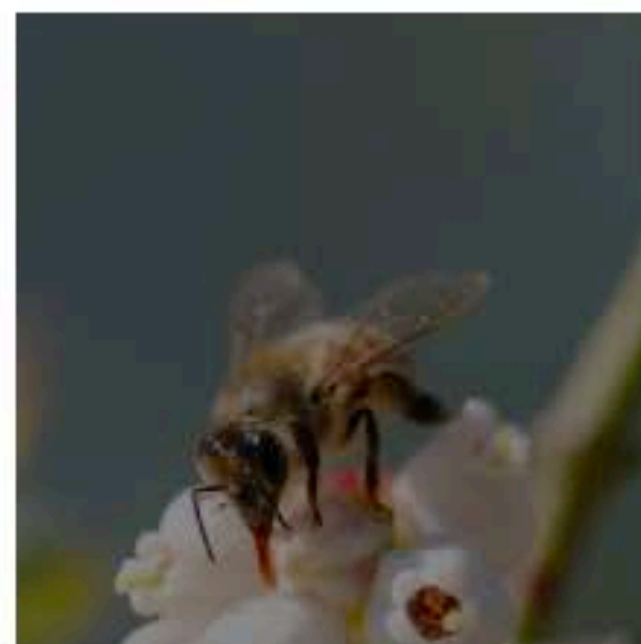
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Journeyman Practical Exam

This column ex-aminer use only			
pass		fail	You must pass <u>each</u> of required questions 1-6 and <u>any three</u> of elective questions 7-13. Unless otherwise stated, passing is 70%.
1			Disorder identification #1
2			Disorder identification #2
3			Disorder identification #3
4			Disorder identification #4
5			Disorder identification #5
6			Identify (by common name, adequate description, or taxonomically diagnostic character) the insects or insect artifacts in the case.

Questions 1-5 may include any of the following. Be prepared to distinguish samples that are both positive and negative for each disorder: Varroa mites, small hive beetles (SHB), Nosema spores, DWV, AFB, EFB, laying worker, drone layer, SHB larvae vs. wax moth larvae. Be prepared to name causative agent (if not same as disorder name) and recommended treatment.

Question 6 will include the following: honey bee worker, honey bee queen, honey bee drone, bumble bee, sweat bee, squash bee, carpenter bee, parasitic wasp, *Vespula* yellow jacket, *Polistes* paper wasp, *Vespa* hornet, cicada killer, leg with corbicula, leg without corbicula, mason bee, and 2 species of fly bee mimics.

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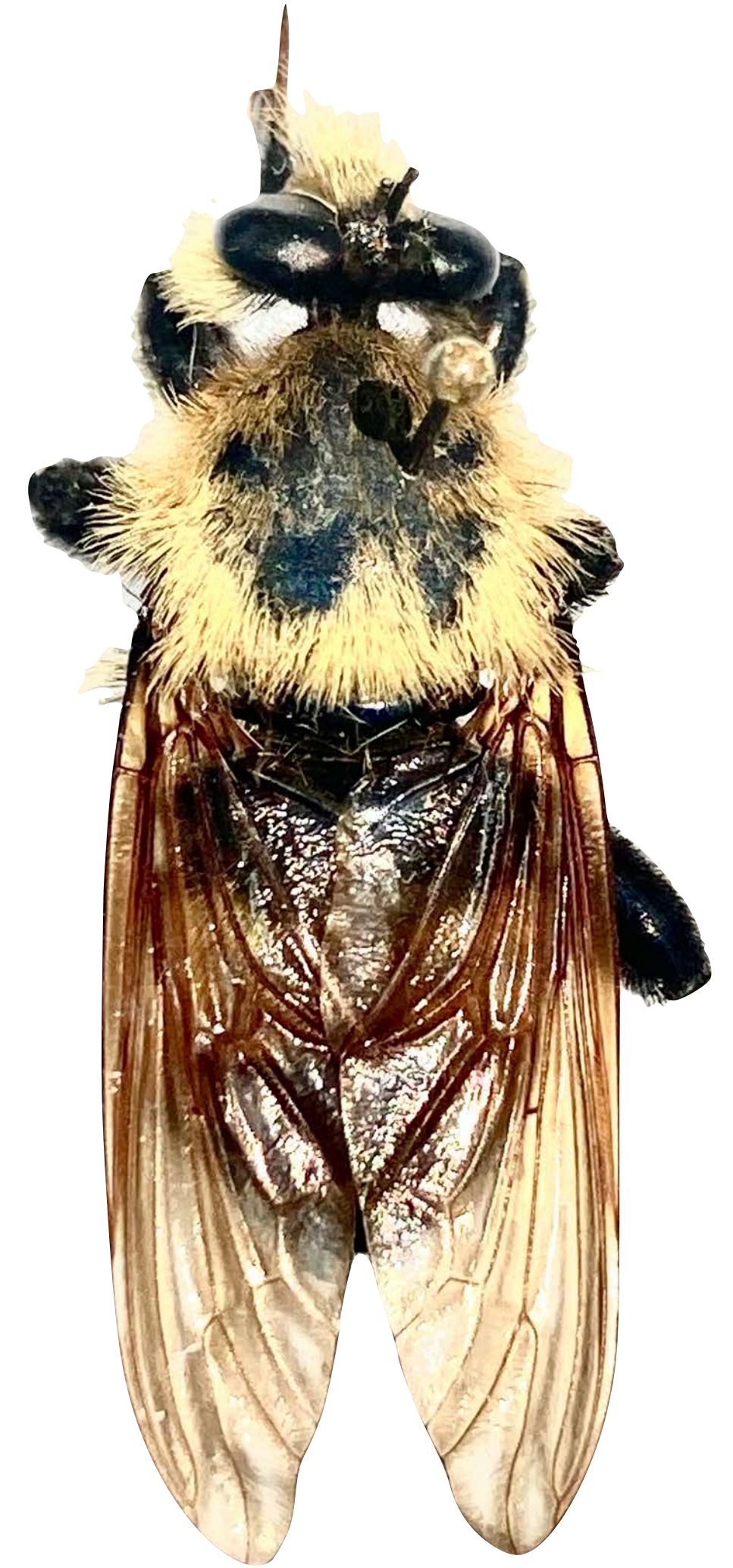
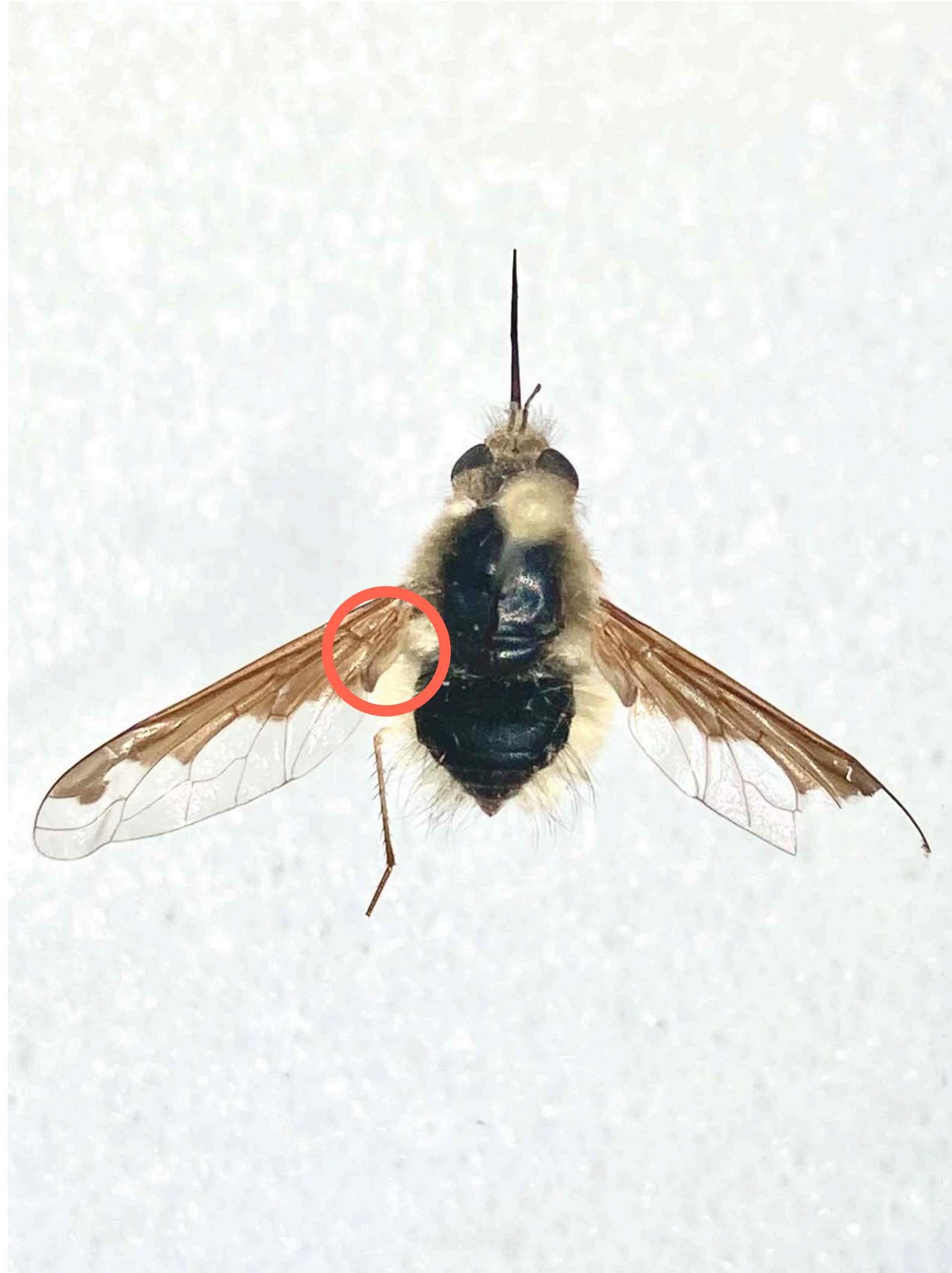
Diptera



Diptera



Diptera



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Hymenoptera (ants)



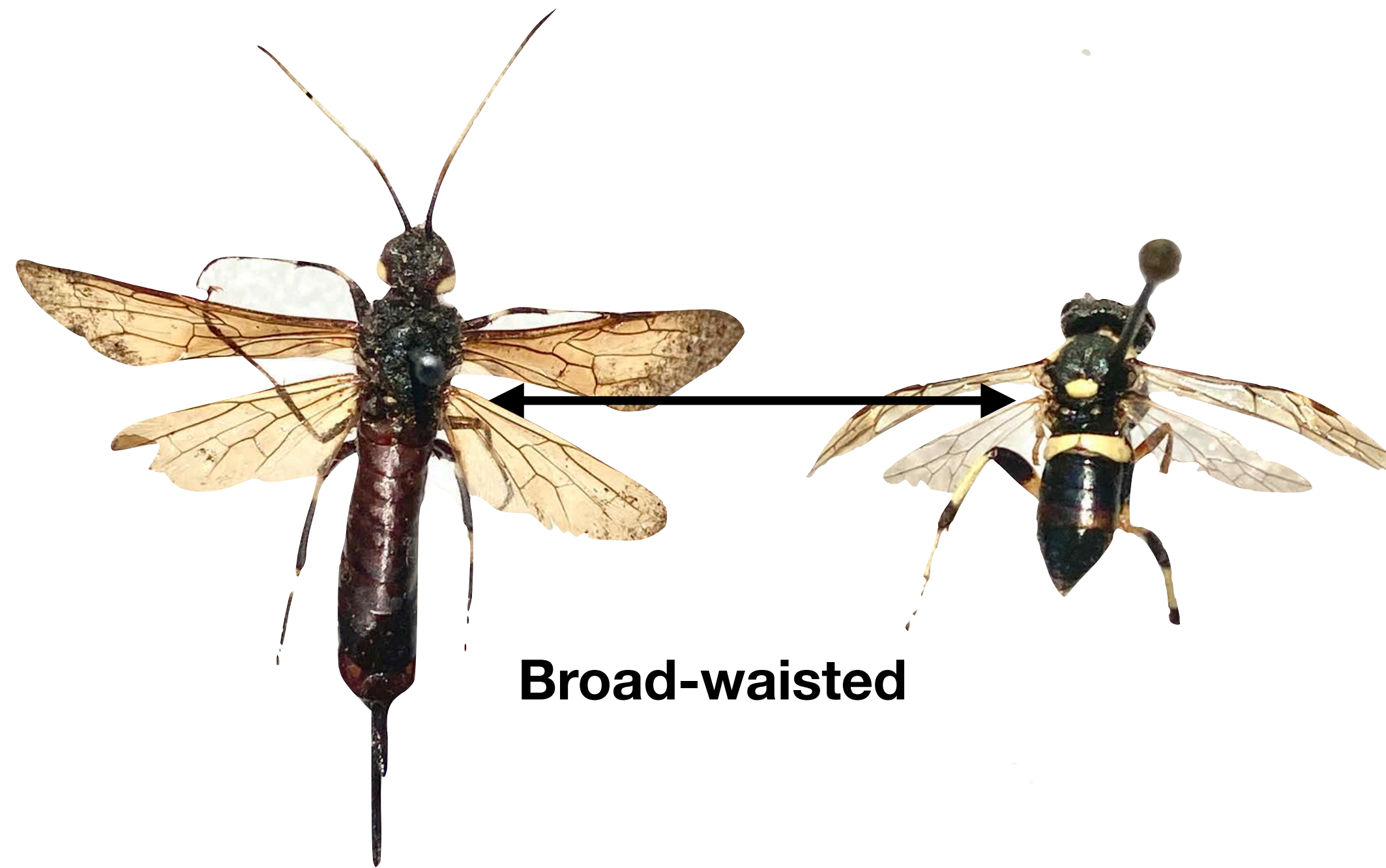
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Hymenoptera, Apocrita (wasp-waisted)

Sawflies

Apocrita



Broad-waisted

Slender-waisted



Decision tree for bees, near bees, or mimics

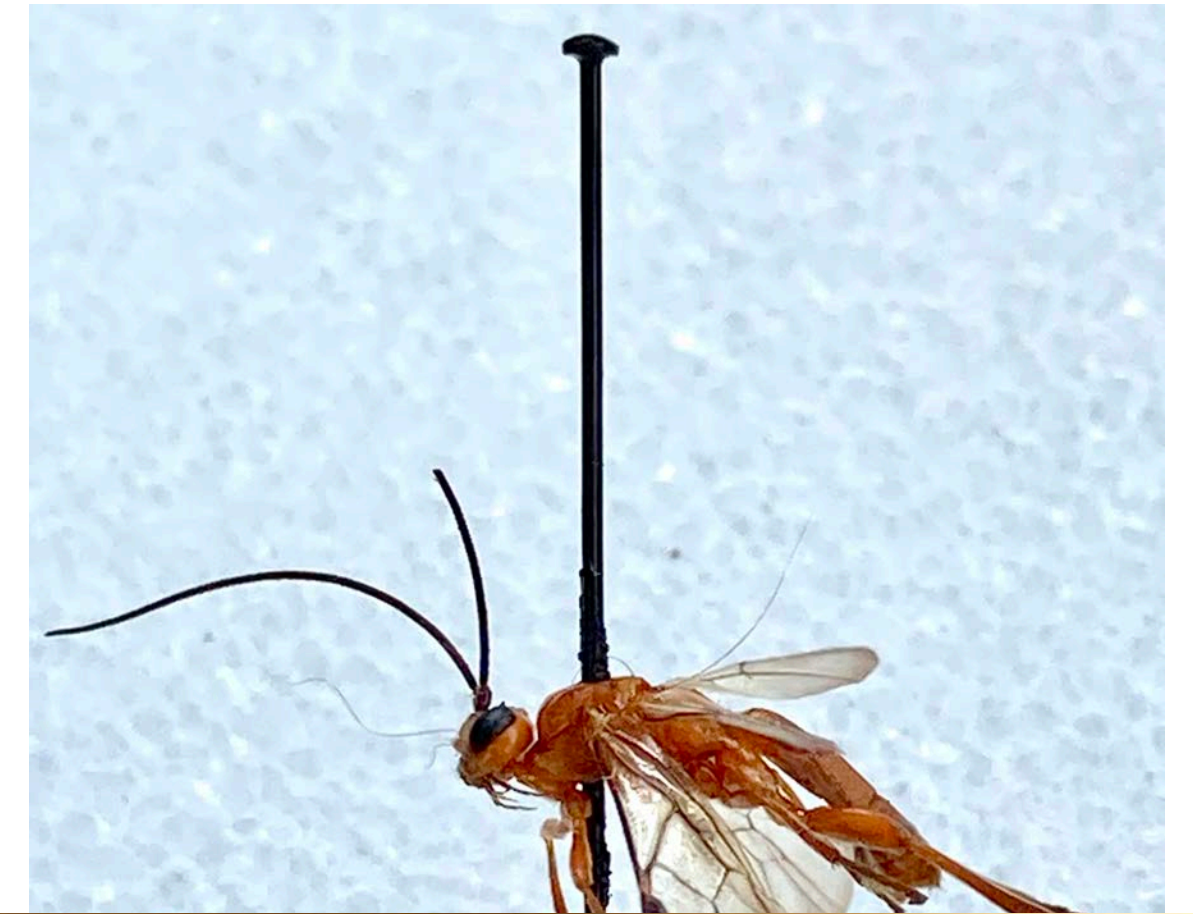
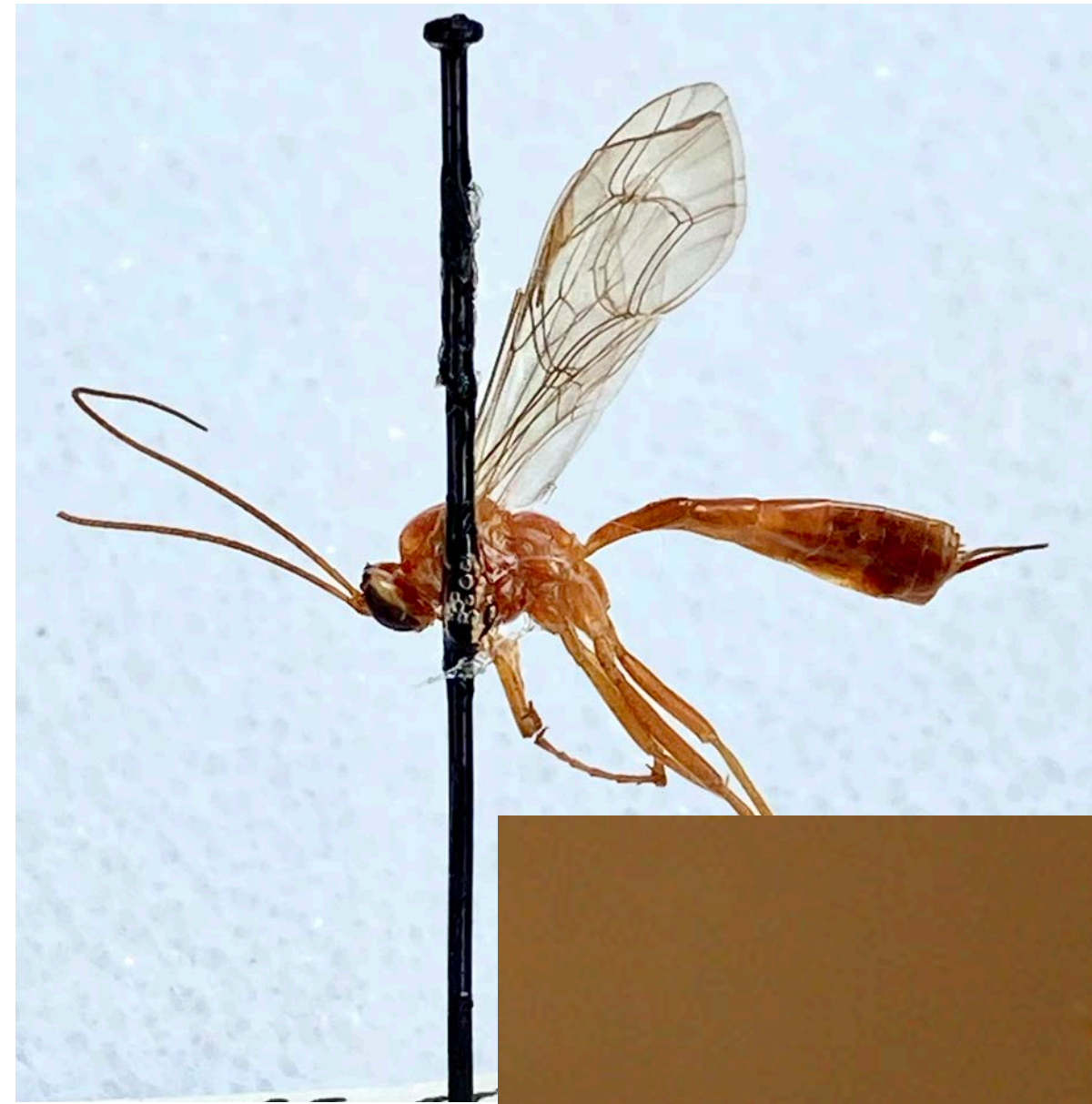
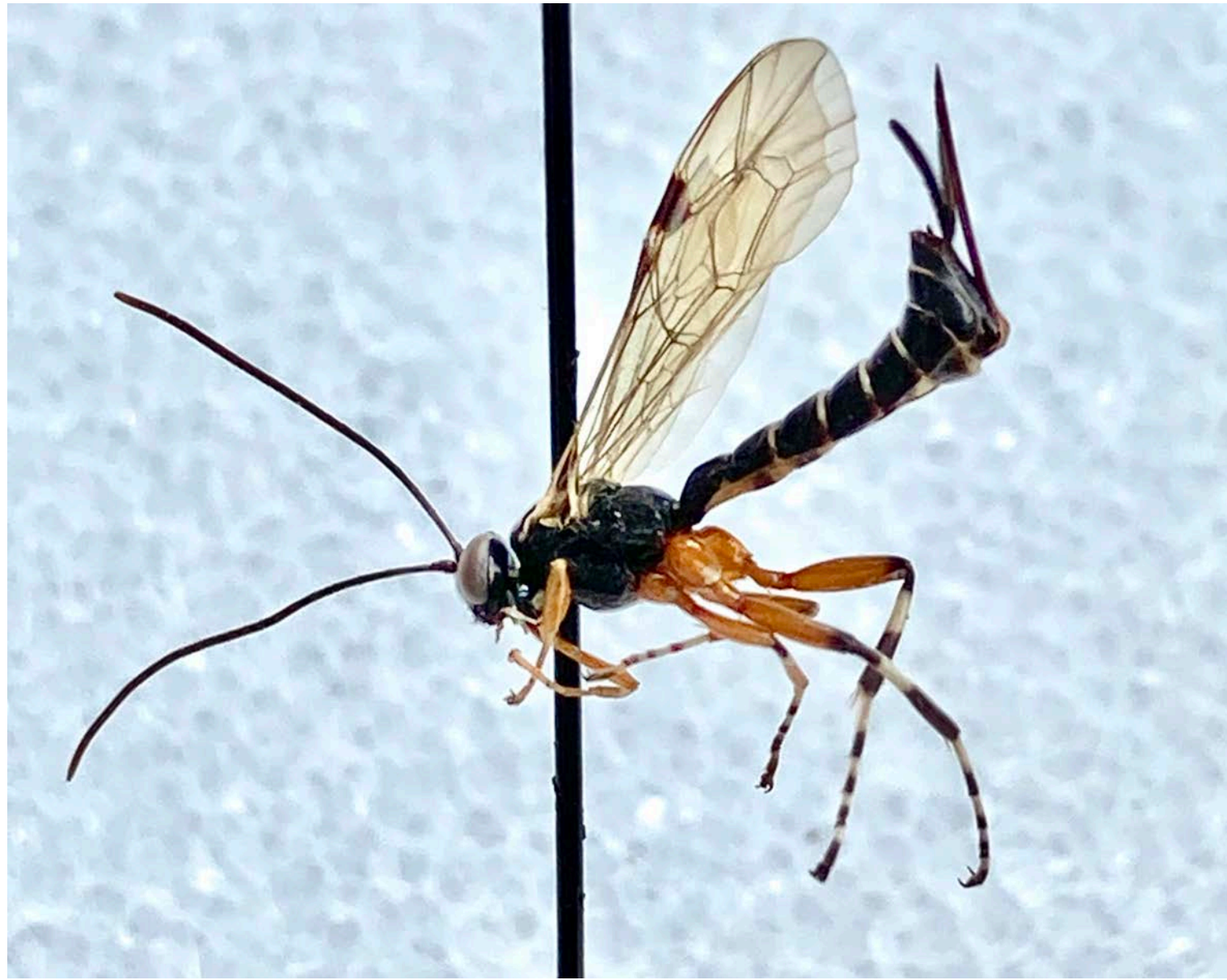
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Hymenoptera (parasitic wasps)



- Includes small to tiny species, some gnat-sized
- Slender body
- Nearly hairless
- Long antennae
- Slender petioles for abdominal flexibility
- Complex ovipositor variations
- Selected for stealthy attack on hosts
- Includes some of the most important bio-control species in agriculture

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- Slender body
- Nearly hairless
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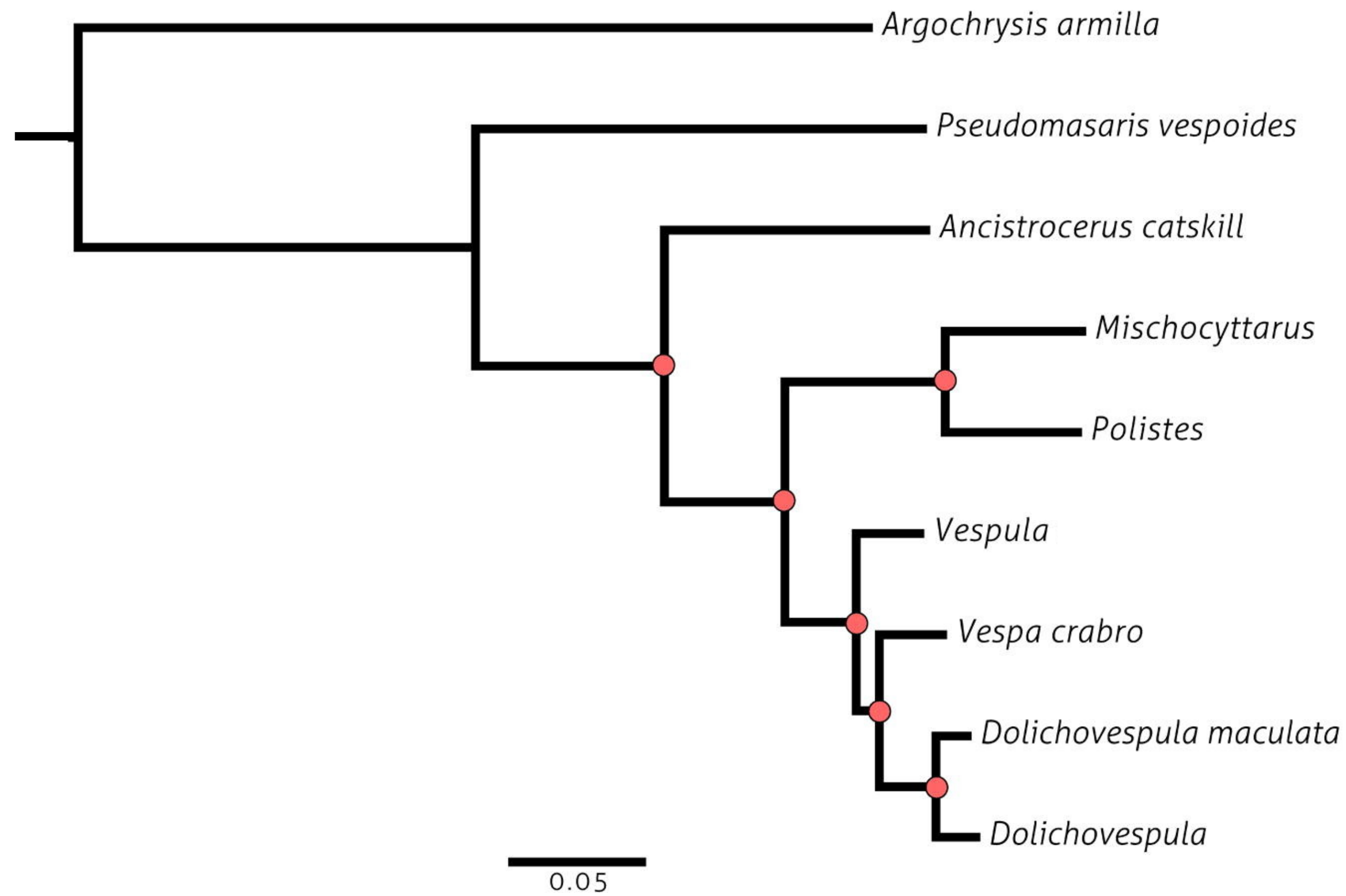
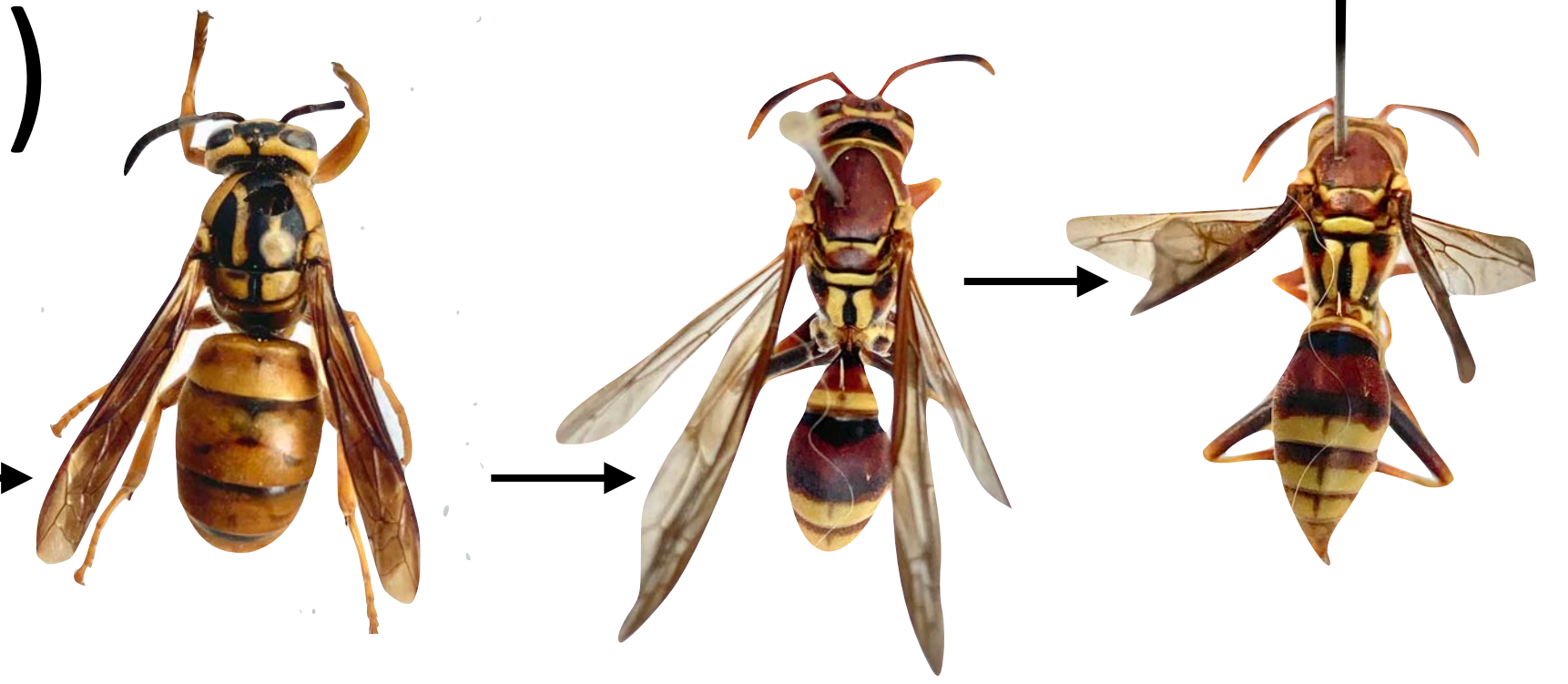


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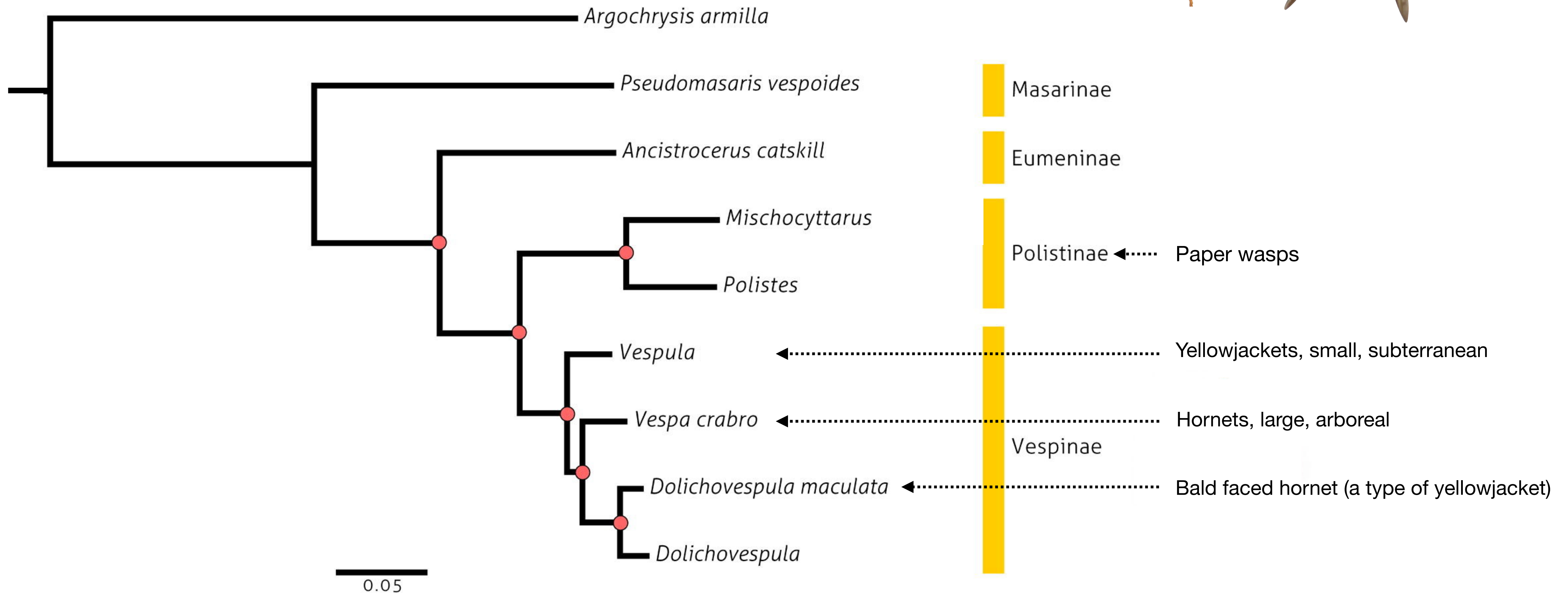
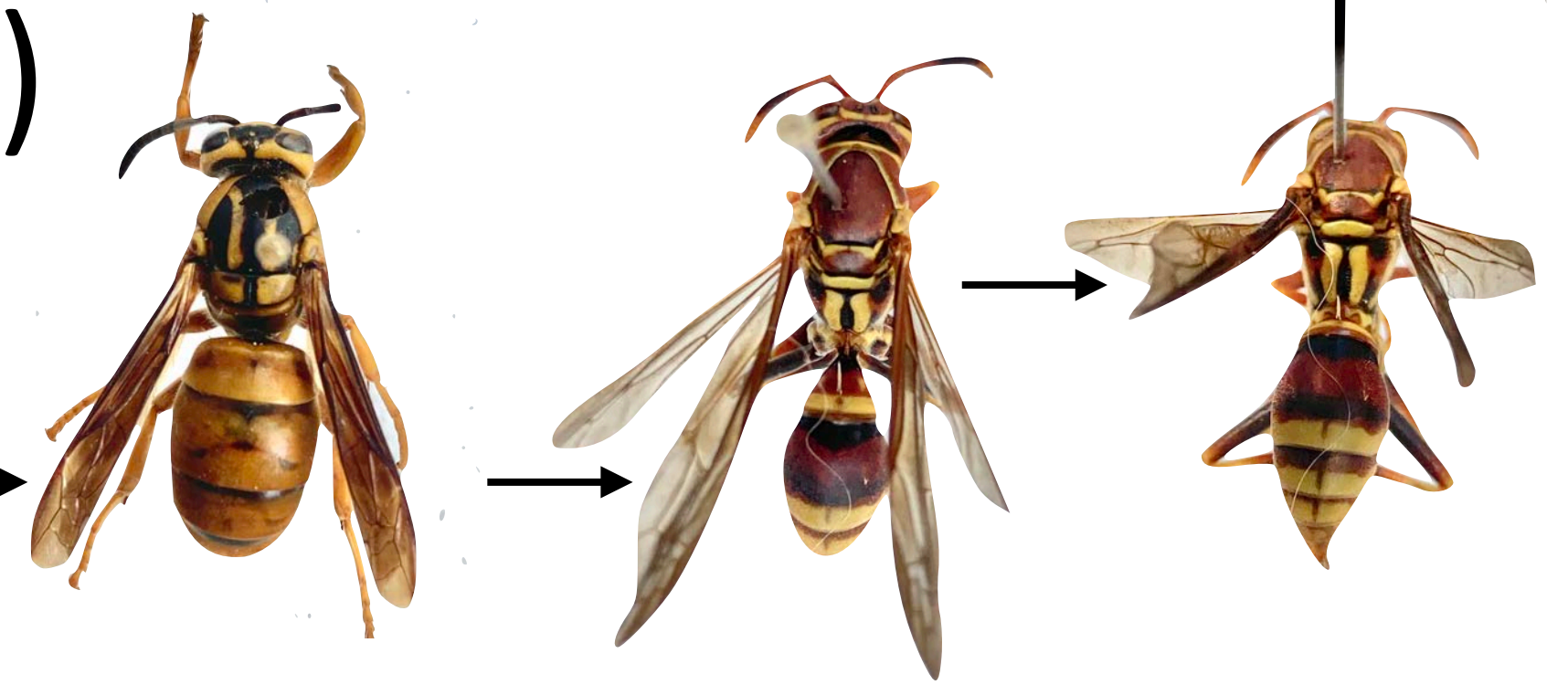
Hymenoptera (hunting wasps)

family Vespidae, longitudinally-folding wings



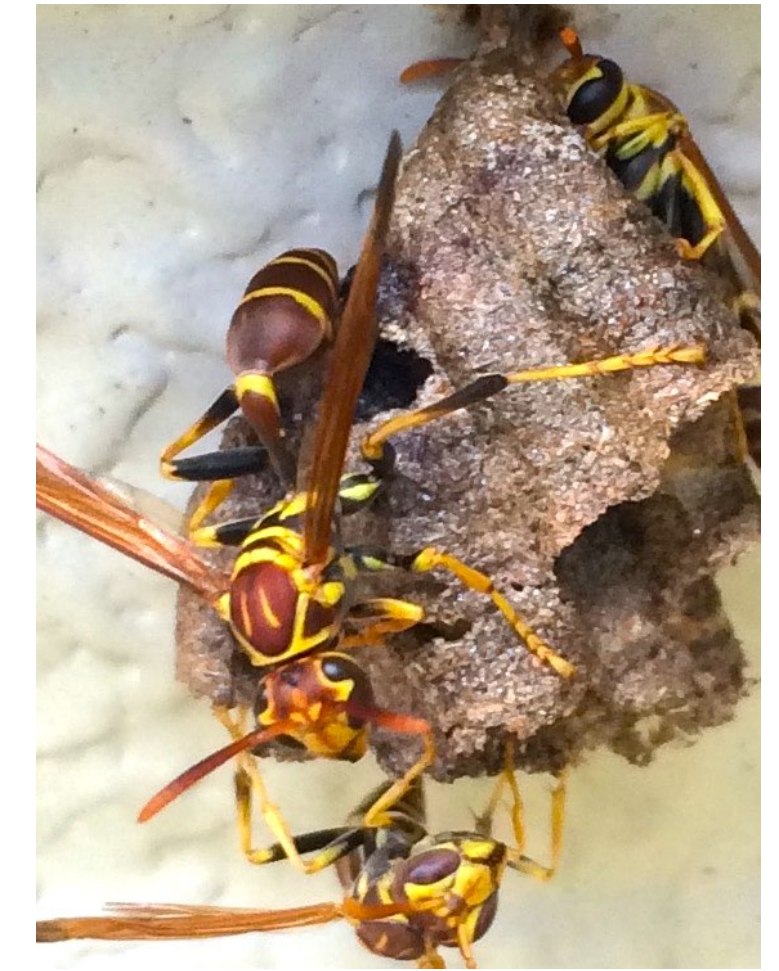
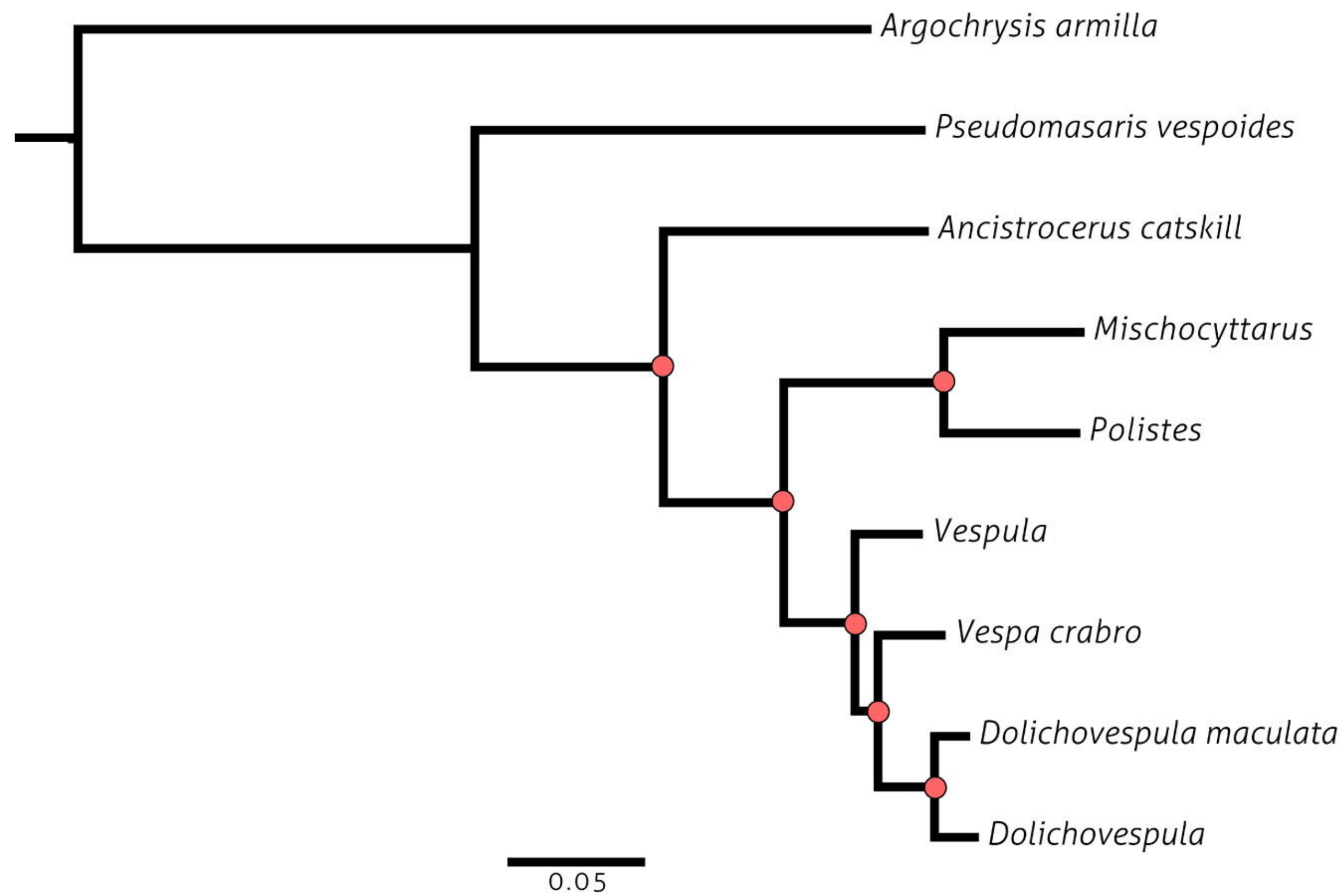
Hymenoptera (hunting wasps)

family Vespidae, longitudinally-folding wings



Hymenoptera (Paper wasps)

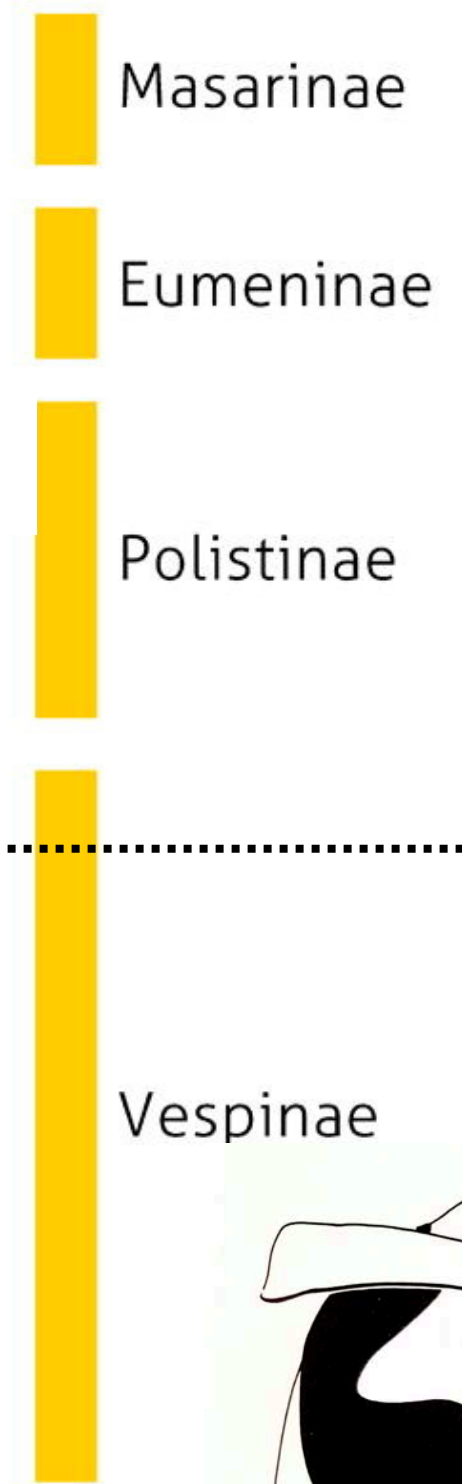
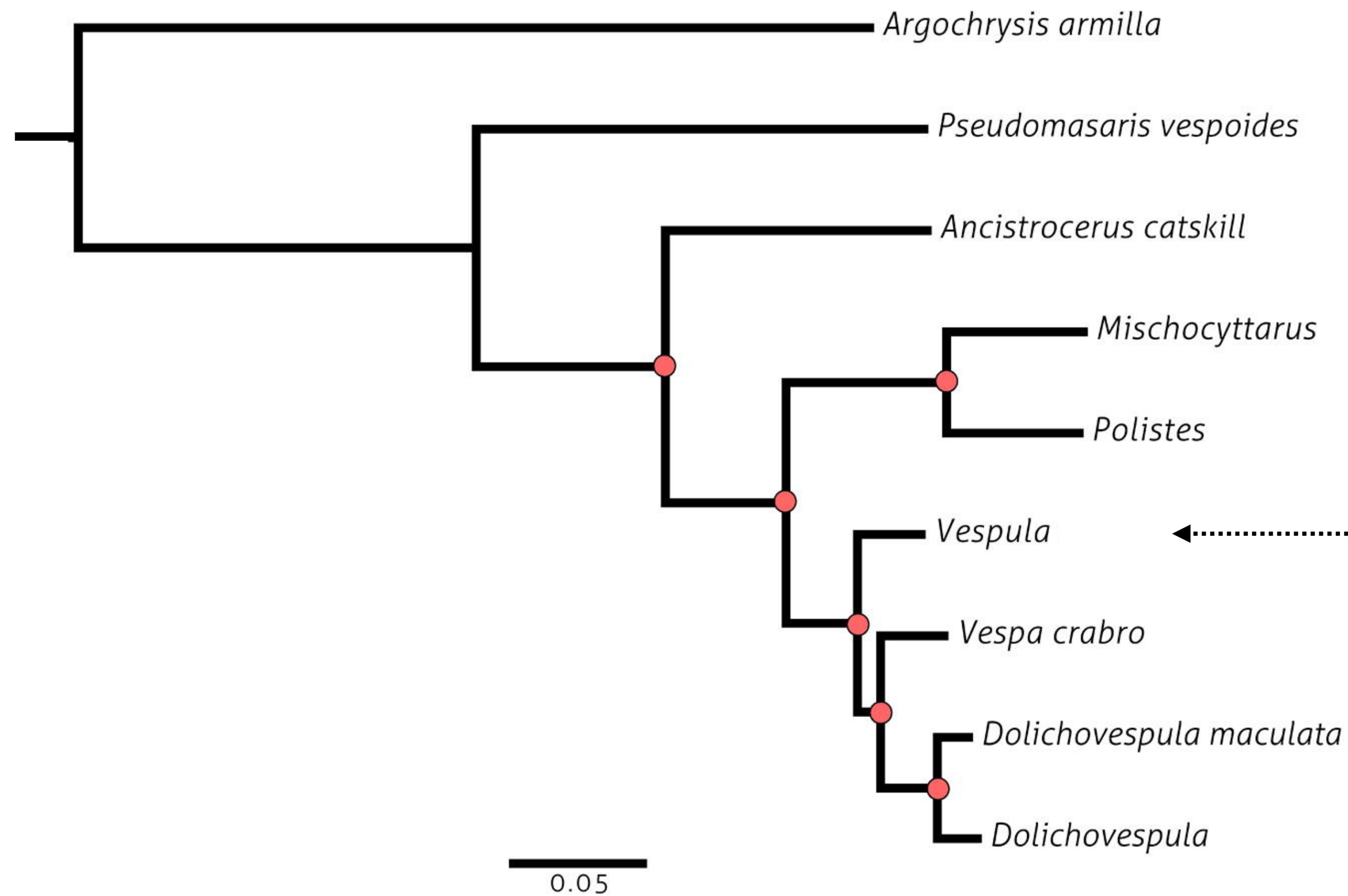
family Vespidae, longitudinally-folding wings



- Paper wasps
- Exposed paper nests
- Slender body
- Pronounced petiole

Hymenoptera (yellowjackets)

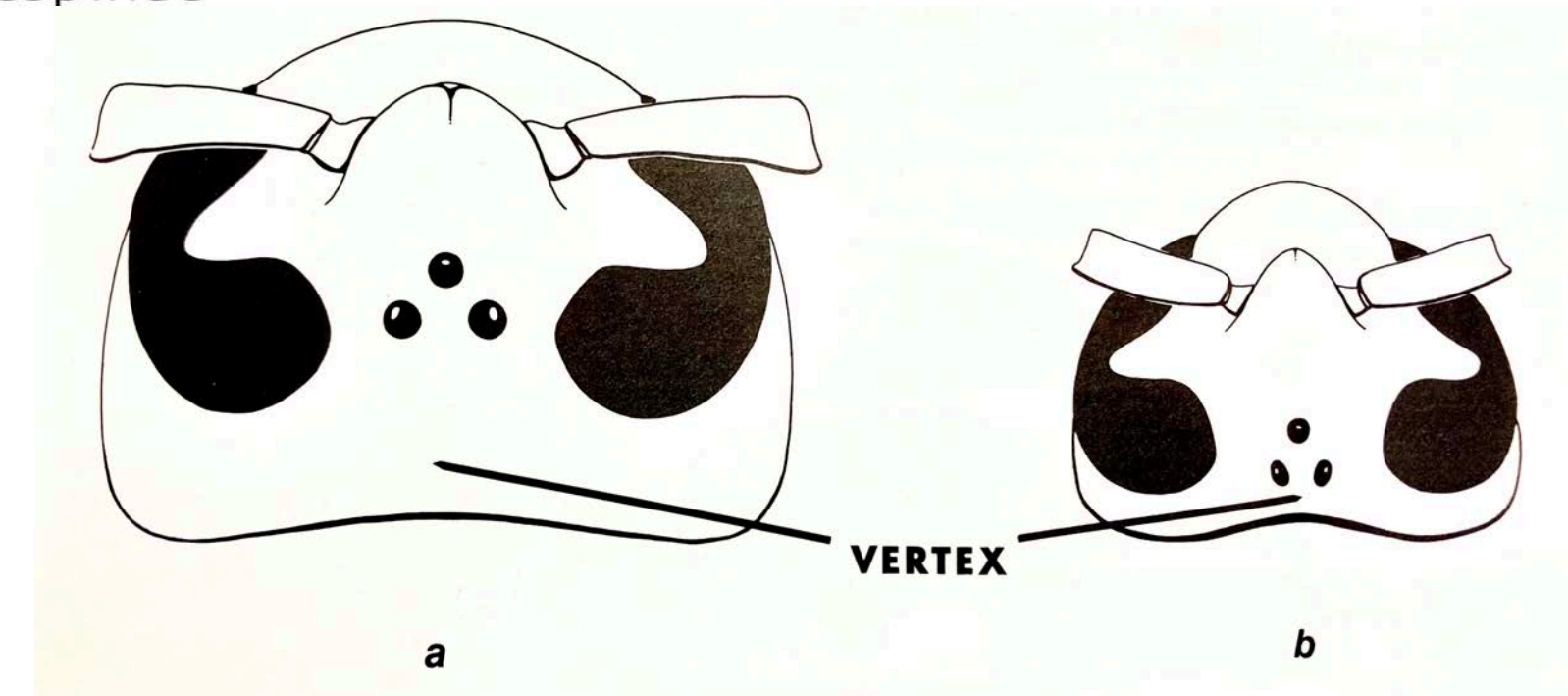
family Vespidae, longitudinally-folding wings



Common yellowjackets, *Vespula maculifrons*, *V. squamosa*, *V. vulgaris*

- Subterranean nests
- Robust body
- Nearly hairless
- Workers small, < 1 inch
- Space between ocelli and back of head narrow (b)
- Strong black/yellow striping

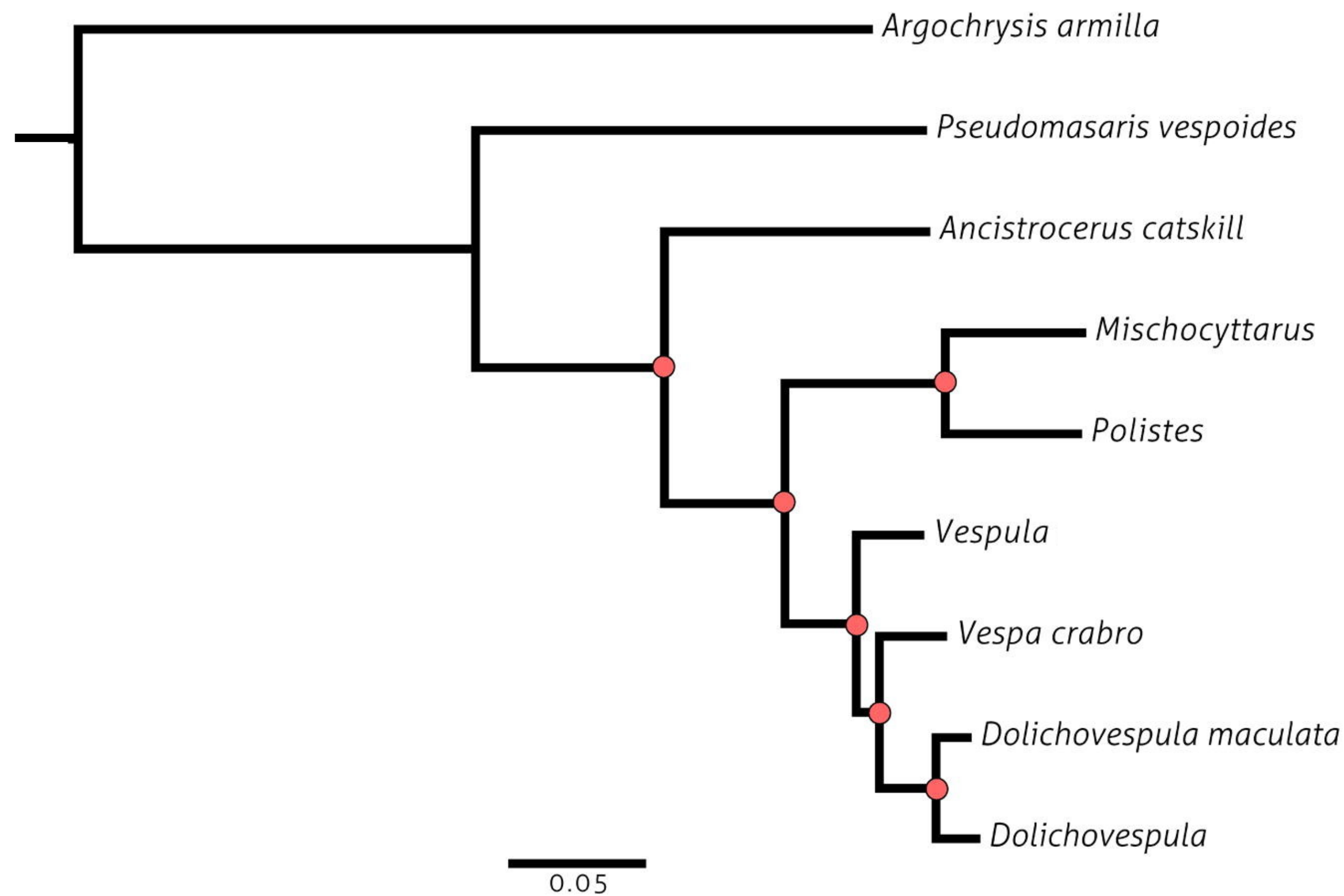
Yellowjackets, small, subterranean





Hymenoptera (yellowjackets)

family Vespidae, longitudinally-folding wings



Bald faced "hornet" (a type of yellowjacket)



1549628

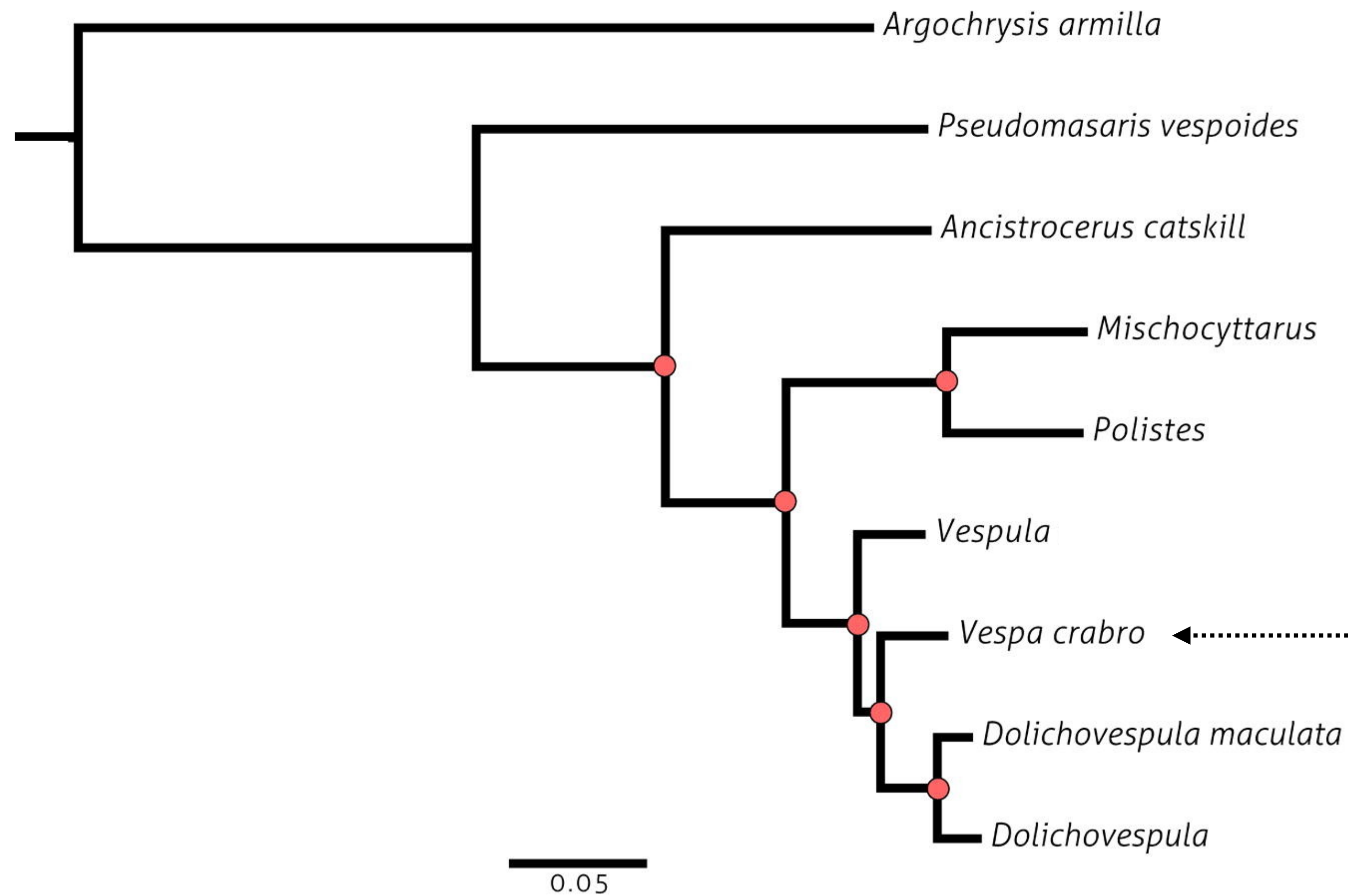




Hymenoptera (hornets)

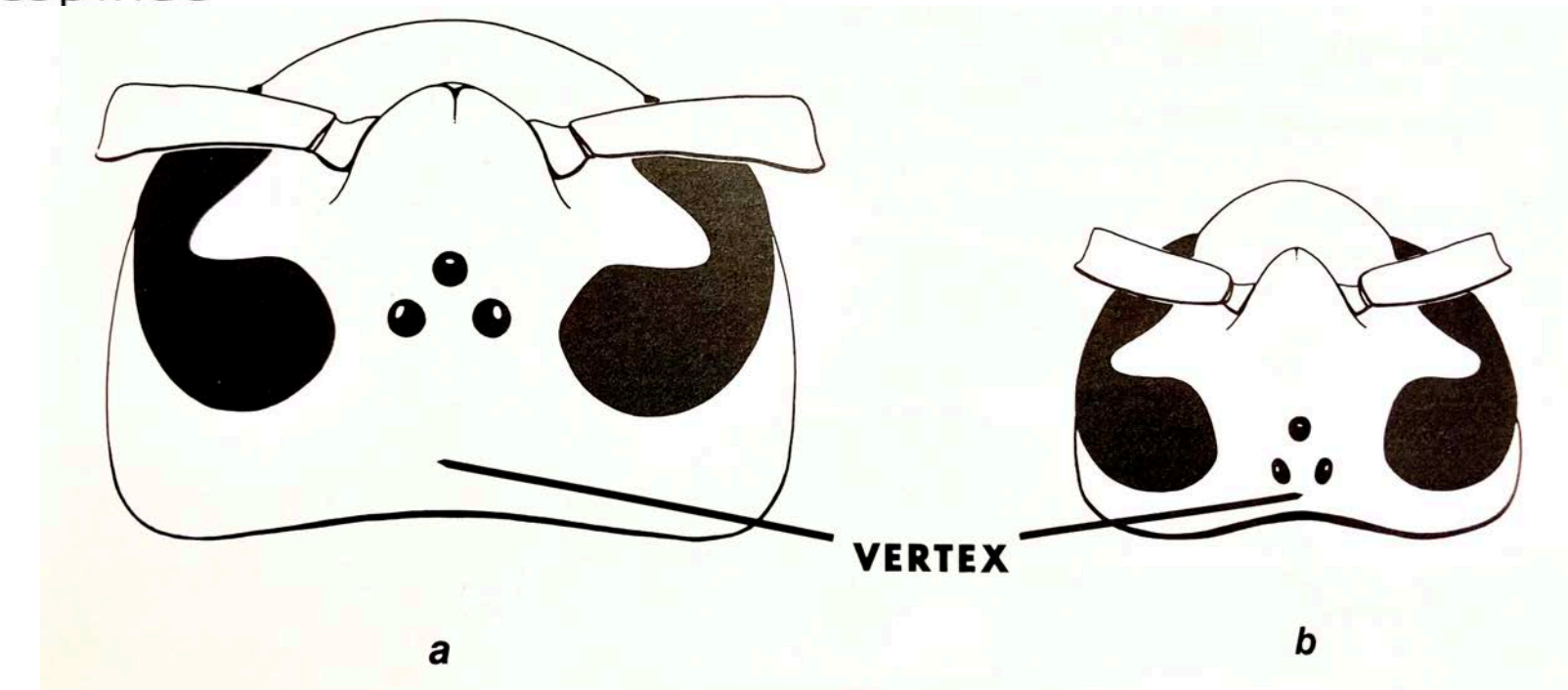


Jim Baker, North Carolina State University, Bugwood.org



- Masarinae
- Eumeninae
 - Arboreal nests
 - Robust body
 - Nearly hairless
 - Workers large, 1 inch or more
- Polistinae
 - Space between ocelli and back of head wide (a)
 - Coloration varied, orange, yellow, brown
 - Often attracted to lights at night
 - Includes important bee predators
 - V. mandarinia*

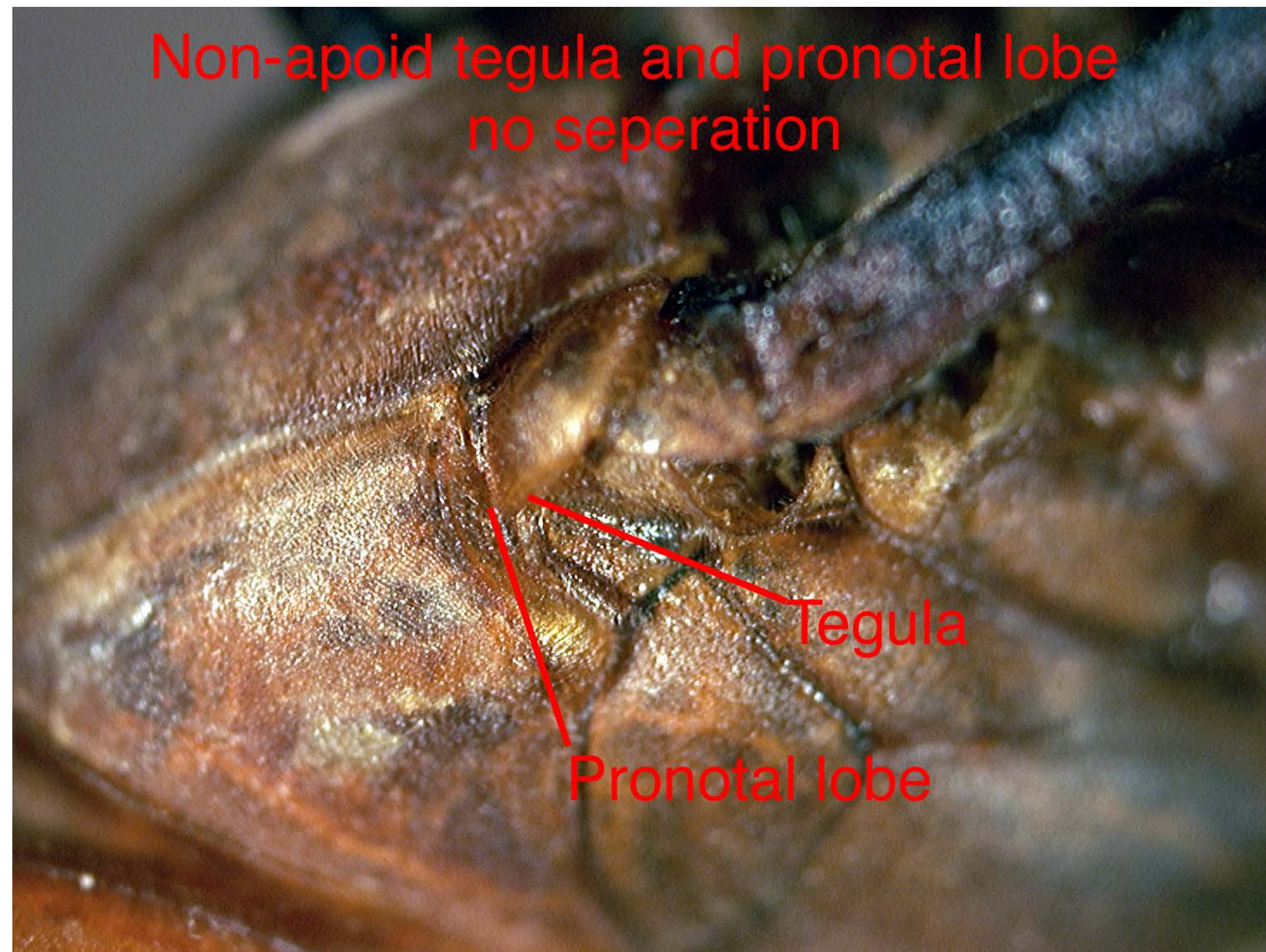
Vespinae Hornets, large, arboreal



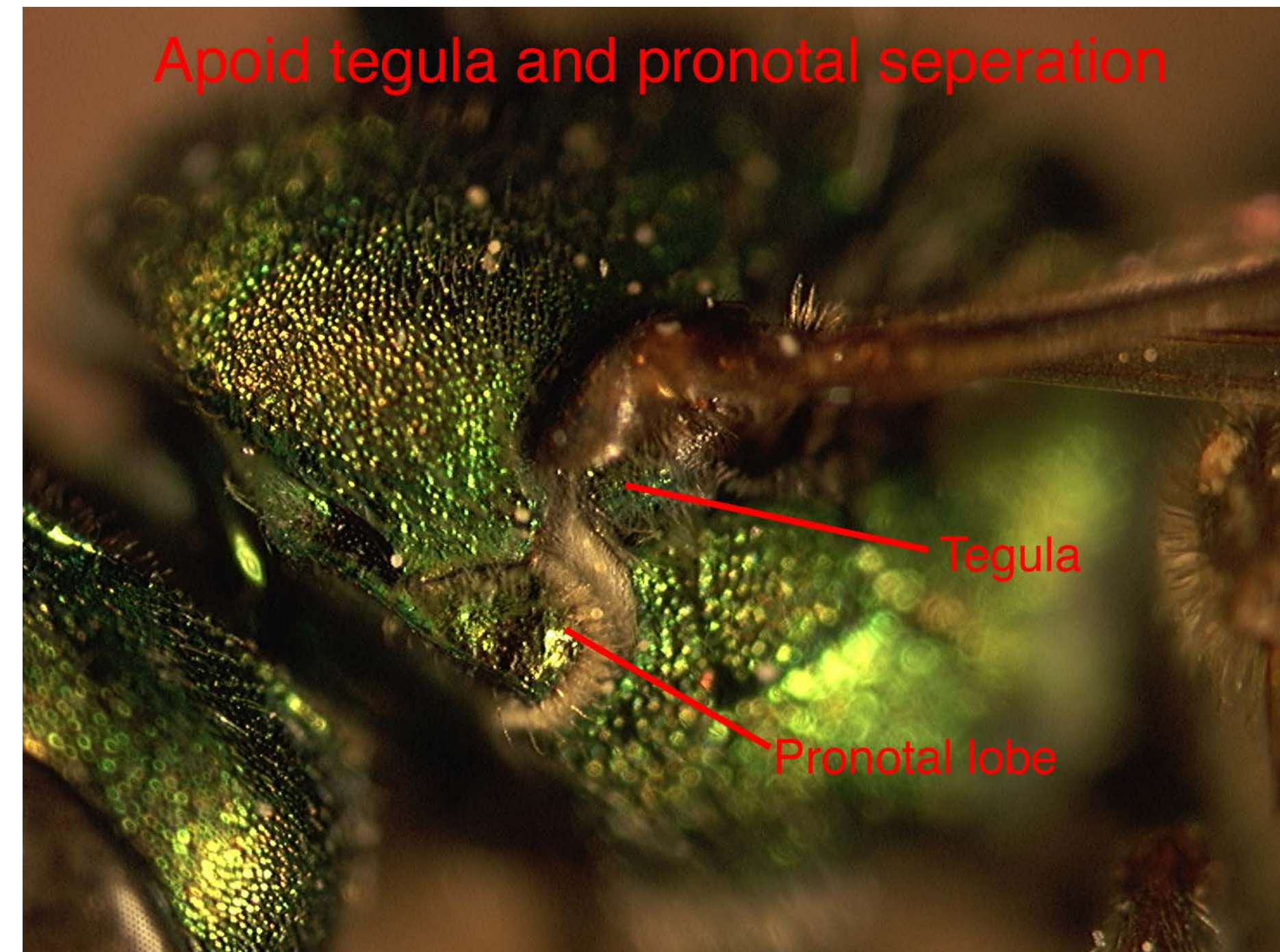
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Non-Apoid
Vespidae, hunting wasps
(many subfamilies)



Apoid
Superfamily (Apoidea)
including Sphecoid wasps and
all bees



Spheciform wasps

No scopae, few hairs on body,
wings don't fold longitudinally

Digging wasps



Spheciform wasps

Cicada killers



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Scopa

Hairs or leg processes for carrying pollen

Scopa under abdomen



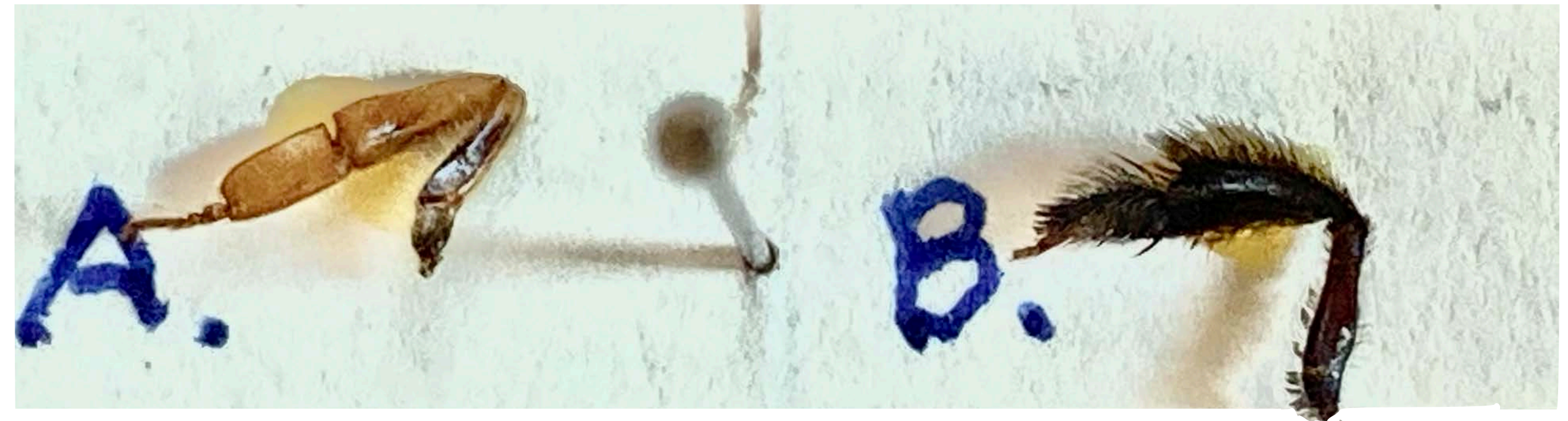
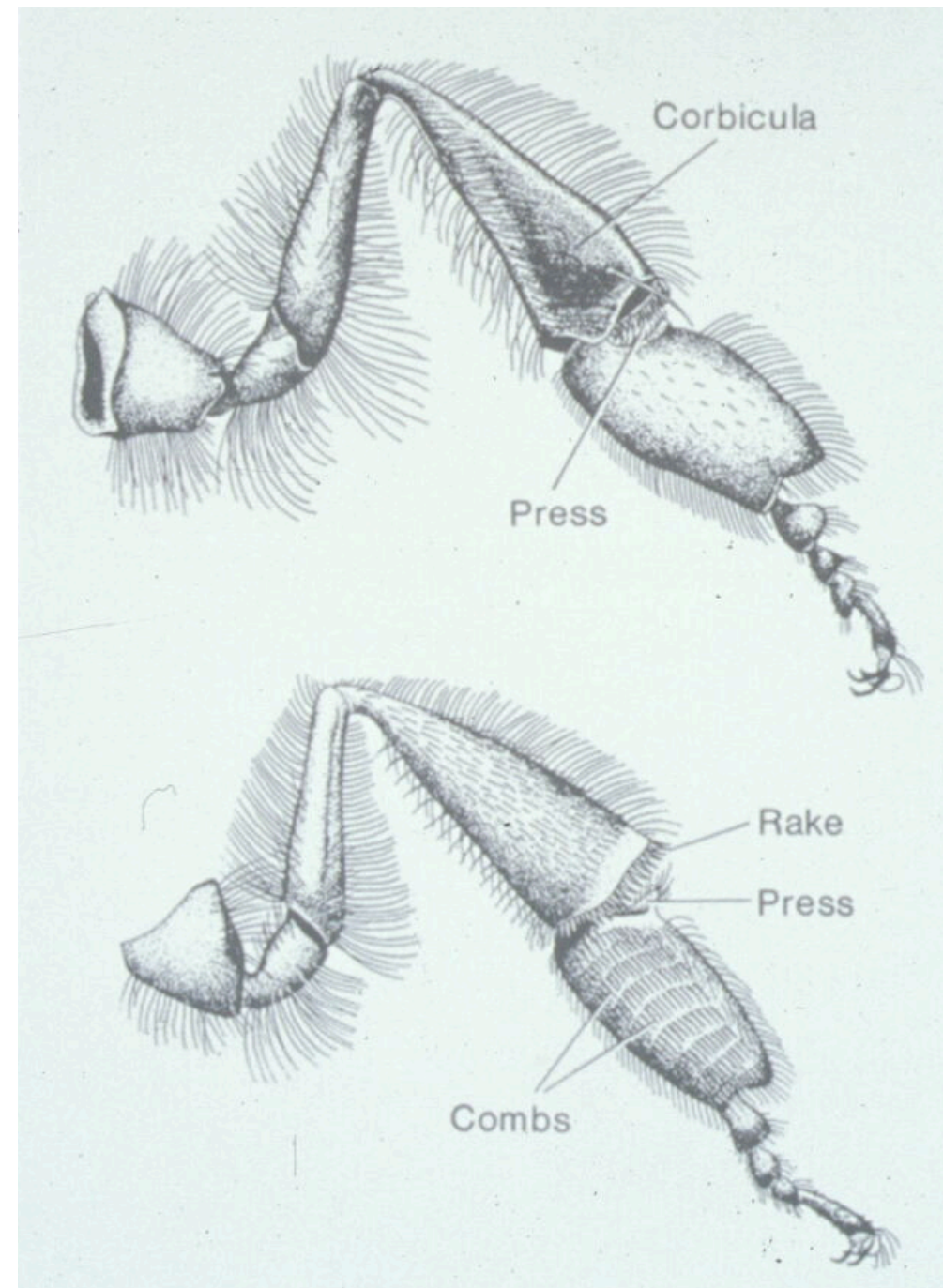
Scopae on legs

Decision tree for bees, near bees, or mimics

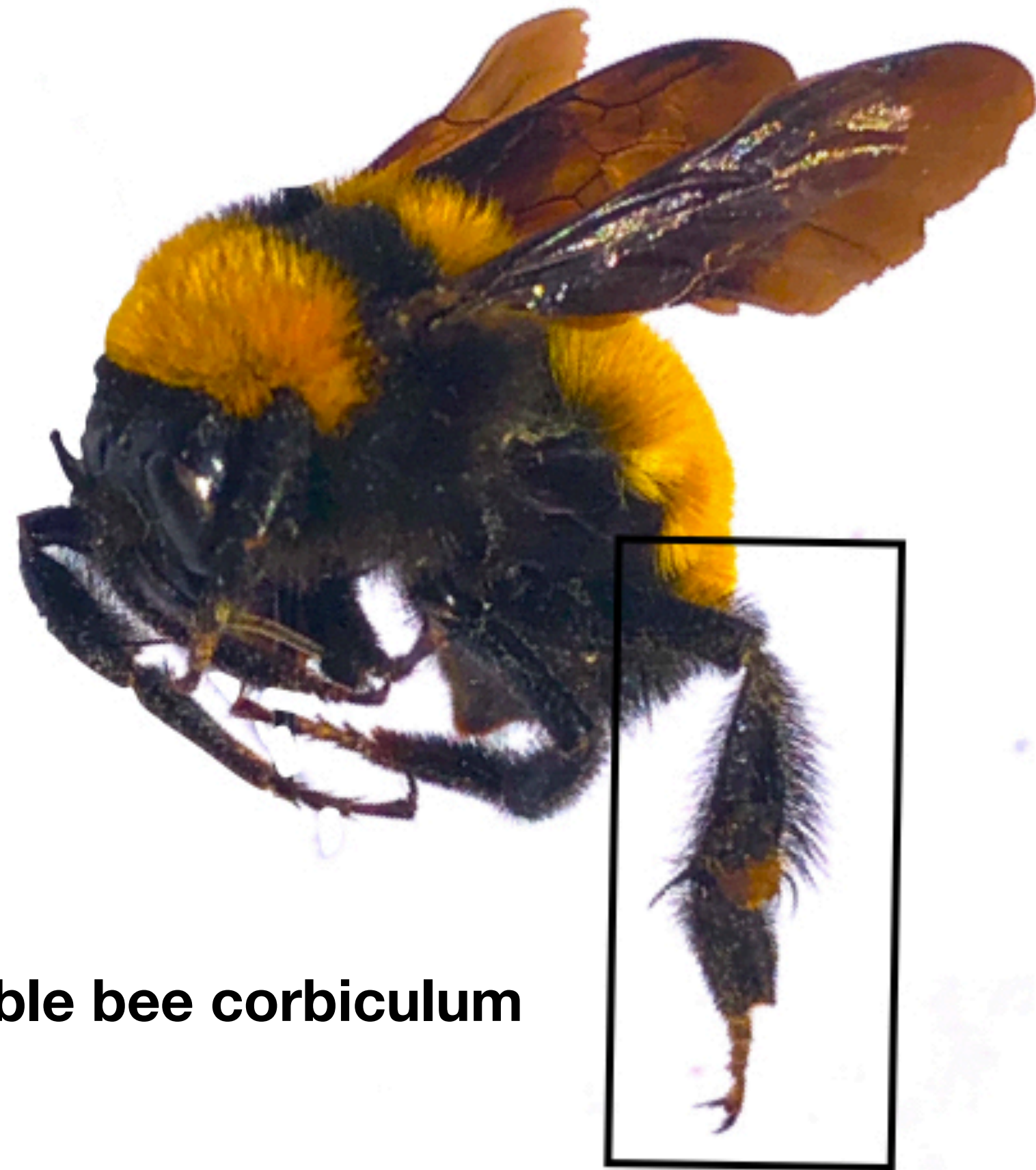
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Corbiculum

A leg scopa specialized with a concave tarsum, combs, and pollen press is a *corbiculum*



a: corbiculum of honey bee, b: non-corbiculate leg scopa



Bumble bee corbiculum



Honey bee corbiculum

Question 6 will include the following: honey bee worker, honey bee queen, honey bee drone, bumble bee, sweat bee, squash bee, carpenter bee, parasitic wasp, *Vespula* yellow jacket, *Polistes* paper wasp, *Vespa* hornet, cicada killer, leg with corbicula, leg without corbicula, mason bee, and 2 species of fly bee mimics.



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Squash bee

Honey bee

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Three submarginal wing veins

Scopa non-corbiculate

Scopa corbiculate

Scopa corbiculate

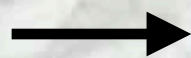
Scopa non-corbiculate

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Filamentous, not
elbowed, antennae



Three submarginal
wing veins

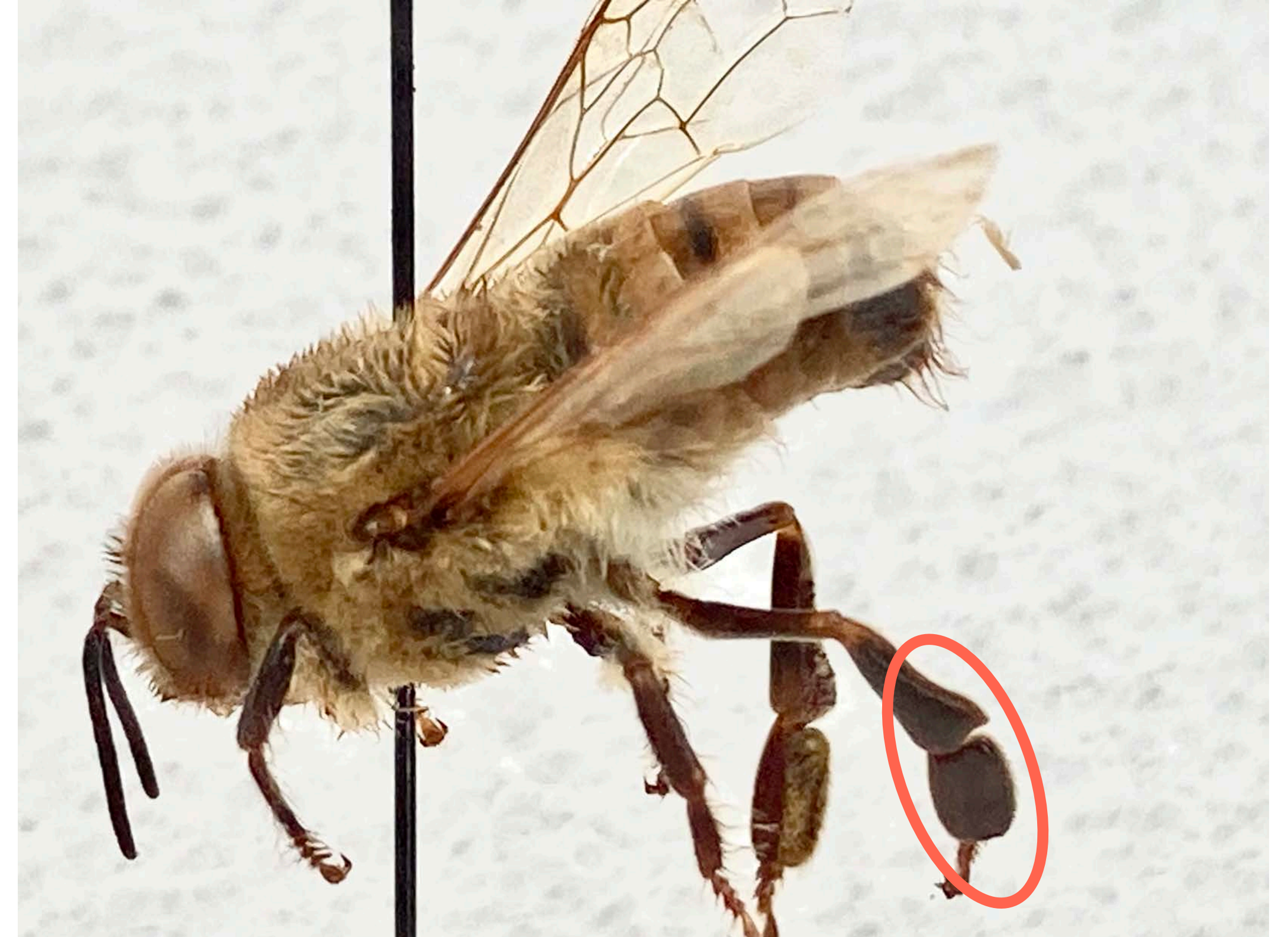
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Honey bee queen



Honey bee drone

Corbiculum has been secondarily lost in the queen, but not in the drone!

Question 6 will include the following: honey bee worker, honey bee queen, honey bee drone, bumble bee, sweat bee, squash bee, carpenter bee, parasitic wasp, *Vespula* yellow jacket, *Polistes* paper wasp, *Vespa* hornet, cicada killer, leg with corbicula, leg without corbicula, mason bee, and 2 species of fly bee mimics.



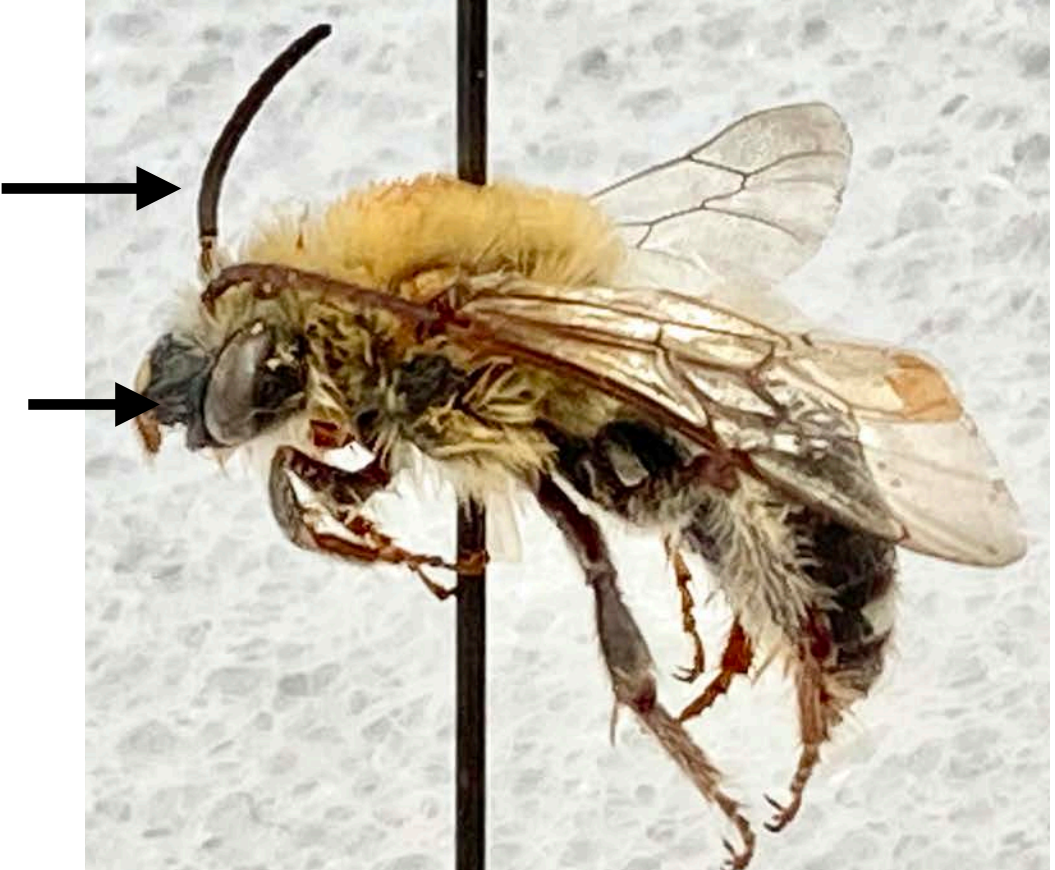
Elbowed antennae

Honey bee queen

Honey bee and bumble bee eyes comparatively narrow



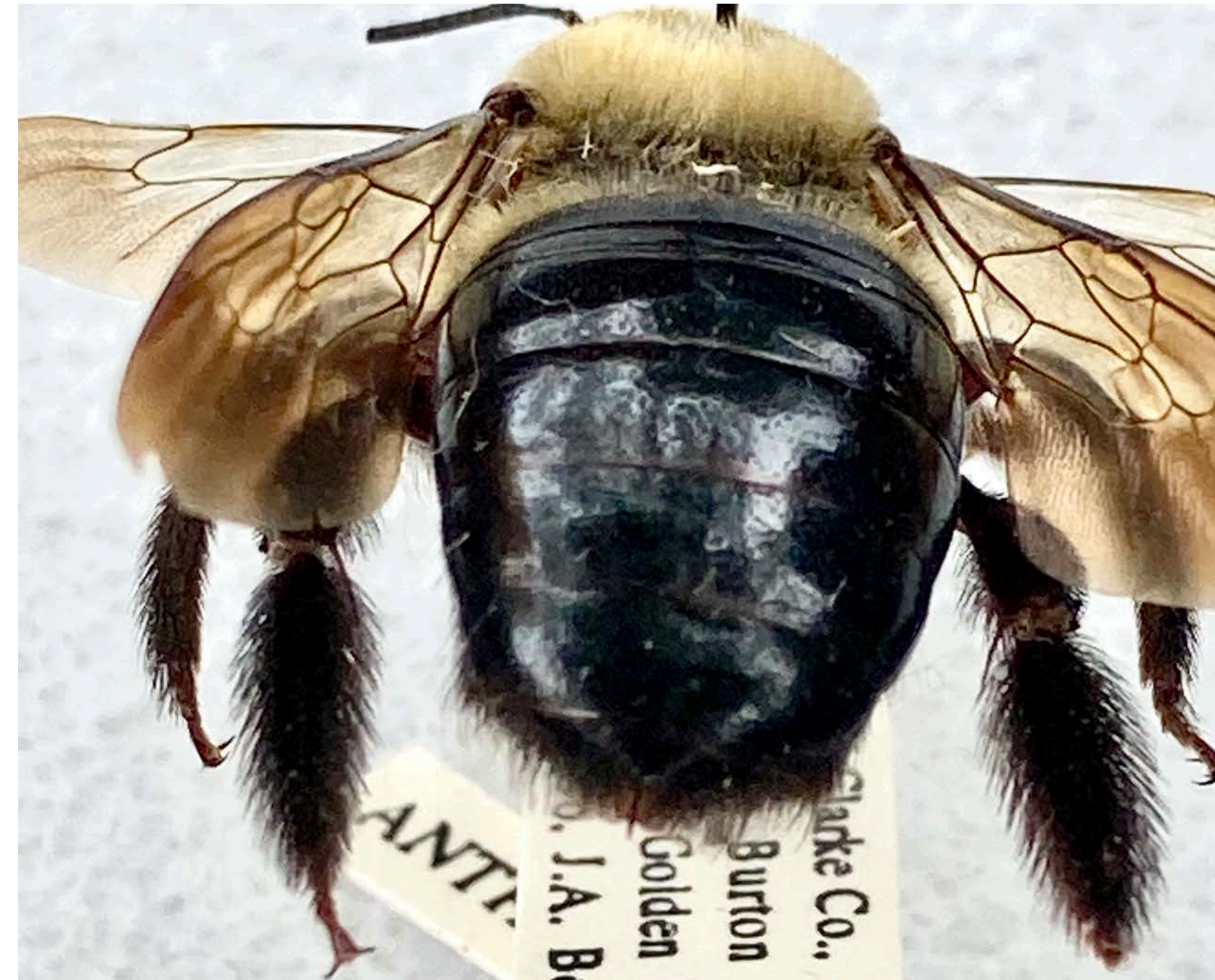
Many other species in Apidae have more rounded face, wider eyes, and filamentous, not elbowed, antennae



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Bumble bee queen

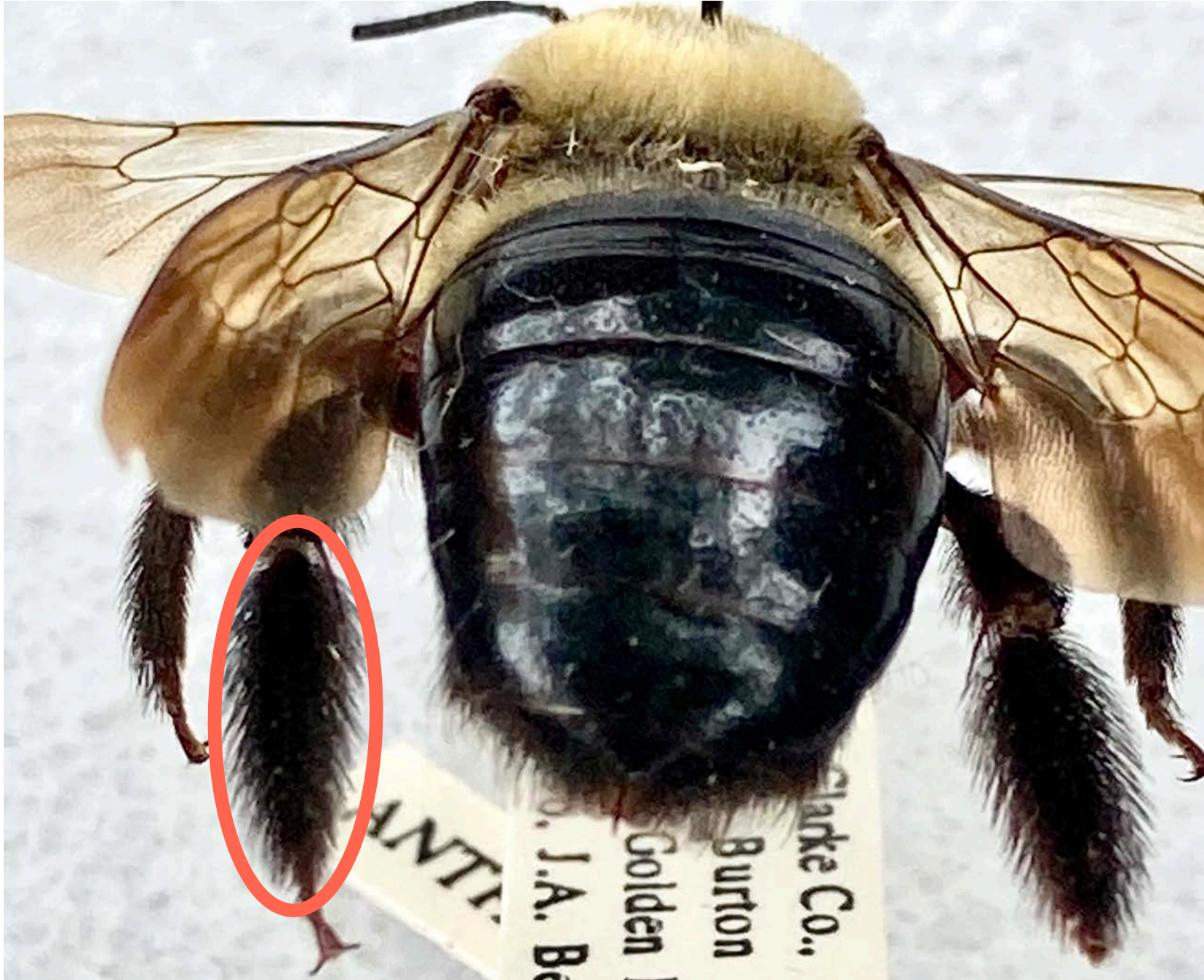


Carpenter bee

Question 6 will include the following: honey bee worker, honey bee queen, honey bee drone, bumble bee, sweat bee, squash bee, carpenter bee, parasitic wasp, *Vespula* yellow jacket, *Polistes* paper wasp, *Vespa* hornet, cicada killer, leg with corbicula, leg without corbicula, mason bee, and 2 species of fly bee mimics.



Bumble bee queen



Carpenter bee

Question 6 will include the following: honey bee worker, honey bee queen, honey bee drone, bumble bee, sweat bee, squash bee, carpenter bee, parasitic wasp, *Vespula* yellow jacket, *Polistes* paper wasp, *Vespa* hornet, cicada killer, leg with corbicula, leg without corbicula, mason bee, and 2 species of fly bee mimics.



Sweat bee

Question 6 will include the following: honey bee worker, honey bee queen, honey bee drone, bumble bee, sweat bee, squash bee, carpenter bee, parasitic wasp, *Vespula* yellow jacket, *Polistes* paper wasp, *Vespa* hornet, cicada killer, leg with corbicula, leg without corbicula, mason bee, and 2 species of fly bee mimics.

Rounded vein
on basal cell

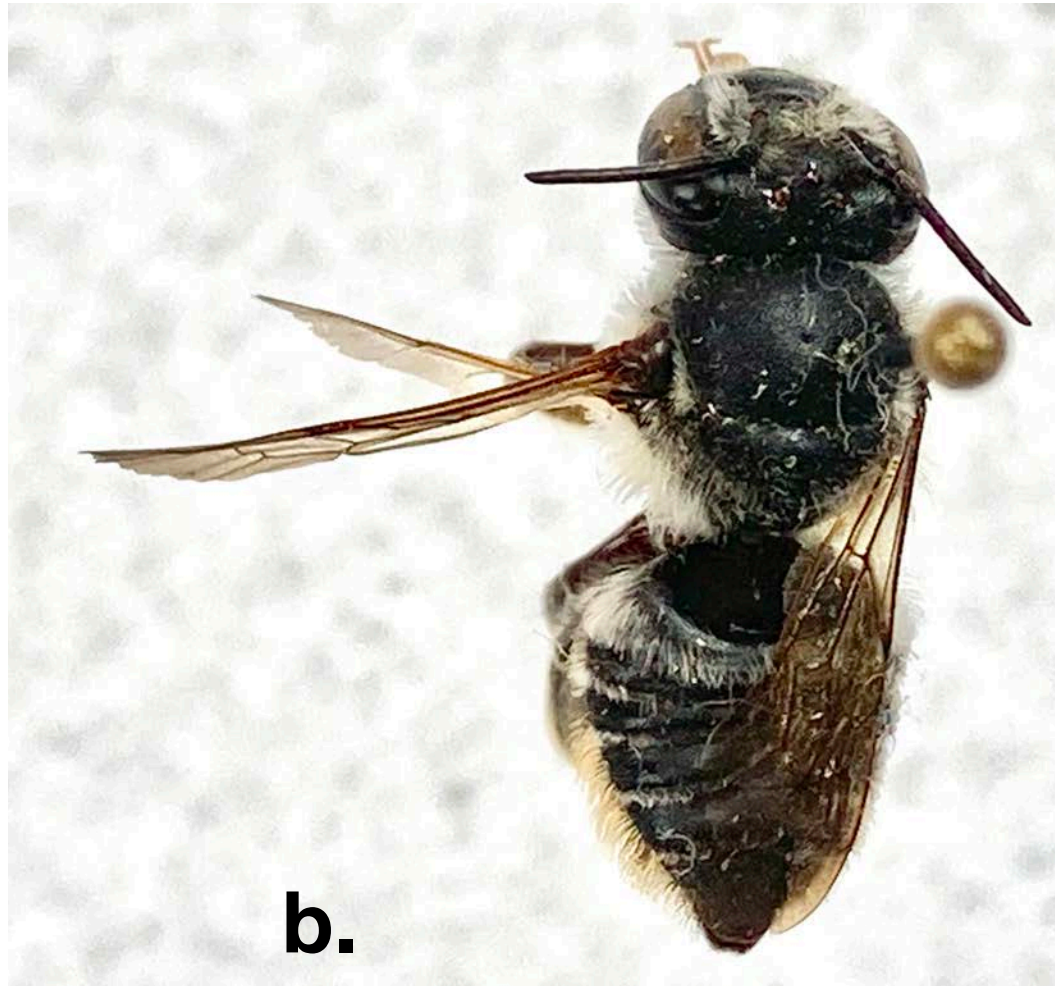


Sweat bee

Question 6 will include the following: honey bee worker, honey bee queen, honey bee drone, bumble bee, sweat bee, squash bee, carpenter bee, parasitic wasp, *Vespula* yellow jacket, *Polistes* paper wasp, *Vespa* hornet, cicada killer, leg with corbicula, leg without corbicula, mason bee, and 2 species of fly bee mimics.



a.



b.



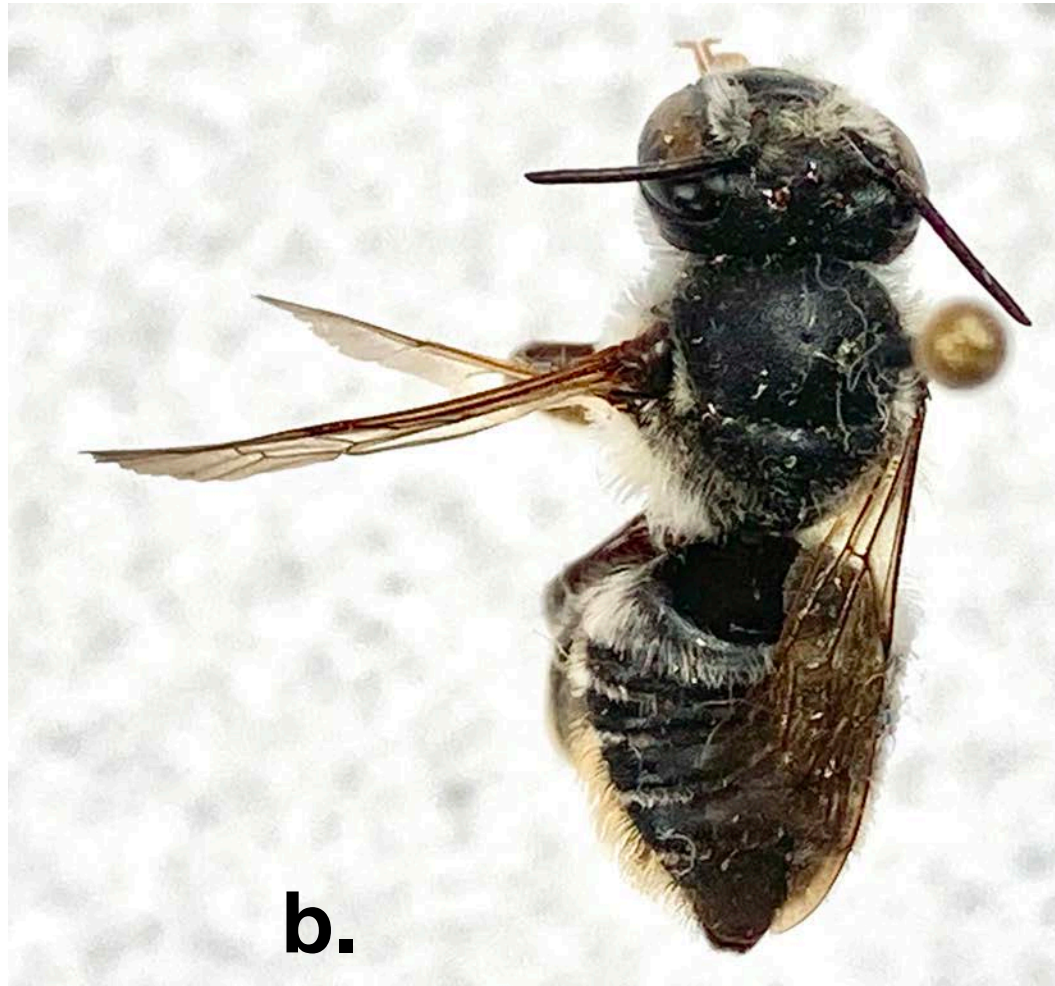
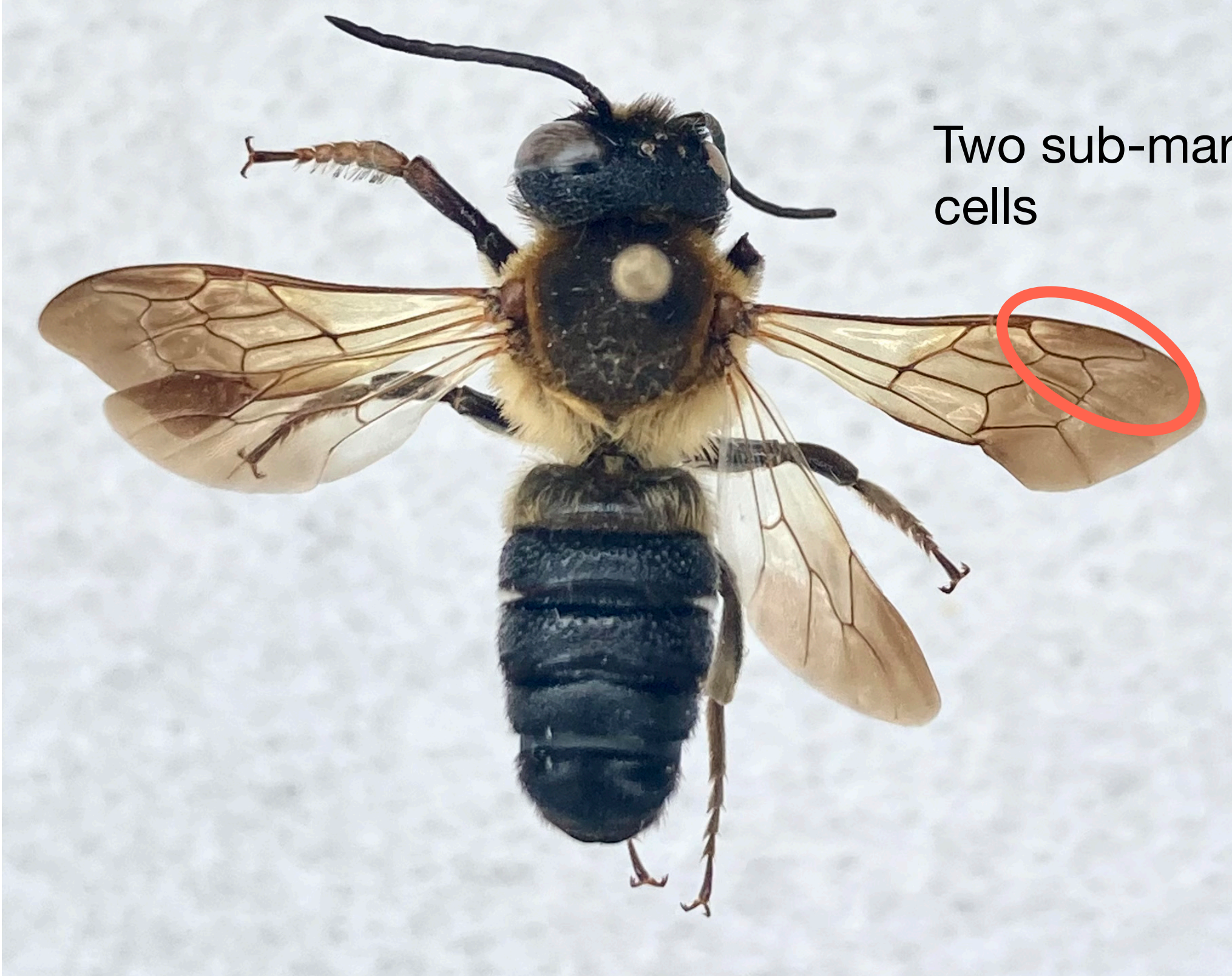
a.



b.

Mason bees

Question 6 will include the following: honey bee worker, honey bee queen, honey bee drone, bumble bee, sweat bee, squash bee, carpenter bee, parasitic wasp, *Vespula* yellow jacket, *Polistes* paper wasp, *Vespa* hornet, cicada killer, leg with corbicula, leg without corbicula, mason bee, and 2 species of fly bee mimics.



Ventral abdominal scopa common

Mason bees