Simple key to important thrips pests of Canadian greenhouses

Fifth edition

Created by:
Ashley Summerfield (Vineland Research and Innovation Centre) &
Dr. Sarah Jandricic (Ontario Ministry of Agriculture, Food and Agribusiness).

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Fully illustrated fifth edition (2024)

Authors

Ashley Summerfield, Senior Research Technician, Vineland

Sarah Jandricic, Greenhouse Floriculture IPM Specialist, OMAFA

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For further information regarding the development of this document, or use of photos or graphics contact Dr. Sarah Jandricic at Sarah.jandricic@ontario.ca or by phone at (905) 687-1277.

A truncated version of this key was published in *Insects*, 2024 (citation below) with only the necessary illustrations. This expanded version includes illustrations for every step, as well as additional advanced ID features for users with access to a compound microscope.

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vineland RESEARCH & INNOVATION CENTRE

Ontario

FLOWERS CANADA GROWERS

Who is this Key Designed For?

This key was designed for use by growers of, and IPM practitioners in, greenhouse floriculture, vegetable, fruit, and cannabis crops in Canada.

What is the purpose of this key?

For greenhouse growers/IPM practitioners to easily and properly identify species of thrips infesting their crops without necessitating the use of outside identification services.

Proper thrips identification is important because A) the presence of some thrips species can threaten exportation of plant material (*e.g.* Chili thrips), and B) effective control measures can vary considerably by species. For example, onion thrips and chrysanthemum thrips are both usually susceptible to Success (spinosad), while western flower thrips is not. On-site identification means that proper control or eradication measures can be implemented more quickly.

Collecting thrips for identification:

Collect thrips using plant taps from multiple areas (randomly selected) to get a picture of the entire thrips population in your greenhouse, or from specific areas of concern. Thrips can be tapped directly into a shallow container of soapy water to kill them. Or, thrips can be tapped into a container with a lid, which can be placed in the freezer for at least 30 min to kill the thrips.

Thrips are easiest to examine under the microscope when dead, but not dried out. Therefore, samples should be identified within the next 48h after collection so the samples do not desiccate.

Light coloured thrips can be identified to species on sticky cards, although some of the features may be more challenging to see. Dark coloured thrips are very difficult to identify on sticky cards so it is best to only try to identify them using specimens collected from plant taps.

How to use this key:

All features used in this key can typically be seen using a mid-quality dissection microscope. Your microscope will need to have a **maximum magnification level of at LEAST 45X**. To determine the maximum level of magnification on your microscope, take the highest number on the adjustable magnification dial (e.g. 4.5) and multiply it by the magnification of the eyepiece (usually 10X).

For each numbered step (1-15), pick one of the two possible choices that most resembles your specimen. This will indicate the species OR the next step you should jump to.

For proper identification, **ADULT (*i.e.* usually winged) thrips must be used**. If none of the thrips in the sample have wings, they may be a wingless species. In this case, choose the largest thrips in the sample which have large eyes, a distinct head, thorax and abdomen (see Fig. 1). Larval thrips will appear more "tube like" without distinctive body parts and have small eyes.

Figure 1. Thrips larva vs. adult thrips. Adult thrips must be positioned with their wings facing up to see identification features.

Position the thrips stomach side down so that the wings and eyes are facing up, with the head facing away from you. This is often easier to do with a small probe or fine paintbrush with the thrips floating in water (or 70% alcohol) in a Petri dish or other small clear container. Look at multiple specimens (minimum of 20) to confirm your identification for an infestation on a specific crop. To get a wider picture of your greenhouse population, at least 100 thrips should be identified.

NOTE: **This key is NOT comprehensive for all thrips species that may occur in Canada** (or that may be found on imported on plant material), but includes those **most likely** to be encountered in floriculture and/or vegetable greenhouses. If proper species identification is in doubt, please contact an OMAFA IPM extension specialist, or the National Identification Service.

Who was this key designed by?

This key was a collaboration between Dr. S. Jandricic at the Ontario Ministry of Agriculture, Food and Agribusiness (OMAFA) and A. Summerfield at the Vineland Research and Innovation Centre in consultation with Eric Maw of the Canadian National Collection of Insects, Arachnids and Nematodes.

Where to find more information:

To see photos of the most common pests found in greenhouses, along with descriptions of their damage and host crops check out our article in Greenhouse Canada:

https://www.greenhousecanada.com/meet-the-new-thrips-on-the-block/

If you are looking for more detailed keys or those that cover more species, there are several keys available online:

- Cluever, J.D., Smith, H.A. 2017. A photo-based key of thrips (Thysanoptera) associated with horticultural crops in Florida, Florida Entomologist, 100(2): 454-467.
    - https://journals.flvc.org/flaent/article/view/87973
- Key to eleven species of thrips found on flowers and foliage, NC State Extension
    - https://content.ces.ncsu.edu/insect-and-related-pests-of-flowers-and-foliage-plants/thrips-found-on-flowers-and-foliage
- Hoddle MS, Mound LA, Paris DL. 2012. Thrips of California. CBIT Publishing, Queensland.
    - https://keys.lucidcentral.org/keys/v3/thrips_of_california/Thrips_of_California.html

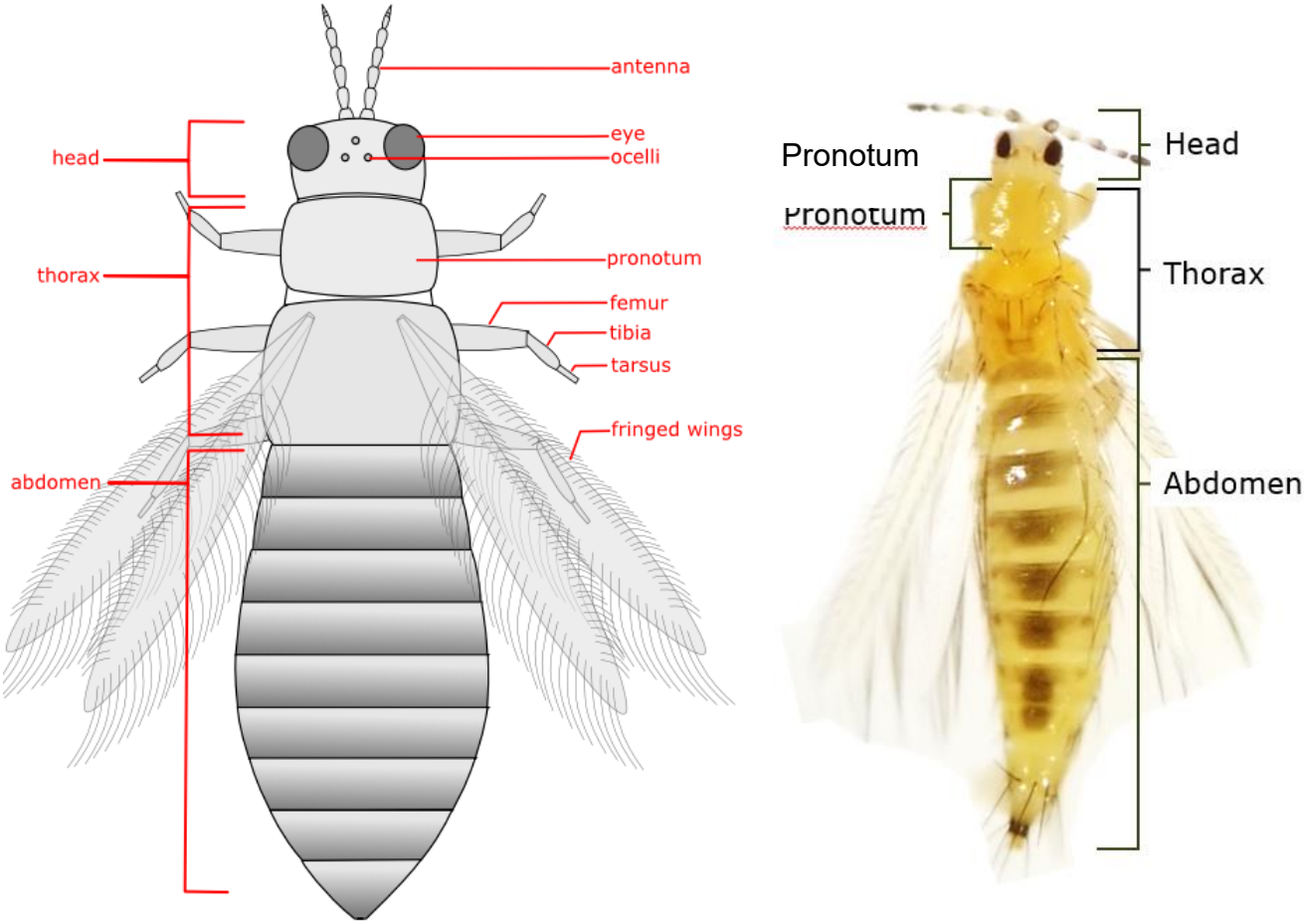


Figure 2. *General anatomy of an adult thrips and important anatomical features used for identification in this kev.*

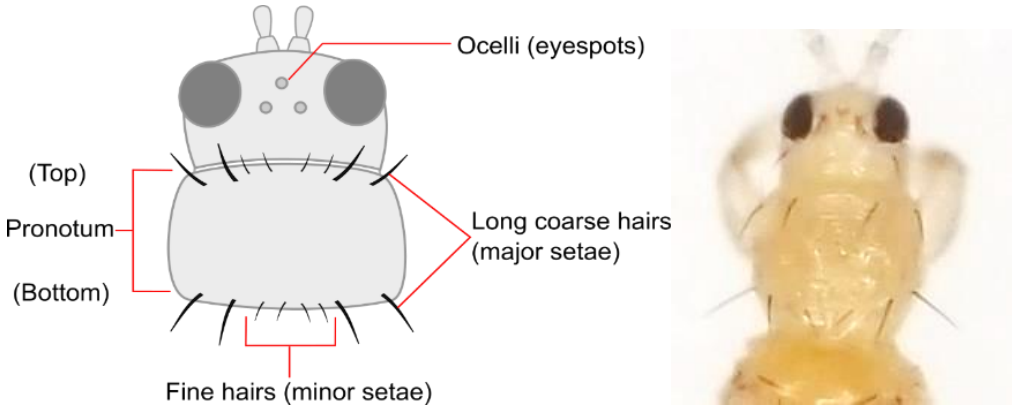


Figure 3. *Close-up of features on the head and pronotum. Minor setae usually not visible under a dissection microscope for most thrips species.*

Identification key

This key works best with loose specimens. Identifying thrips on sticky cards is not recommended as the colours will look different and important features can be difficult or impossible to see. If you are having difficulty ID-ing samples on sticky cards, collect specimens directly from the crop instead.

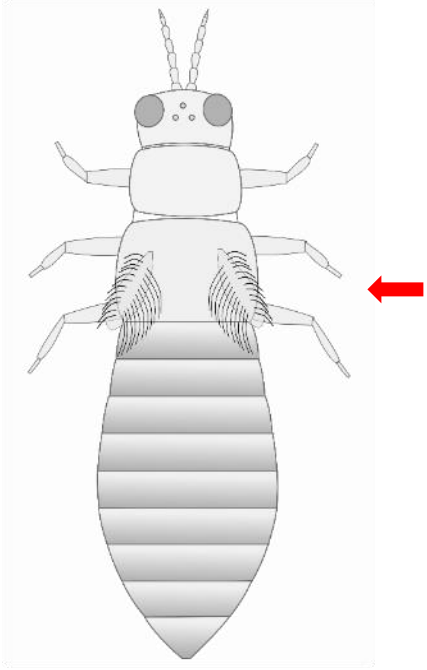
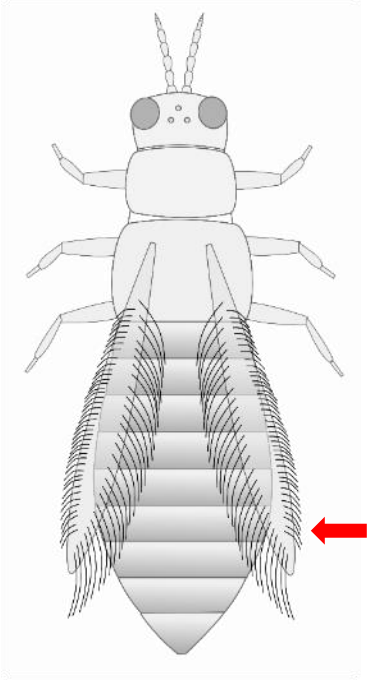
STEP 1.

	
a. Head and pronotum light tan or yellow; abdomen can be tan, yellow, light to medium brown, or pale with brown patches: (GO TO STEP 2)	b. Head, pronotum, and abdomen all brown to black in colour; head and pronotum may be light brown, dark tan, medium or dark brown, but never light yellow; head and pronotum may or may not be lighter than the abdomen: (GO TO STEP 7)

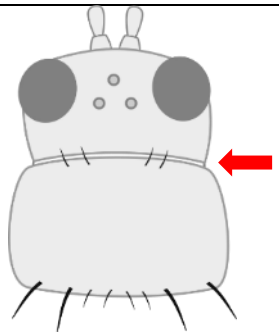
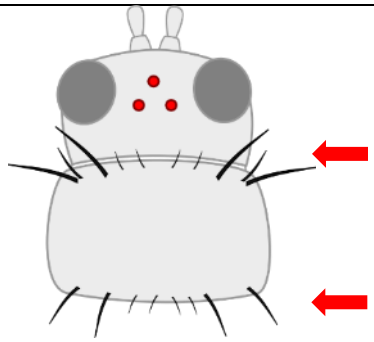
Note: if your thrips in question seems to be intermediate between light and dark, key a few samples out following Step 2, then Step 7, and see which makes more sense in terms of subsequent features given in the key.

LIGHT COLOURED THRIPS

STEP 2.

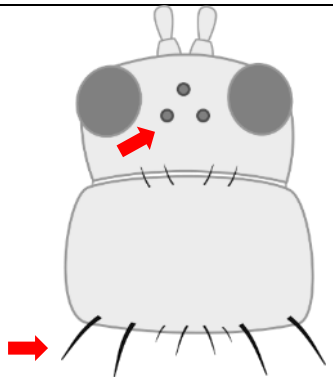
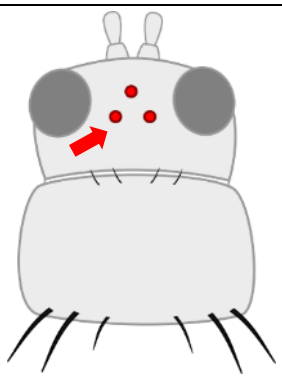
	
a. Very short wings, shorter than the width of the body: ***Thrips nigropilosus* (chrysanthemum thrips),** wingless form. Both winged and wingless forms may be present in the same population.	b. Long fringed wings extending nearly the full length of the body: (GO TO STEP 3)

STEP 3.

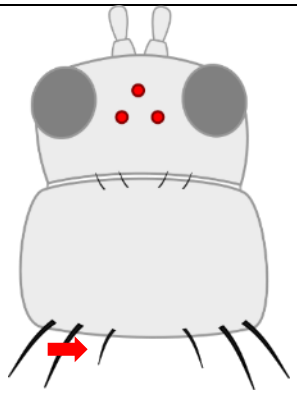
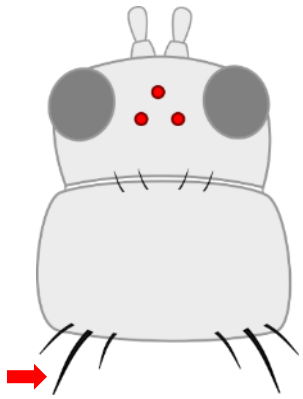
	
a. No long coarse hairs on the top of pronotum; bottom of pronotum may or may not have long coarse hairs; ocelli may or may not be red: (GO TO STEP 4)	b. Top of pronotum has 2 pairs of long coarse hairs that are roughly equal in length; ocelli are red: ***Frankliniella occidentalis*** **(western flower thrips)**[1] or may be another *Frankliniella species.*

[1] In Ontario greenhouses, the **majority of thrips you are likely to encounter will be *F. occidentalis*.** However, specimens with coarse hairs on the top of the pronotum may also be other *Frankliniella* species such as *F. tritici, F. bispinosa,* or *F. schultzei* (pale forms). Differentiating between the other *Frankliniella* is generally of little importance, as these species are of **low pest importance in greenhouse crops**. To determine conclusively if your specimens are western flower thrips (*F. occidentalis*), you can see the "Advance Features" section of this key – these steps require a compound microscope and advanced identification skills.

STEP 4.

	
a. Ocelli grey; 2 pairs of long coarse hairs on the bottom of the pronotum: ***Thrips tabaci*** **(onion thrips)**	b. Ocelli red; bottom of pronotum may or may not have long coarse hairs: (GO TO STEP 5)

STEP 5.

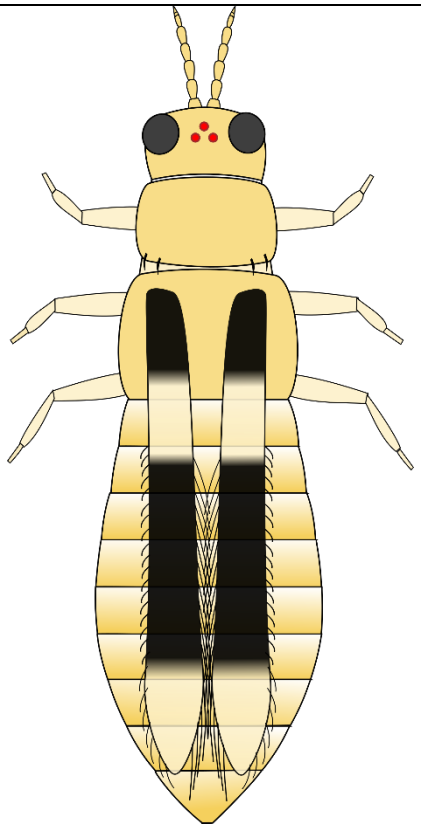
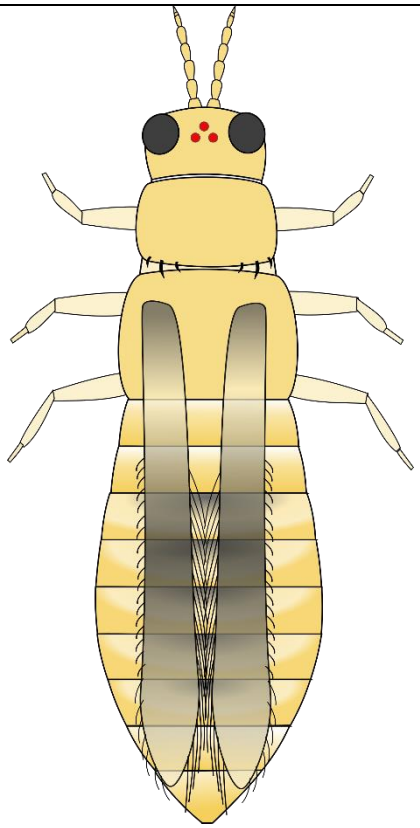
	
a. Three pairs of long coarse hairs on the bottom of the pronotum, outer two pairs distinctively longer than those in the middle; wings are pale or absent; foliar feeding damage typically on lower leaves: Most likely ***Thrips nigropilosus*** **(chrysanthemum thrips)**[2], winged form: present throughout North America, though does not often cause outbreaks.	b. Coarse dark hairs on the bottom of the pronotum are short and may be difficult to see. Small body size compared to other thrips species. Wings are grey or black; usually found on tropicals: (GO TO STEP 6)

[2] Could also be male *Thrips parvispinus* or *T. setosus* - **see Step 11** for identification of females if dark coloured thrips are found in the same population.

If found on crops other than chrysanthemum and gloxinia may be *T. palmi***, which is not present in Canada but may be intercepted on plant material imported from tropical regions including Florida, Mexico, and Central America. Differentiating between *T. nigropilosus* and *T. palmi* requires advanced identification skills and compound microscope.

**If you think you may have found a species not usually present in Canada you should consult an OMAFA IPM specialist to verify the identification and discuss management options.

STEP 6.

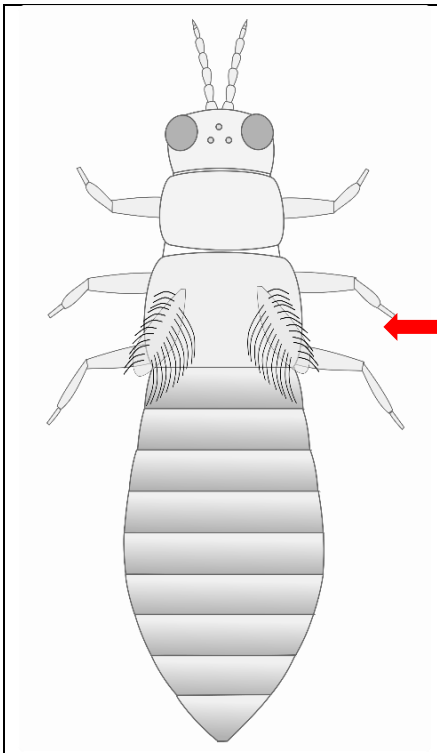
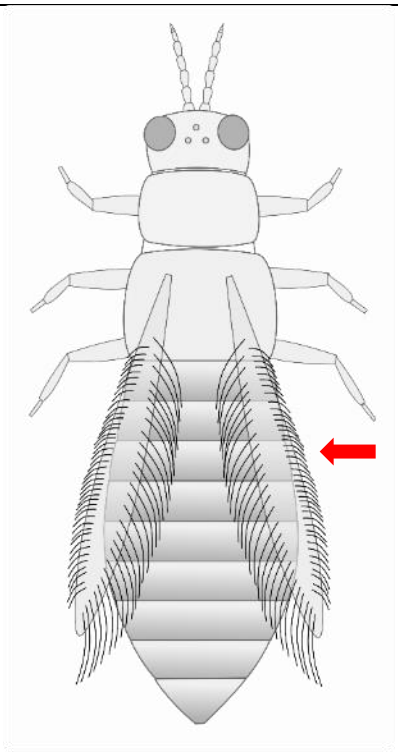
	
a. Head and body yellow; wings black with distinct clear band in the middle; hairs on the bottom of the pronotum are fine and may not be visible with a dissection microscope. Usually found on tropicals: *****Chaetanaphothrips ochidii,*** **(orchid thrips)**. This species is not present in Canada but widespread in tropical and sub-tropical regions, including California and Florida; may be intercepted on imported tropical plant material.	b. Coarse dark hairs on the bottom of the pronotum are short and may be difficult to see, middle pair distinctly longer than the others. Wings are grey with some pale sections but not distinct bands. Usually found on tropicals; distinctive feeding damage that resembles broadmite damage: **** Scirtothrips dorsalis (*chilli thrips*).** This species is not present in Canada, but present in Florida, Texas, Mexico, and the Caribbean; may be intercepted on imported plant material.

** If you think you have found a species not usually present in Canada, such as *C. orchidii* or *S. dorsalis*, you should consult an OMAFA IPM specialist to verify the identification and discuss management options.

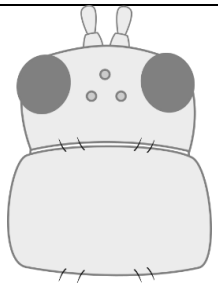
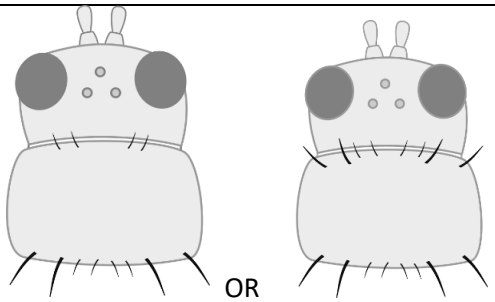
Dark-coloured thrips:

Dark-coloured thrips are very difficult to identify on sticky cards because the dark pigmentation makes the hairs on the pronotum nearly impossible to see. Therefore, **this key should not be used to identify dark-coloured species stuck to cards.** If you are finding thrips that are very dark brown to black on your sticky cards, it is advisable to collect specimens from the crop before proceeding with this key (if you can't find any in your crop, you probably don't need to worry about them!)

STEP 7.

	
a. Very short wings, shorter than the width of the body; body dark brown to black: ***Frankliniella fusca* (tobacco thrips),** wingless form. Both winged and wingless forms may be present in the same population.	b. Long fringed wings extending nearly the full length of the body: (GO TO STEP 8)

STEP 8.

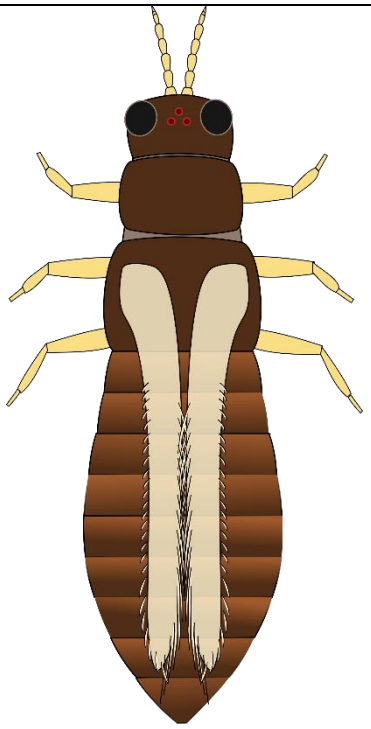
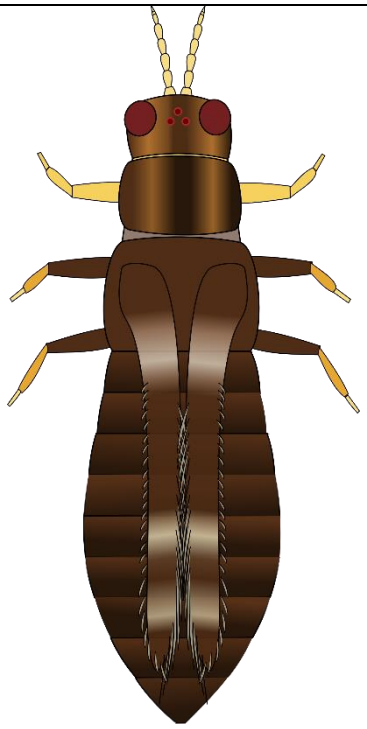
	 OR
a. No long coarse hairs on the pronotum; front legs entirely yellow: (GO TO STEP 9)	b. Pronotum has long coarse hairs on the bottom, and may or may not have long coarse hairs on the top. (Hairs may be difficult to see on very dark thrips – may be easier to see in side view) (GO TO STEP 10)

Pro tip:

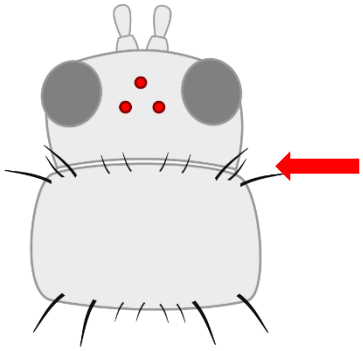
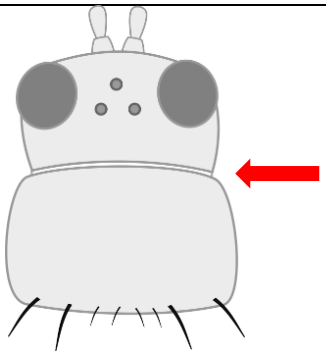
Hairs on the pronotum may be difficult to see on very dark specimens.

The hairs may be easier to see if you turn the specimen on its side.

STEP 9.

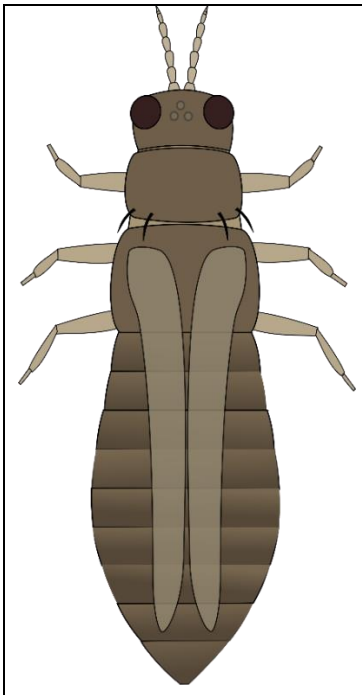
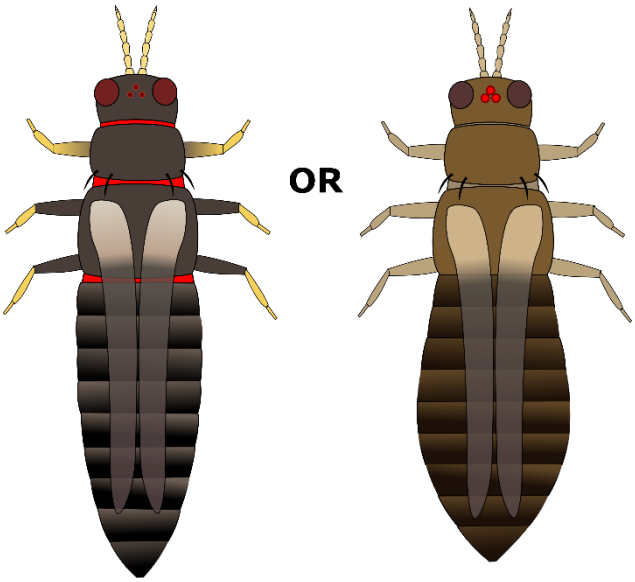
	
a. All legs entirely yellow; head and pronotum as dark as or darker than the rest of the body; wings uniform in colour and paler than the body (visible on dry specimens): ***Heliothrips haemorrhoidalis* (greenhouse thrips)**; very uncommon in Ontario	b. Front legs yellow, back legs yellow with brown femurs; head and pronotum often lighter in colour than the rest of the body; light patches at the top and tips of the wings (visible on dry specimens): ***Hercinothrips femoralis* (banded greenhouse thrips)** uncommon in Ontario, typically found on tropicals.

STEP 10.

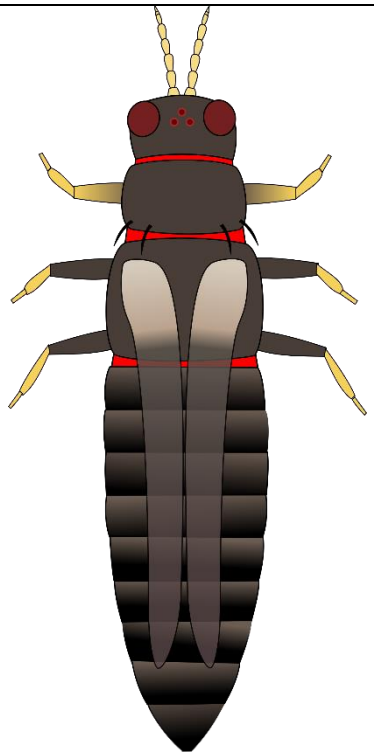
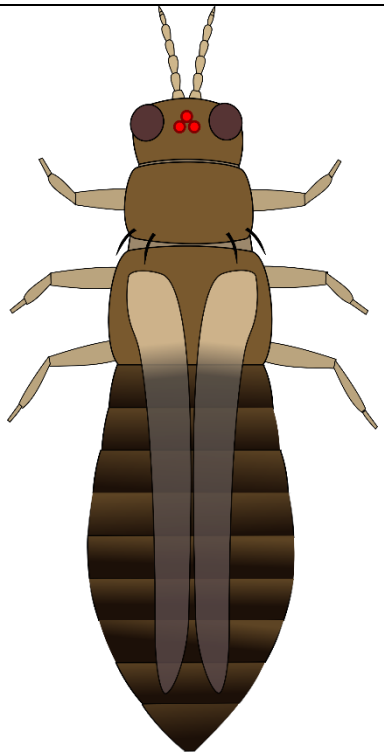
	
a. Pronotum has long coarse hairs on BOTH top and bottom of pronotum; no red pigment visible between the segments: Most likely ***Franklinella fusca***, **(tobacco thrips)** [3], winged form; present throughout North America, often appears in low numbers spring and summer as fly-ins, though does not often cause outbreaks.	b. NO long coarse hairs or fine hairs on the top of pronotum; bottom has 2 pairs of long coarse hairs; red pigment may or may not be visible between segments: (GO TO STEP 11)

[3] May also be *F. occidentalis*, dark morph (usually seen in fall and winter), *F. intonsa* (not known from Ontario, but present in British Columbia), or *F. schultzei* (not present in Canada but present in Florida, Central America & the Caribbean, may be intercepted on imported plant materials). Differentiating between the other *Frankliniella* is generally of little importance, as these species are of **low pest importance in greenhouse crops**. To determine conclusively if your specimens are western flower thrips (*F. occidentalis*) or another *Frankliniella* species, you can see the "Advance Features" section of this key – these steps require a compound microscope and advanced identification skills.

STEP 11.

	
a. Head and body light to medium brown, never black, uniform in colour. Grey ocelli/no ocelli visible; wings uniform in colour and pale in colour: ***Thrips tabaci* (Onion Thrips),** dark morph	b. Abdomen dark brown to black; head and pronotum either medium brown or black; red ocelli; light patches at the top of the wings (visible on dry specimens): (GO TO STEP 12)

STEP 12.

	
a. Head and body black; red ocelli (may be difficult to see); red pigmentation often visible between the segments; back legs yellow with black femurs, femurs of front legs dusky at base but not distinctly black; abdomen widest at the top and narrowing towards the tip**:** ***Echinothrips americanus***, **(poinsettia thrips)**; present throughout North America, found on many crop species. On orchid crops this may also be *Dichromothrips corbetti.*	b. Head and pronotum medium to dark brown, abdomen often darker than head; ocelli bright red and easily visible; no red pigmentation visible between segments; legs pale and uniform in colour; abdomen widest in the middle: ***Thrips parvispinus* (pepper thrips)** or ***Thrips setosus* (Japanese flower thrips)**,** females The males of both species are pale yellow. Neither species is established in Canada but are present in some US states; may be intercepted on imported plant material. In northern latitudes, *T. parvispinus* is typically intercepted on tropicals, and *T. setosus* has been found on Hydrangea.

**If you think you have found a species not usually present in Canada, such as *Thrips parvispinus* or *T. setosus*, you should consult an OMAFA IPM specialist to verify the identification and discuss management options.

Advanced Identification Features

Most of the features in this section are not visible using a dissection microscope, and **a compound microscope is required** to complete these steps.

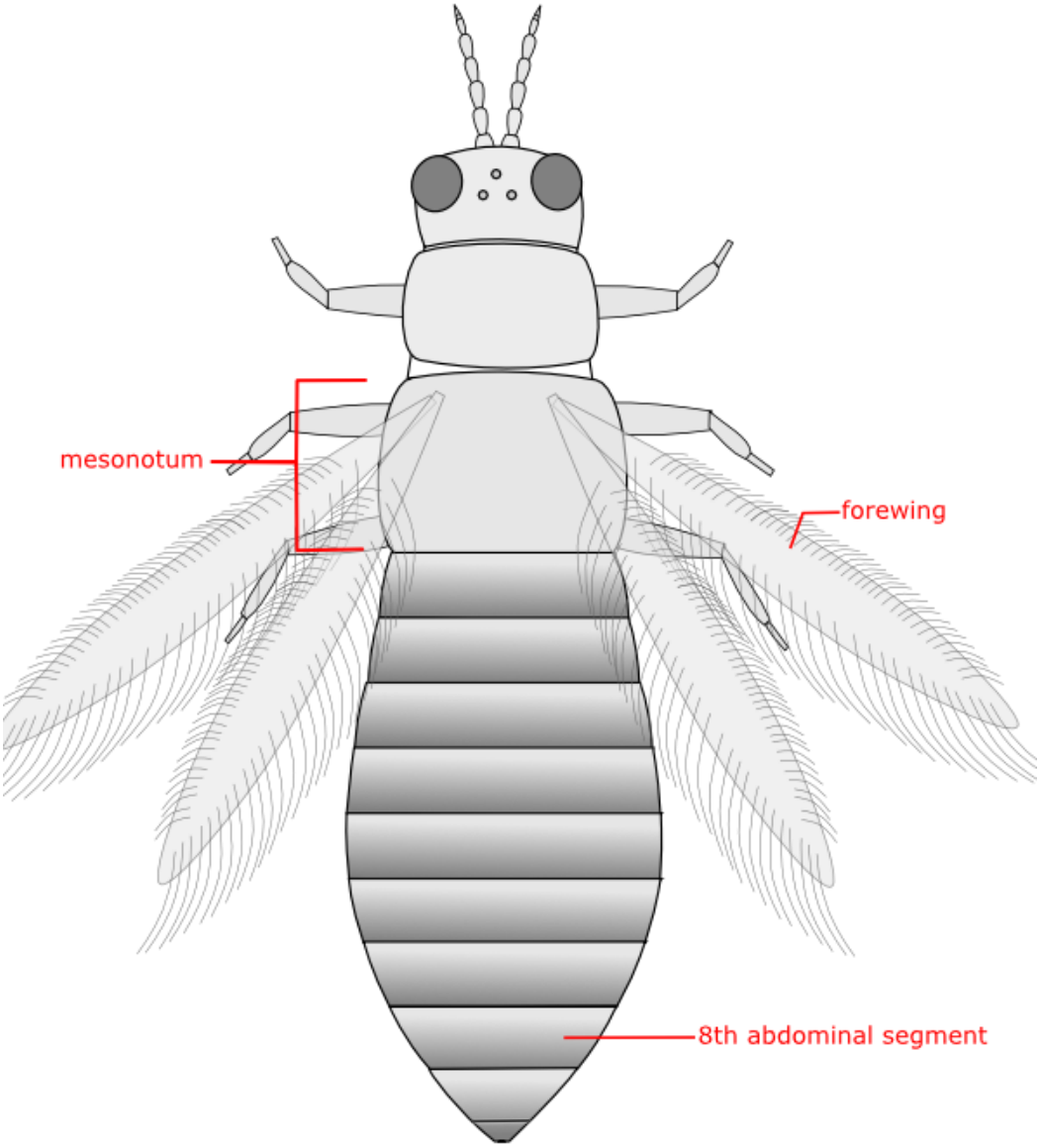
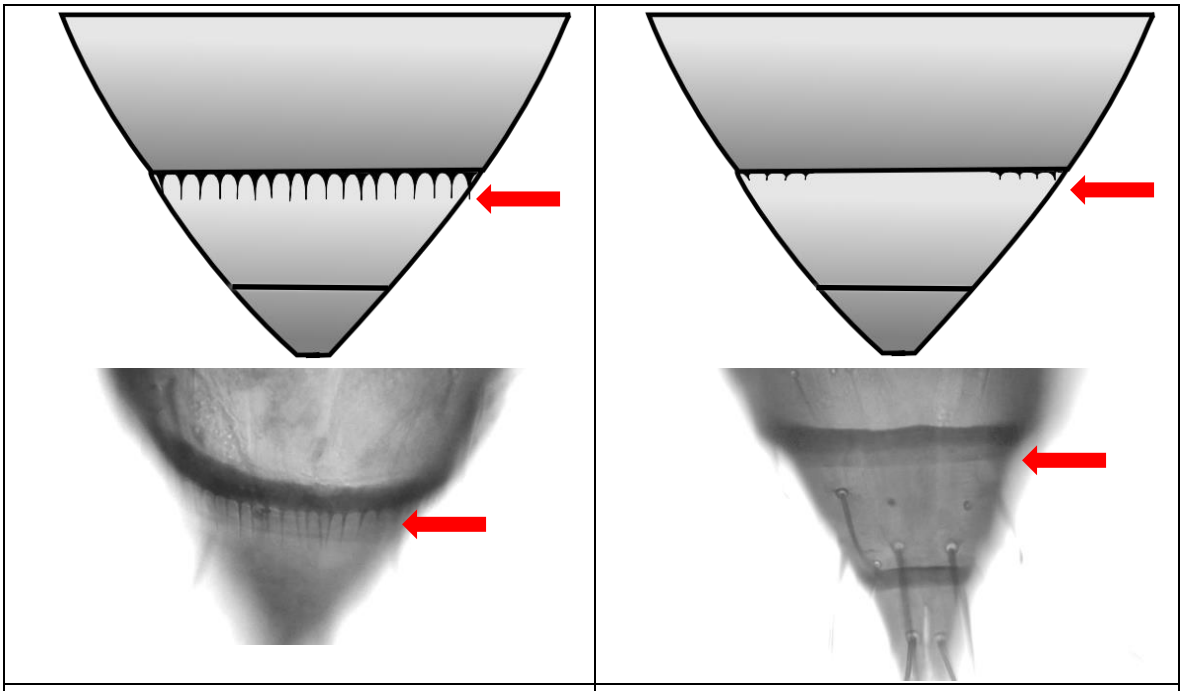


Figure 5. *Additional anatomical regions where identification features are found using a compound microscope.*

Japanese flower thrips (*Thrips setosus*) vs. *T. parvispinus*



a. pores on mesonotum present (see Fig. 6); bottom edge of abdominal segment 8 with complete row of hairs long & evenly spaced: **Japanese flower thrips** (*Thrips setosus*)	b. pores on mesonotum absent; bottom edge of abdominal segment 8 with hairs nearly absent, short on sides, and none in middle: ***Thrips parvispinus***

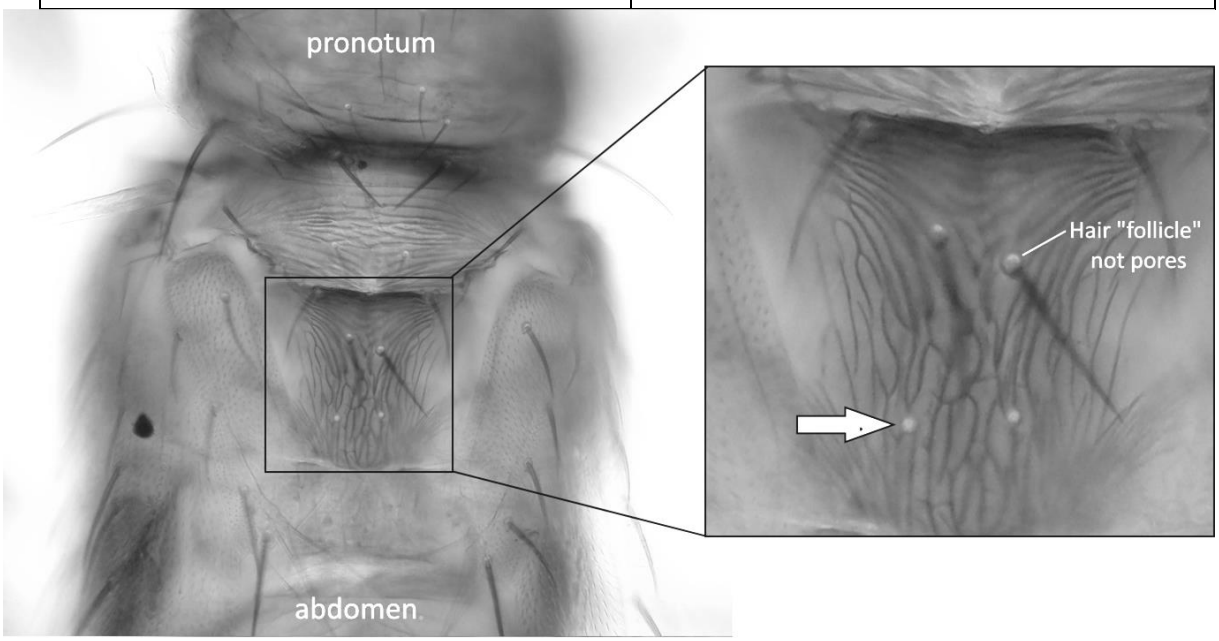
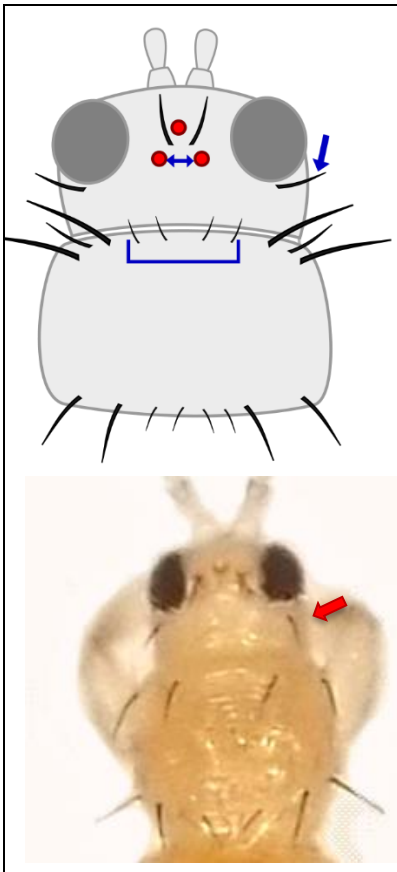
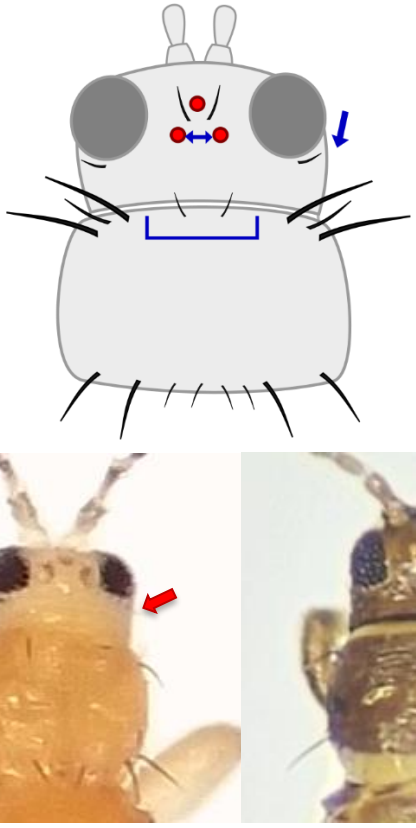
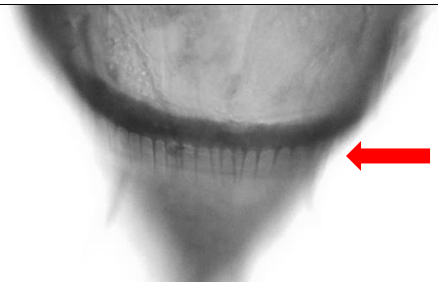
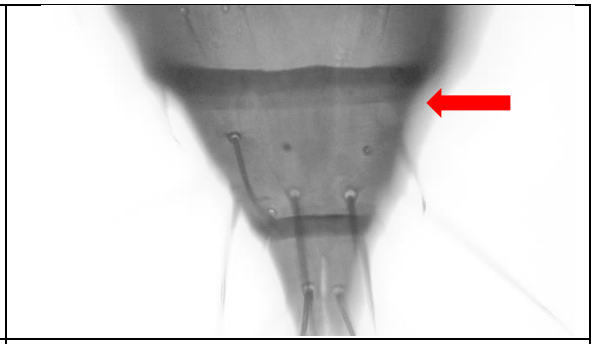


Figure 6. *Pair of pores on mesonotum (formally called "campaniform sensillae") located below pair of long coarse hairs. Note that the "follicle" (attachment point) for the hairs may look like pores.*

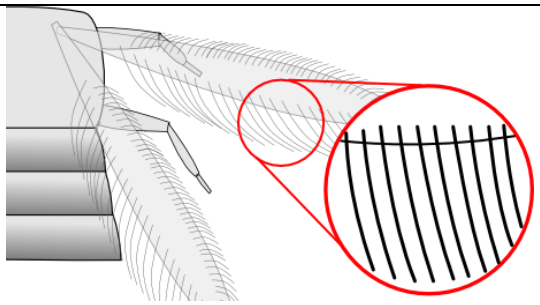
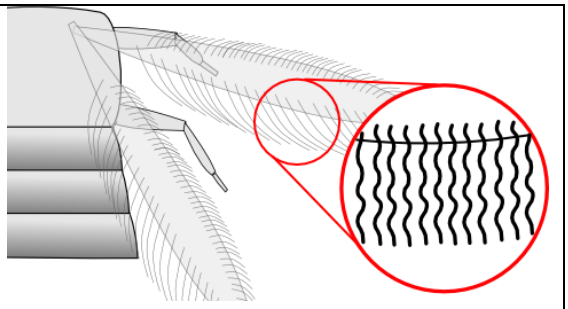
Western flower thrips (*Frankliniella occidentalis*) vs. other *Frankliniella* species:

	
a. Coarse hairs behind the eyes visible under dissection microscope, long and prominent (longer than the distance between the ocelli); Hairs on top of the pronotum very long, about as long as the hairs on the bottom. Four fine hairs on the top of the pronotum between two major setae (this feature can only be seen under a compound microscope): **Western Flower Thrips** (*Frankliniella occidentalis*)	b. Hairs behind eyes short and less noticeable (shorter than the distance between the ocelli) and may not be visible under a dissection microscope. Hairs on top of the pronotum may or may not be shorter than those on the bottom. Only two fine hairs on top of pronotum between two major setae (this feature can only be seen under a compound microscope): **Other *Frankliniella* species** Pale coloured specimens may be: **Eastern Flower Thrips** (*F. tritici*), **Florida Flower thrips** (*F. bispinosa*), **Common blossom thrips,** light morph (*F. schultzei*) Dark coloured specimens may be: **Tobacco thrips** (*F. fusca*), **European flower thrips** (*F. intonsa*), **Common blossom thrips**, dark morph (*F. schultzei*)

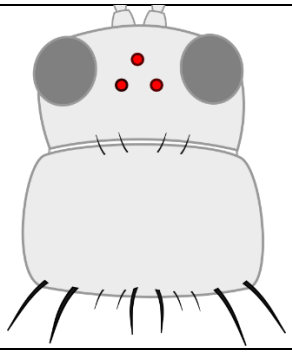
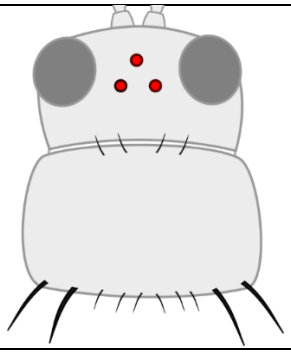
***Frankliniella fusca* vs. *F. intonsa*:**

	
a. pores on mesonotum absent; bottom edge of abdominal segment 8 with complete row of hairs: ***Frankliniella intonsa***	b. pores on mesonotum present (see Fig. 6 above); bottom edge of abdominal segment 8 no hairs: ***Frankliniella fusca***

Chilli thrips (*Scirtothrips dorsalis*) vs. other thrips species:

	
a. fringe of hairs on forewings straight: **Chilli thrips** (*Scirtothrips dorsalis*)	b. fringe of hairs on forewings wavy: **NOT chilli thrips**

Chrysanthemum thrips (*Thrips nigropilosus*) vs. Melon thrips (*Thrips palmi*):

	
a. pores on mesonotum absent; three pairs of long coarse hairs on pronotum, center pair shorter than the outer two: **Chrysanthemum thrips** (*Thrips nigropilosus*)	b. pores on mesonotum present (see Fig. 6 above); only two pairs of long coarse hairs on pronotum: **Melon thrips** (*Thrips palmi*)