

A Key to the Thrips (Thysanoptera: Thripidae) on Seedling Cotton in the Mid-Southern United States

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Introduction

Thrips belong to the insect order, Thysanoptera, which is divided into two suborders, Tubulifera, and Terebrantia. A primary difference between the two suborders is that Tubuliferans lay eggs on the surface of plant tissue, and Terebrantians insert eggs within plant tissue. All pest species on cotton belong to the suborder Terebrantia. Thrips of the genus *Frankliniella* have been recognized as pests on cotton since 1931 (Eddy and Livingstone 1931). *Frankliniella fusca* (Hinds), *F. tritici* (Fitch), and *F. occidentalis* (Pergande) are all recognized as serious pests of the cotton crop, and *F. williamsi* Hood and *F. bispinosa* Morgan have also been found on seedling cotton. *Frankliniella fusca* and *F. tritici* have historically been the thrips species occurring on seedling cotton (Eddy and Livingstone 1931, Newsom et al. 1954, Watts 1936). *Frankliniella occidentalis* was present in the Mid-south region in the early 1980's as typified by specimens in the Beshear thrips collection housed at the University of Georgia, but it was not recognized as a serious pest of Mid-south cotton until 1985 (Burris et al. 1989, Reed 1988). A recent survey of thrips in Georgia, Mississippi, Arkansas, Alabama, Louisiana and Tennessee documented the importance of the genus *Frankliniella*, and established that the important species continue to be *F. fusca*, *F. occidentalis* and *F. tritici* (Burris et al. 2000, Cook et al. 2003, Freeman et al. 2002, Reed et al. 2001).

Although species of the genus *Frankliniella* are the most important pests of seedling cotton in the Mid-south, *Neohydatothrips variabilis* (Beach) (formerly *Sericothrips variabilis*) and *Thrips tabaci* Lindeman are frequently found on seedling cotton. Watts (1937) reported the presence of 14 species of thrips on cotton including *F. fusca*, *F. tritici*, *F. williamsi*, *Thrips tabaci*, *T. panicus* (Moulton) (a synonym of *Plesiothrips perplexus* [Beach]), *Leptothrips mali* (Fitch), *Anophothrips obscurus* (Müller), *Sericothrips variabilis* (Beach), *Echinothrips americanus* (Morgan), *Limothrips cerealium* (Haliday), *Aelothrips bicolor* Hinds, *Stomatothrips flavus* (Hood), and an unidentified species of *Liothrips*. In addition to those listed above, the Beshear thrips collection housed at the University of Georgia contains *F. exigua* (Hood) collected from cotton. Other species collected from cotton and represented by specimens in the collection of the Mississippi State University Entomological Museum are: *F. bispinosa* (Morgan), *Caliothrips fasciapennis* (Pergande), *Chirothrips texanus* (Andre), *Sericothrips cingulatus* Hinds, *Microcephalothrips abdominalis* (Crawford, D. L.), and *Thrips nigripilosus* Uzel. *Scolothrips palidus* (Beach) was collected from cotton in a greenhouse at Mississippi State University.

Thrips are often identified on seedling cotton by field personnel involved with insect control and crop consulting. Identification of thrips within the genus *Frankliniella* on seedling cotton is important because control measures may vary with different species. The western flower thrips (*F. occidentalis*) may be difficult to control with insecticides in greenhouses and cotton fields (Graves et al. 1987, Immaraju et al. 1992, Reed 1988). Proper separation of this pest from tobacco thrips (*F. fusca*) and flower thrips (*F. tritici*) is necessary to choose the proper insecticide to insure economic control. The dark color of tobacco thrips is normally sufficient to separate it from flower thrips or western flower thrips in the mid-South; however, tobacco thrips and western flower thrips vary from very dark to very light in coloration making field identification based on color difficult. Additionally, several species of *Frankliniella* are very similar, making it difficult to positively identify them with standard dichotomous keys. A few specimens of thrips from the genus *Frankliniella*, collected from cotton, were examined in preparation for this publication did not key to known species. Positive identification may be accomplished in the future following collection of additional specimens.

A great majority of the thrips collected from cotton in the Mid-South are females. Thrips of at least some species of the genus *Frankliniella* may reproduce parthenogenetically, and in the case of tobacco thrips and flower thrips, this is in the form of arrhenotokous parthenogenesis and produces male offspring from unfertilized eggs (Eddy and Livingstone 1931, Watts 1936). Aggregations of males of western flower thrips on cotton have been described (Terry 1997), and occasionally relatively high numbers of males are collected from seedling cotton plants. However, males are usually far less abundant on cotton than females, and since the authors did not have males of all species for reference, only females are presented in the key.

It is the purpose of this publication to provide a key to thrips species collected from seedling cotton. Parts one and two represent the dichotomous key and identifying characteristics of keyed species, respectively. Note that *Leptothrips mali*, and *Stomatothrips flavus* have been reported from cotton. *L. mali* is an arboreal tubuliferan species that would occur on cotton only as an incidental, and *S. flavus* has not been reported in recent years. These species are not included in this key.

Materials and Methods

Most thrips specimens used for this study were either identified by thrips taxonomists, primarily Ramona Beshear, University of Georgia, retired, or S. Nakahara, USDA, ARS, Washington D. C., retired, or were compared with thrips specimens identified by thrips taxonomists. Characteristics of each species were photographed for development of the photographic key that would augment identification of thrips mounted on microscope slides and observed under microscopy, thus bypassing the need for interpretation of line drawings. Because not all characteristics can be easily seen or photographed under the same kind of microscopy, phase contrast, Nomarsky, bright field, and dissection microscopy were used as needed. Additionally, because not all specimens provide a perfect mount, photographs of different parts of a single species may include images from different specimens. Images were made with an Evolution MP, 5-megapixel digital camera associated with Image-Pro Plus software, (Media Cybernetics Inc., Silver Spring, MD). In some cases, composite images taken at different focal distances were used to increase depth of field and improve clarity. A few images of whole thrips were taken of insects suspended in liquid carboxylated methyl cellulose mounting medium (CMC 10, Masters Company, Inc., Wooddale, IL). Other images of whole thrips were taken of insects mounted on microscope slides. Only females are included in the key. Most photographs were taken at 400 magnifications, but some were made at 630X or 1000X. Scale bars (lines) are therefore provided on micrographs in section two of the key to aid in determining size relationships.

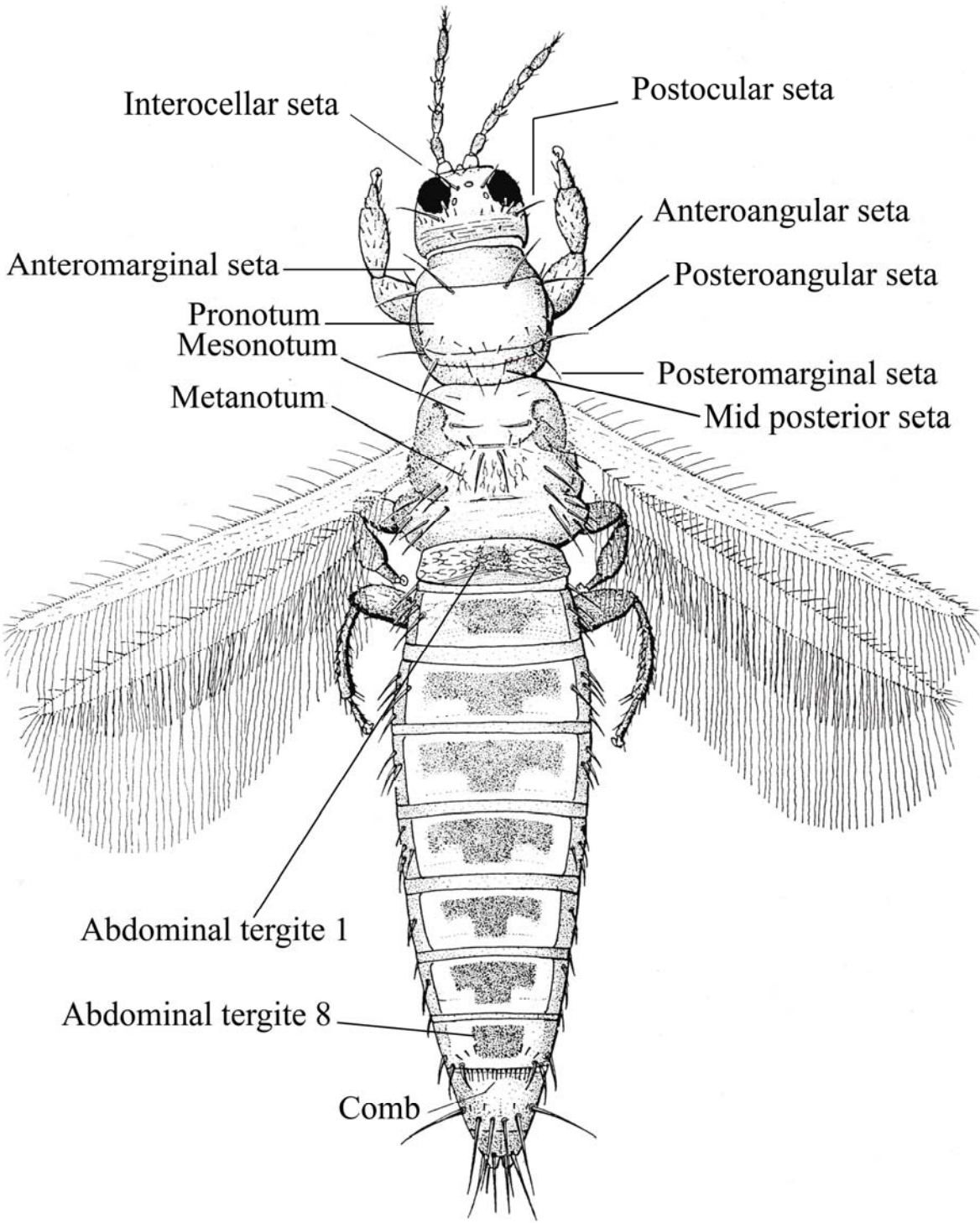
Mounting Procedure for Thrips Specimens

Thrips must be mounted on microscope slides before characteristics can be adequately observed through a microscope. The following procedure is recommended.

Required materials: Microscope slides (76 mm (3 inch) by 25.4 mm (1 inch) by 1 mm), cover slips (12 mm circles), CMC-10 mounting media, fine-tipped forceps, and a microspatula. A satisfactory microspatula used for transferring thrips from alcohol to the mounting medium may be made by flattening the tip of an insect pen with a hammer (place the tip of the pen on a ¼ inch bolt or similar cylindrical surface for use as an anvil).

Procedure: Place a drop of CMC-10 mounting medium in the center of the slide. Transfer a thrips directly from the alcohol to the drop of mounting medium with the microspatula. Use an insect pin or the microspatula to force the thrips to the bottom of the drop of medium so that it rests ventral side down on the microscope slide with its head facing to the bottom of the slide (toward the technician). Place a cover slip on the drop by holding an edge with a forceps and placing the opposite edge of the cover slip on the slide and lowering the other edge slowly onto the drop of medium. By looking through the microscope and pressing gently with the forceps on the cover slip, press the cover slip down. By careful off-center pressure on the cover slip, the thrips can be moved slightly to center it or arrange it on the slide. Enough medium should be used so that it extends beyond the edge of the coverslip, otherwise air tends to come under the cover slip as the material cures. Label the slide with the collection date, location and collector's name. The CMC-10 medium will clear the thrips specimen within a few days to enable identification with a compound microscope. Phase-contrast or Nomarsky type microscopes are preferred.

Figure 1. Key characters of thrips.



Part1: Key to Female Thrips

Species occurring incidentally on cotton are indicated by “*”.

1. a. Antennae with 7 segments (including basal segment) (Fig. 2), pronotum lacking long setae anteriorly (Fig. 3.).....2



Figure 2.

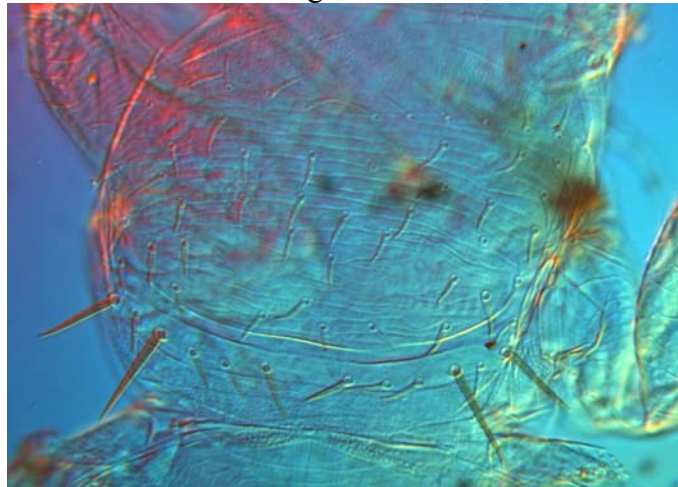


Figure 3.

- b. Antennae with more than 7 segments including basal segment5

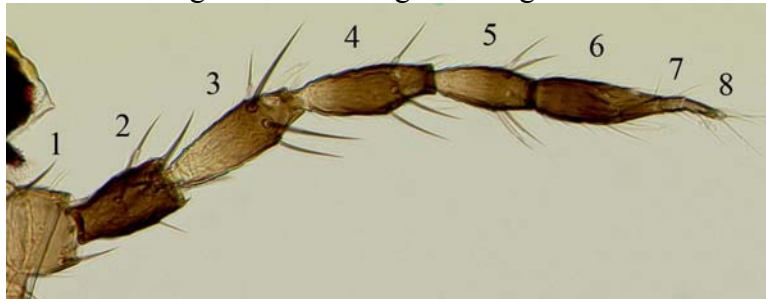


Figure 4.

2. a. Second antennal segment expanded distally (Fig. 5), abdominal tergites with posteromarginal scallops (Fig.6), head small, about as long as wide (Fig. 7).....

.....*Microcephalothrips abdominalis**

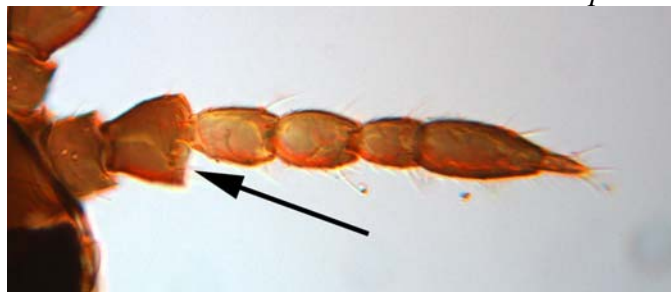


Figure 5.

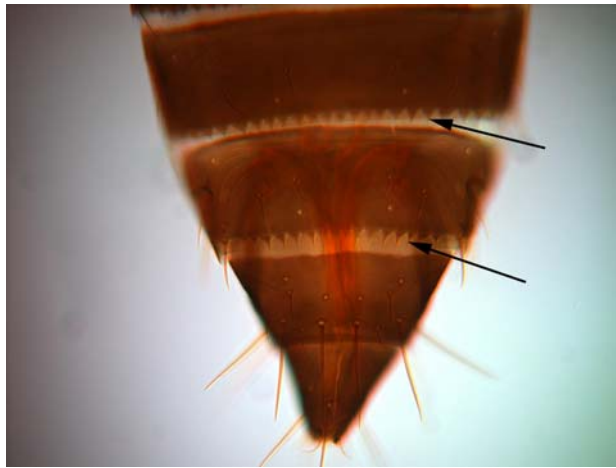


Figure 6.



Figure 7.

- b. Second antennal segment not expanded distally (Fig. 8), abdominal tergites without obvious posteromarginal scallops (Fig. 9).....3



Figure 8.

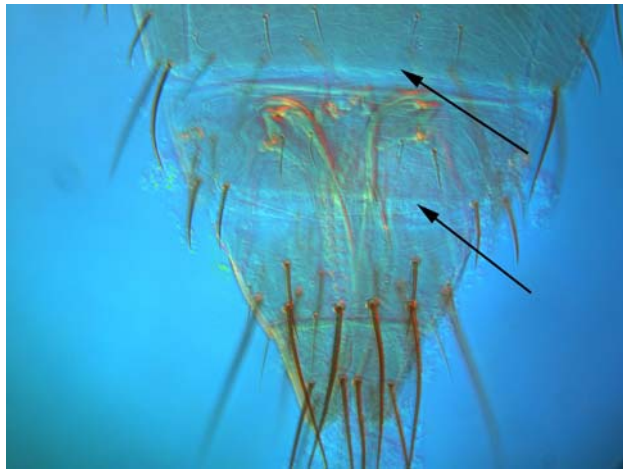


Figure 9.

3. a. Head, thorax and tip of abdomen dark (Fig. 10), head longer than wide, tenth abdominal tergite split longitudinally (Fig. 11), comb absent on tergite 8.....*Plesiothrips perplexus**



Figure 10.

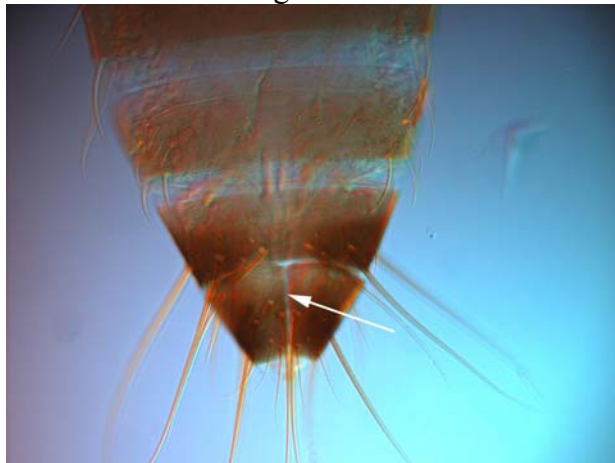


Figure 11.

- b. Body uniformly light colored (Fig. 12), head wider than long, comb on tergite 8 present (Fig. 13).....4



Figure 12.

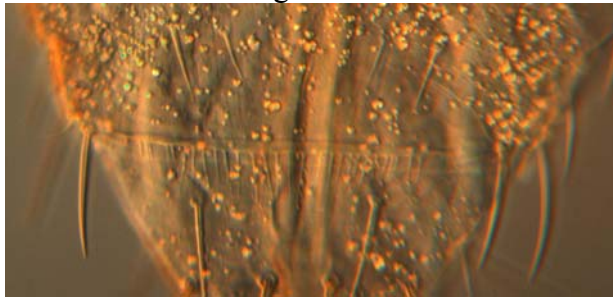


Figure 13.

4. a. Major pronotal setae stout and light colored (Fig. 14), length of setae in comb on eighth tergite relatively long (Fig. 15) *Thrips tabaci*

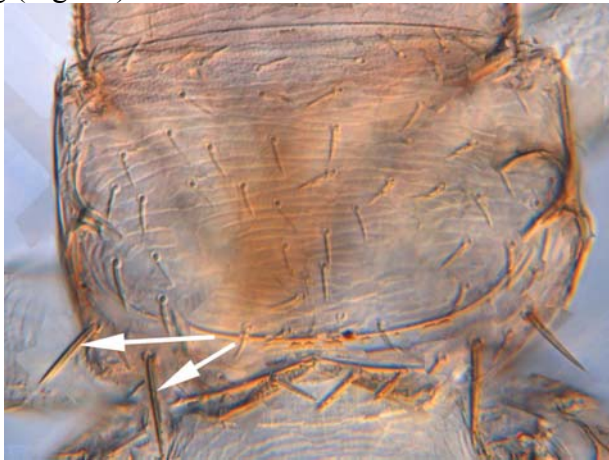


Figure 14.

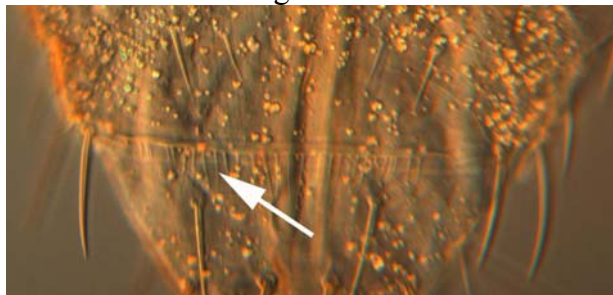


Figure 15.

- b. Major pronotal setae dark colored and slender (Fig. 16), setae of comb on 8th tergite short (Fig. 17) *Thrips nigripilosus**



Figure 16.

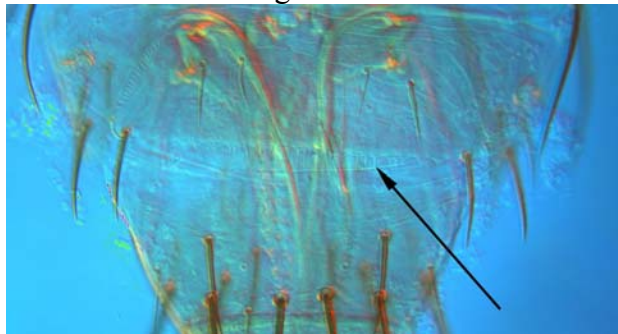


Figure 17.

5. a. Antennae 8 segmented, sensory setae forked (Fig. 18) or single (Fig. 19)6



Figure 18.



Figure 19.

- b. Antennae 9 segmented, sensory setae on antennal segments 3 and 4 narrow elongate regions located on distal end of segment (Fig. 20) *Aelothrips bicolor**

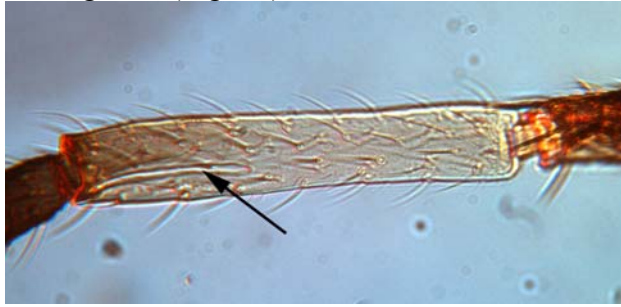


Figure 20.

6. a. Body nearly colorless, wings with 3 spots (Fig. 21), all major pronotal setae very long (Fig. 22) *Scolothrips pallidus**



Figure 21.

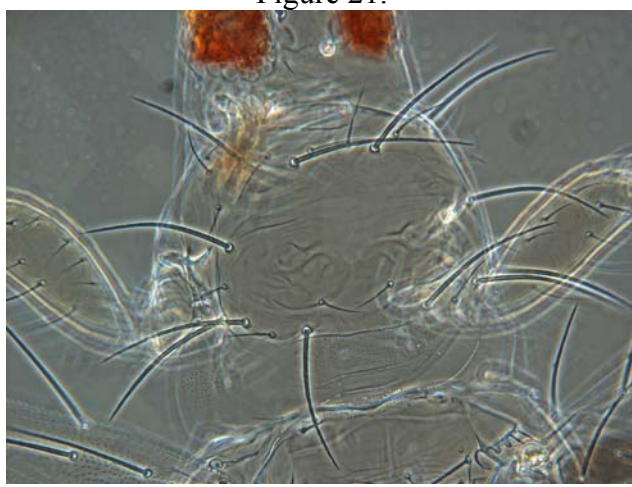


Figure 22.

- b. Body variously colored, pronotal setae short to moderately long, wings darker and variously colored 7
7. a. Seventh segment of antennae with partial suture or separation at apical third of segment (Fig. 23), all pronotal setae short and difficult to see (Fig. 24) *Anophothrips obscurus*



Figure 23.



Figure 24.

- b. Seventh antennal segment lacking partial separation (Fig. 25), pronotum with at least some posterior setae long (Figs. 26-27).....8



Figure 25.

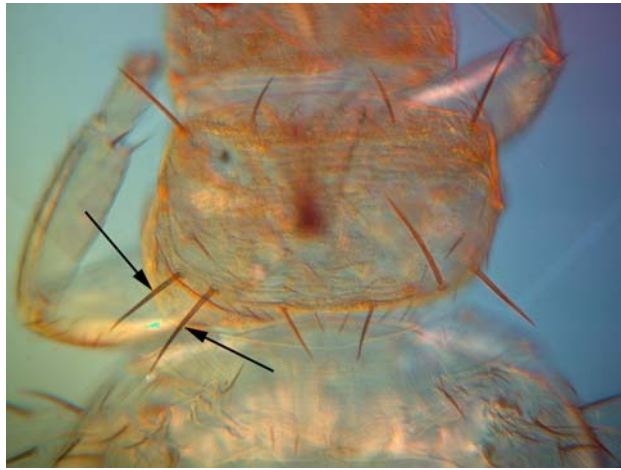


Figure 26.

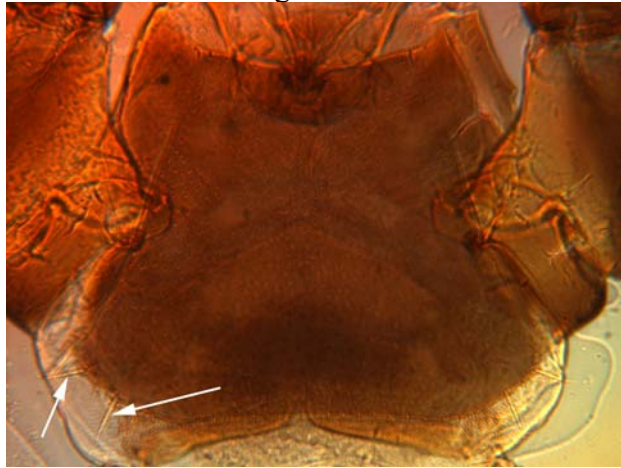


Figure 27.

8. a. Forelegs massive (Fig. 28), second antennal segment extruded to one side distally (Fig. 29), head and pronotum with numerous short spines, pronotum trapezoidal, about as long as wide, only the posteroangular setae long (but clear and difficult to see).....
*Chirothrips texanus**



Figure 28.



Figure 29.

- b. Forelegs not massive, antennal segment 2 not extruded, pronotum wider than long (Fig. 30).....9



Figure 30.

9. a. Wings with light or dark bands or spots (Fig. 31), abdomen with numerous microsetae at least in lateral areas of tergites (Fig. 32) or tergites with spine-like scallops (Fig. 33), head and pronotum deeply striated or reticulated (Figs. 34-35).....10

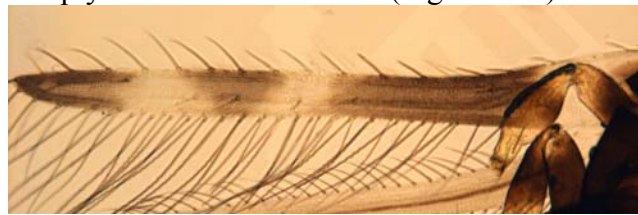


Figure 31.

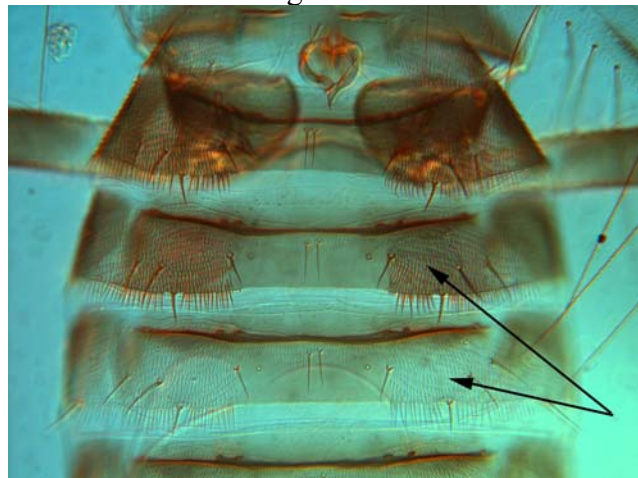


Figure 32.

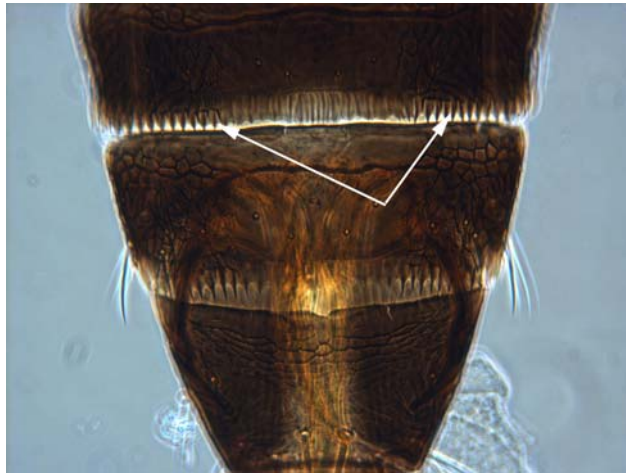


Figure 33.

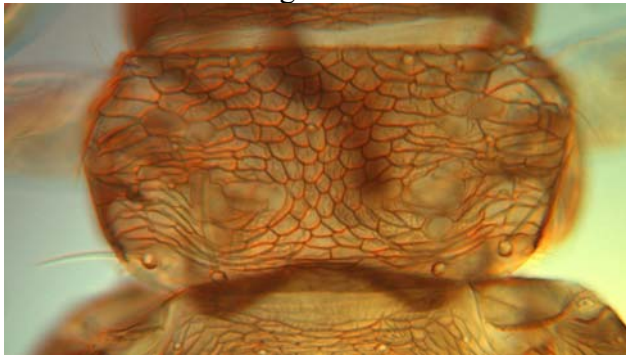


Figure 34.

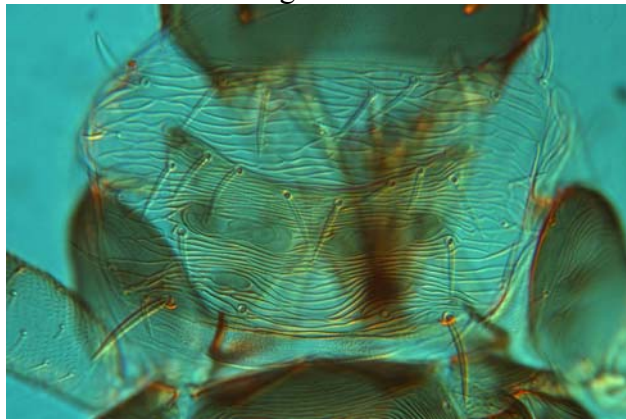


Figure 35.

- b. Wings of uniform color or colorless (Fig. 36), micro spines lacking on abdomen (Fig. 37)
.....13



Figure 36.



Figure 37.

10. a. Forewings brown with 2 light bands in distal half and one at wing base (Fig. 38), posteromarginal abdominal tergites with spine-like scallops (Fig. 39).....
 *Caliothrips fasciapennis**

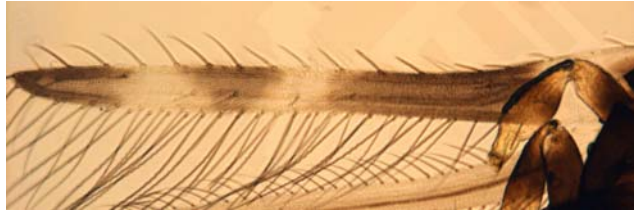


Figure 38.



Figure 39.

- b. Forewings light either at base only or with light bands (Fig. 40), abdominal tergites lacking spine-like scallops but with numerous microsetae (Figs. 41, 42), pronotum striated or reticulate (Figs. 43, 44).....11



Figure 40.



Figure 41.



Figure 42.

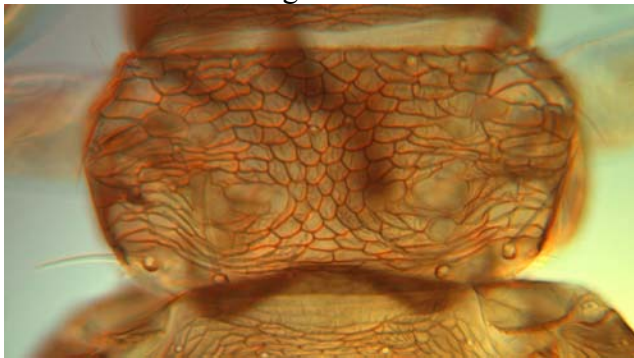


Figure 43.

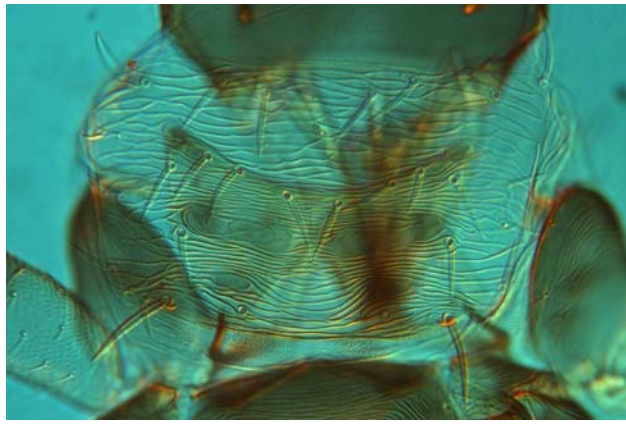


Figure 44.

10. a. Head and pronotum reticulate (Fig. 45), wings brown with lighter bars basally and mid-wing (Fig. 46), tips of setae on veins and front margin of wing blunt or slightly expanded *Echinothrips americanus**

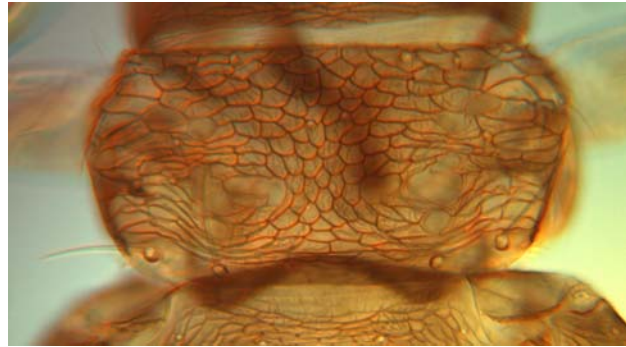


Figure 45.



Figure 46.

- b. Pronotum striate (Figs. 47, 48).....12

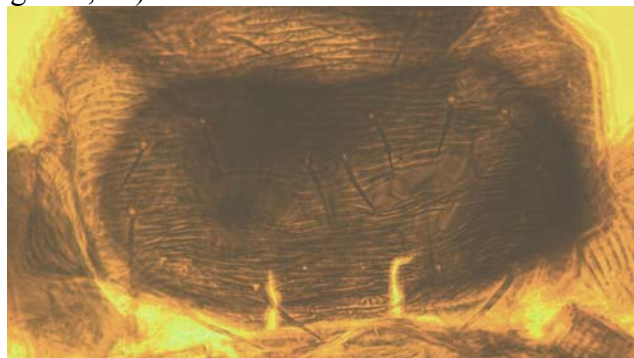


Figure 47.

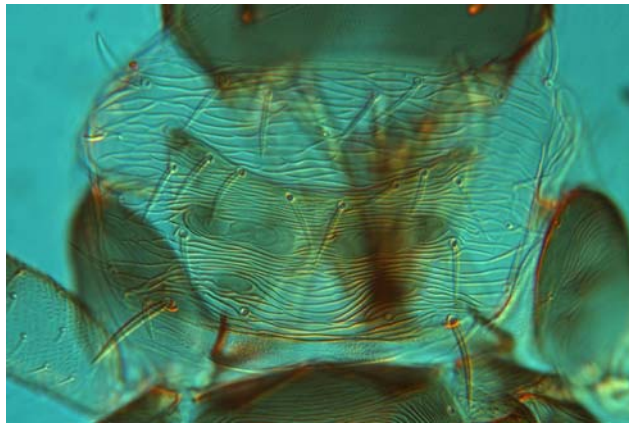


Figure 48.

12. a. Wings light at base, otherwise uniformly light brown, head and thorax darkly sclerotized, nearly opaque, abdominal tergites 4-6 very light, other segments dark brown (Fig. 49)..... *Sericothrips cingulatus**



Figure 49.

- b. Wings with 2 dark bands plus dark spot at base (Fig. 50), abdominal segments 4-6 light colored, other segments light brown, pronotum with smile-shaped sclerotized area (Fig. 51)..... *Neohydatothrips variabilis*



Figure 50.

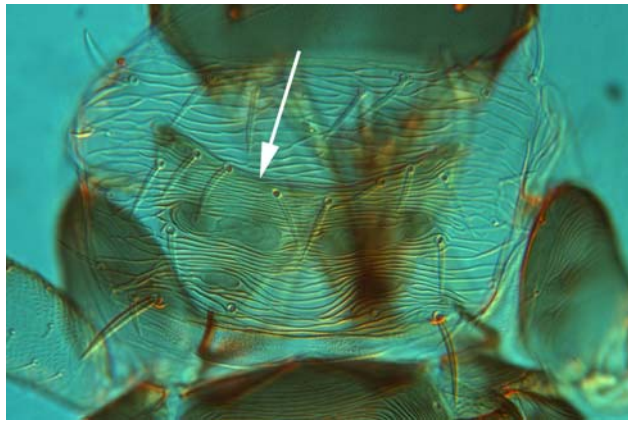


Figure 51.

13. a. Veins in fore wings delineated by small rectangular platelets (Fig. 52), tenth abdominal segment with longitudinal split (Fig. 53), sense cones on third and fourth antennal segments single (Fig. 54).....*Limothrips cerealium**

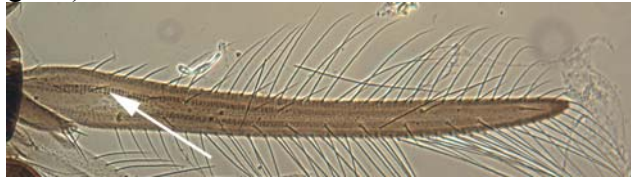


Figure 52.

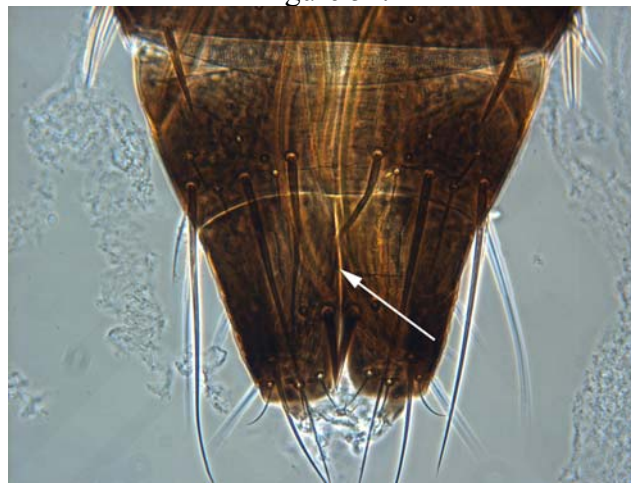


Figure 53.



Figure 54.

- b. Pronotum with 2 small setae between the posteromarginal setae (Figs. 55, 56), sensory setae on antennae forked (Fig. 57) *Frankliniella* spp. 14

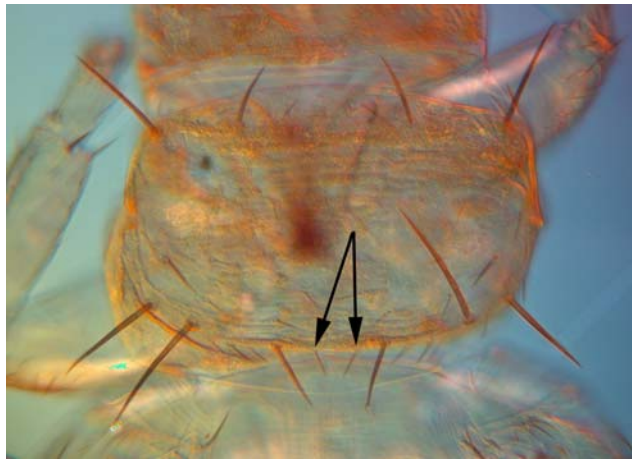


Figure 55.

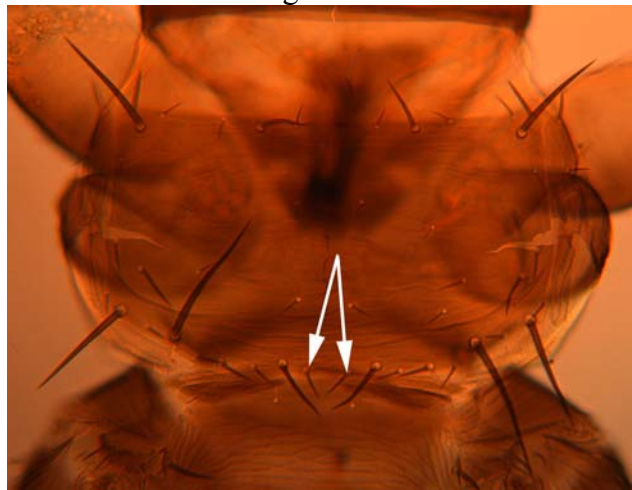


Figure 56.



Figure 57.

14. a. Postocular seta small, same size as other setae in the row (Fig. 58), comb on eighth tergite absent or vestigial (Fig. 59), antennal segments uniformly dark, wings present or absent, color usually dark brown but may be light brown with darker areas
*Frankliniella fusca*



Figure 58.

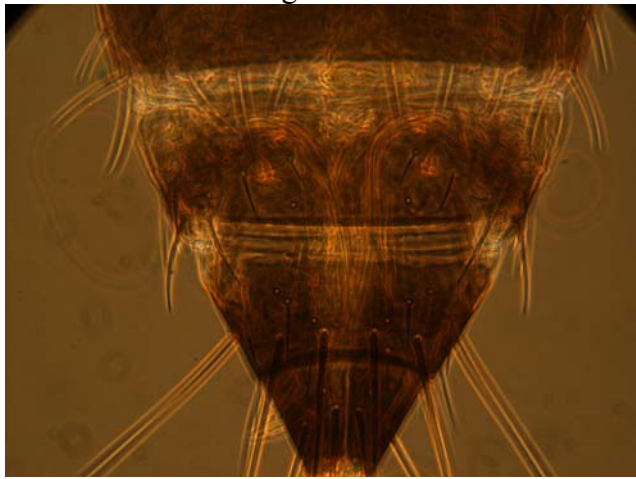


Figure 59.

- b. Postocular seta obviously larger than other setae in the row (Fig. 60), color usually light amber, comb present on eighth abdominal tergite (Fig. 61) 15



Figure 60.

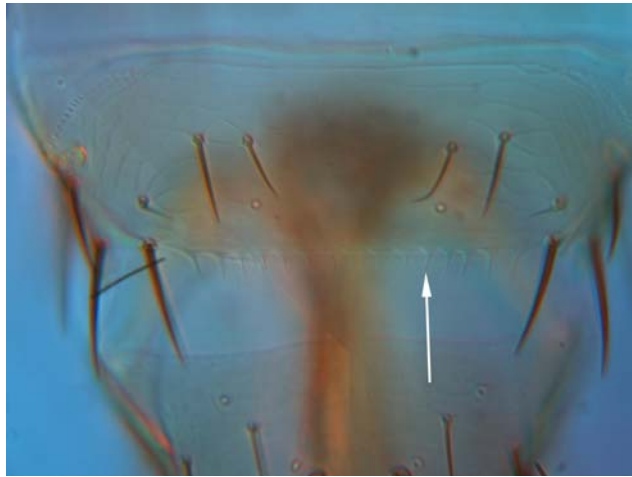


Figure 61.

15. a. Postocular setae much shorter than interocellar setae (Fig. 62), Comb on 8th abdominal tergite incomplete (lacking spines in center) (Fig. 63), pedicel of third antennal segment with angular expanded ring (Fig. 64) or vase-like (Fig. 65)16

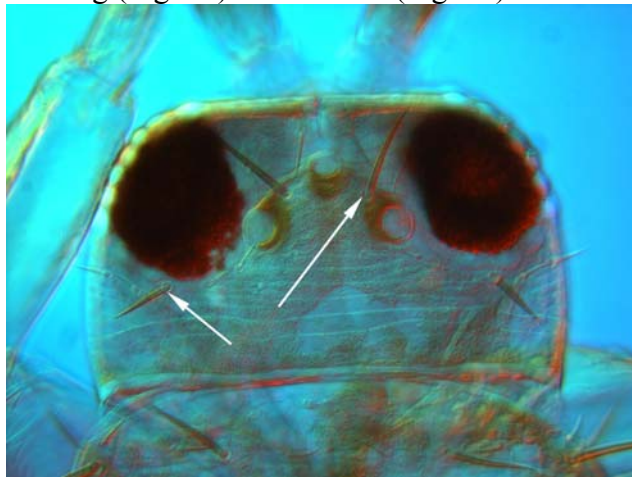


Figure 62.

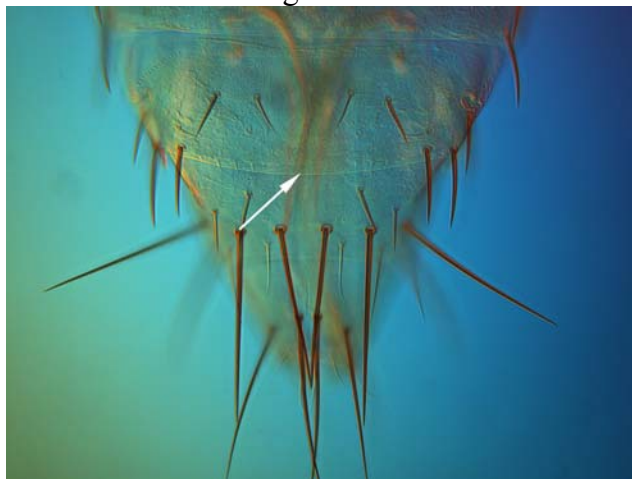


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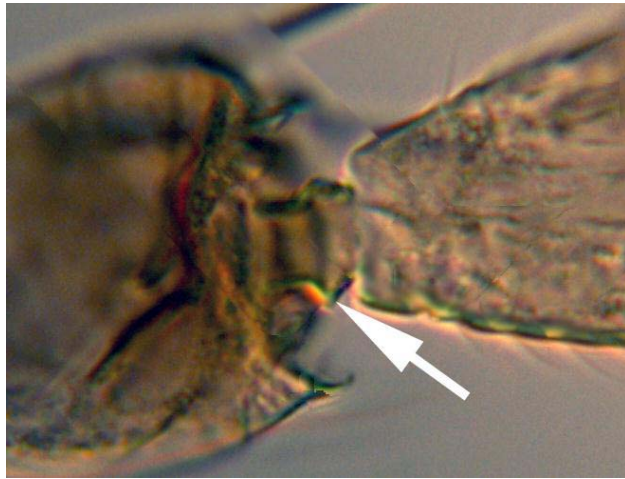


Figure 64.



Figure 65.

- b. Comb on eighth abdominal tergite complete (Fig. 66), interocellar setae nearly as long as or longer than postocular seta (Fig. 67).....17

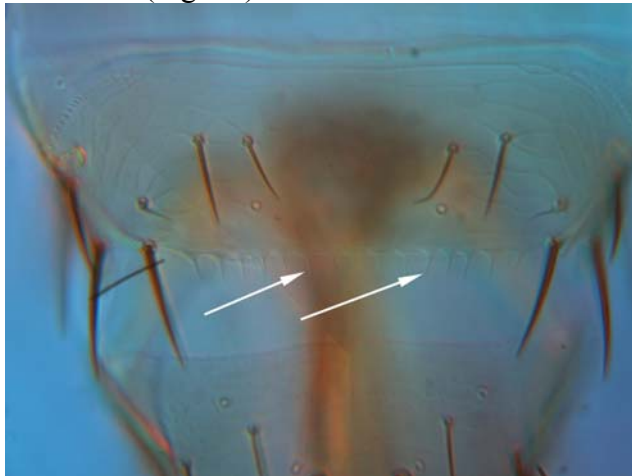


Figure 66.



Figure 67.

16. a. Pedicel of third antennal segment wider in center – appearing angular (Fig. 68), antennal segment two without stout, spine-like setae, antenna coloration from base to apex: light, dark, light, dark, light, dark, dark, dark (Fig. 69).....*Frankliniella tritici*

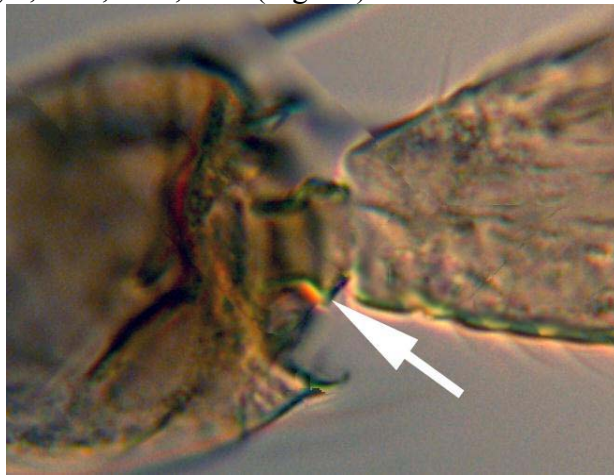


Figure 68.

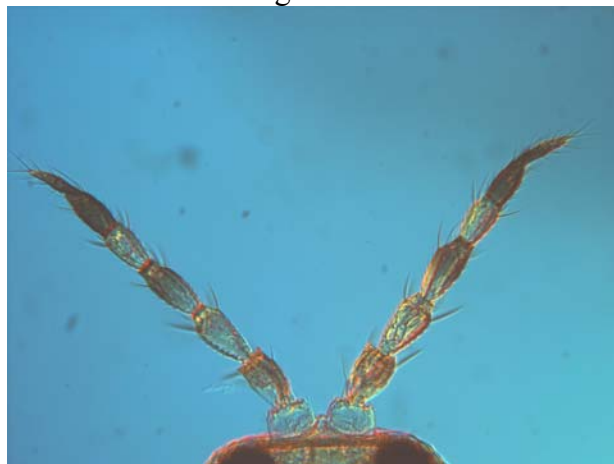


Figure 69.

- b. Pedicel of third antennal segment vase-like, antenna segment 2 with a pair of stout, spine like setae (Fig. 70).....*Frankliniella bispinosa**

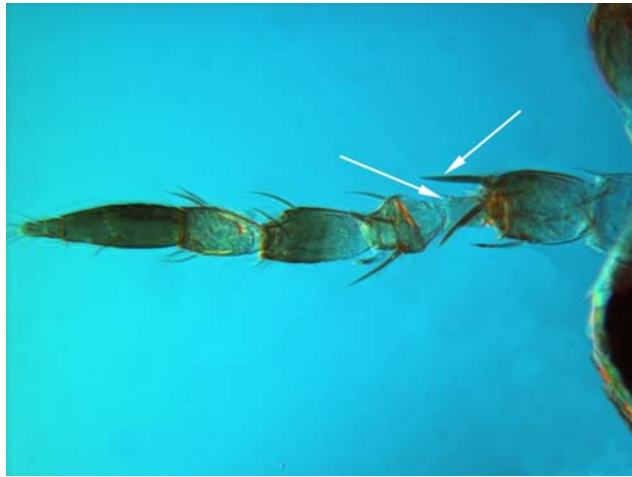


Figure 70.

17. a. Major setae on head and pronotum dark, interocellar and postocular setae approximately the same length (Fig. 71), antennal segments 2- 5 darker distally, segments 6-9 dark (Fig. 72), color usually amber with some brown areas primarily on anterior central portion of abdominal tergites but the body may be entirely dark brown (Fig. 73)
*Frankliniella occidentalis*



Figure 71.



Figure 72.



Figure 73.

- b. Comb on 8th abdominal tergite with long slender setae (Fig. 74), interocellar setae about as long as or longer than anteromarginal setae (Fig. 75), antennal segments gradually darker towards tips, body coloration light amber lacking dark patches,.....18

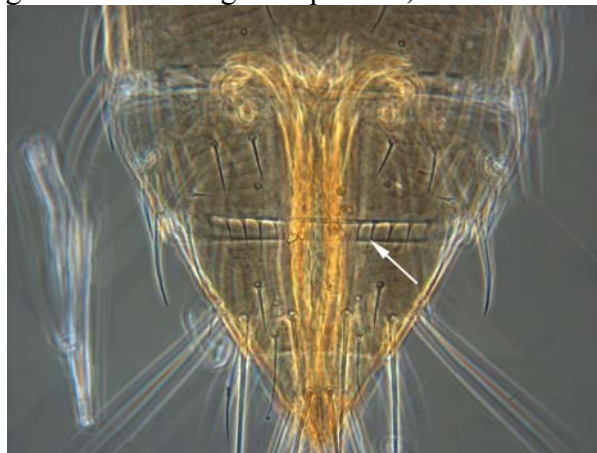


Figure 74.



Figure 75.

18. a. Intercellar setae about as long as anteromarginal setae (Fig. 76)
*Frankliniella williamsi**



Figure 76.

b. Intercellar setae longer than anteromarginal setae (Fig. 77)*Frankliniella exigua*

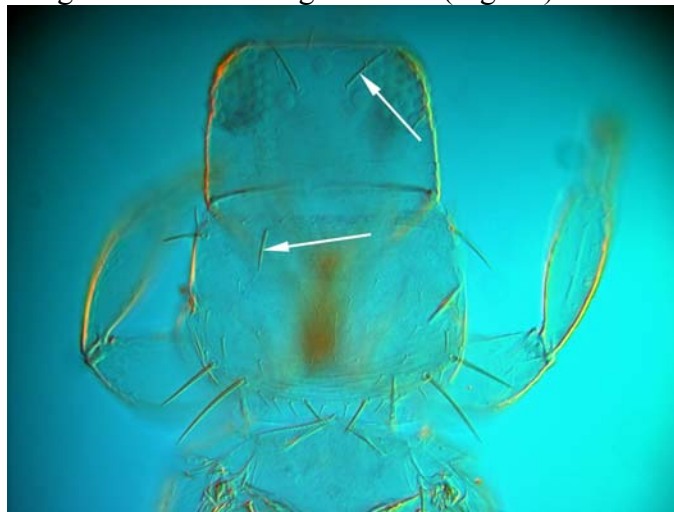


Figure 77.

Part 2: Identifying Characteristics of Keyed Species.

Index

<i>Aelothrips bicolor</i>	-----
<i>Anophothrips obscurus</i>	-----
<i>Caliothrips fasciapennis</i>	-----
<i>Chirothrips texanus</i>	-----
<i>Echinothrips americanus</i>	-----
<i>Frankliniella bispinosa</i>	-----
<i>Frankliniella exigua</i>	-----
<i>Frankliniella fusca</i>	-----
<i>Frankliniella occidentalis</i>	-----
<i>Frankliniella tritici</i>	-----
<i>Frankliniella williamsi</i>	-----
<i>Limothrips cerealium</i>	-----
<i>Microcephalothrips abdominalis</i>	-----
<i>Neohydatothrips variabilis</i>	-----
<i>Scolothrips palidus</i>	-----
<i>Sericothrips cingulatus</i>	-----
<i>Thrips nigripilosus</i>	-----
<i>Thrips tabaci</i>	-----

Aelothrips bicolor Hinds

Aelothrips bicolor is a common thrips in most of temperate north America and is an inhabitant of prairies and grasslands. It is an incidental on seedling cotton.



Figure 78. *Aelothrips bicolor* female.

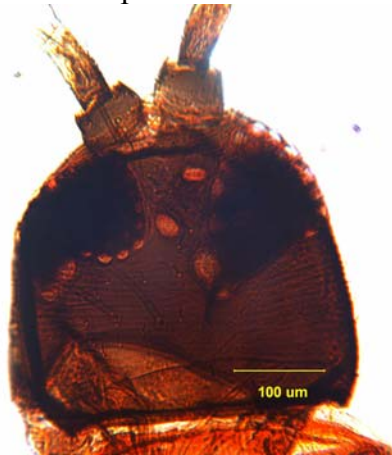


Figure 79. Head.



Figure 80. Antennae.

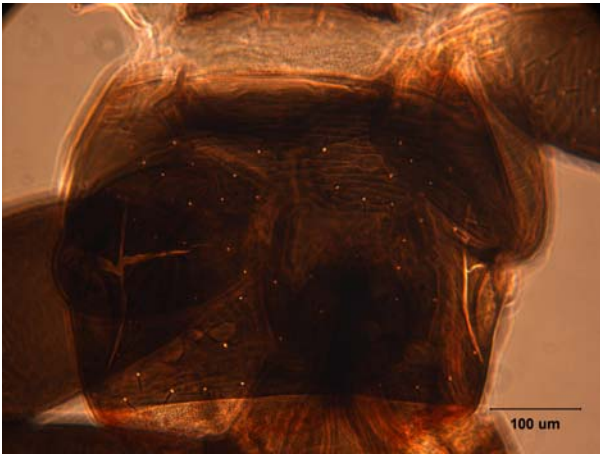


Figure 81. Pronotum.

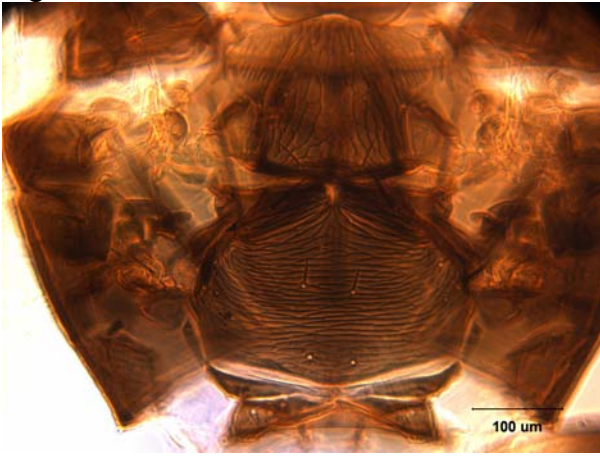


Figure 82. Mesonotum and metanotum.

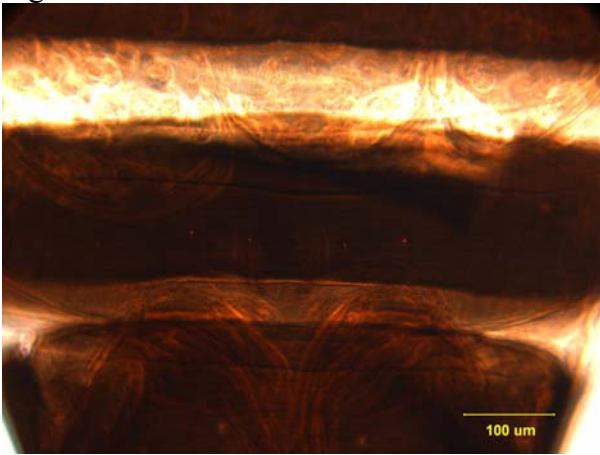


Figure 83. Eighth Abdomenal tergite.

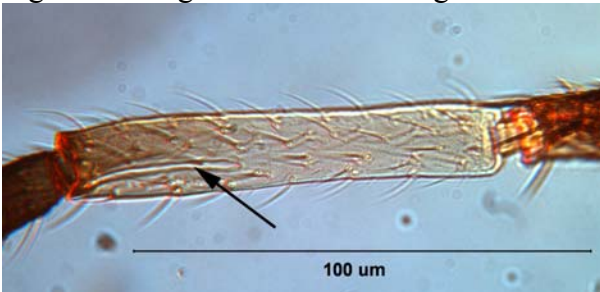


Figure 84. Antenna segment 3 with sensorium.

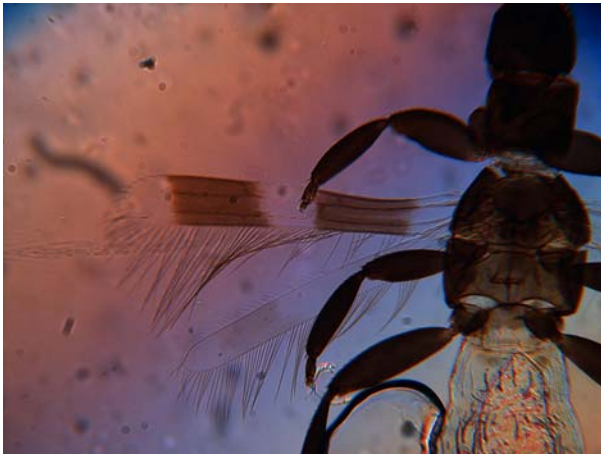


Figure 85. Wing (100X).

Anophothrips obscurus (Müller) - Grass thrips

Anophothrips obscurus, as its common name implies, feeds and lays its eggs primarily on grass but is also commonly found on corn. It has a worldwide distribution. Males of this species are unknown. It is an incidental on seedling cotton.



Figure 86. Female.



Figure 87. Head.

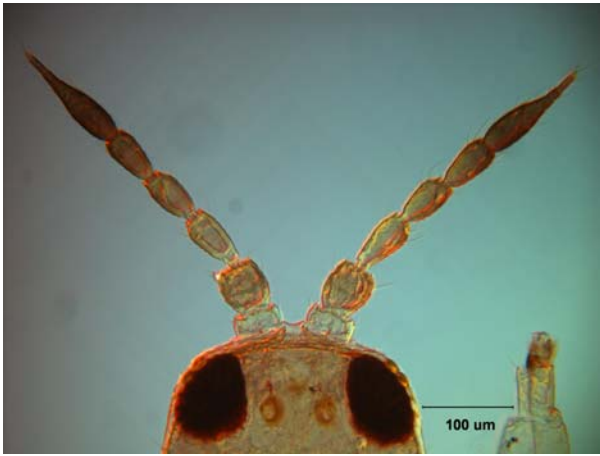


Figure 88. Antenna.



Figure 89. Pronotum.

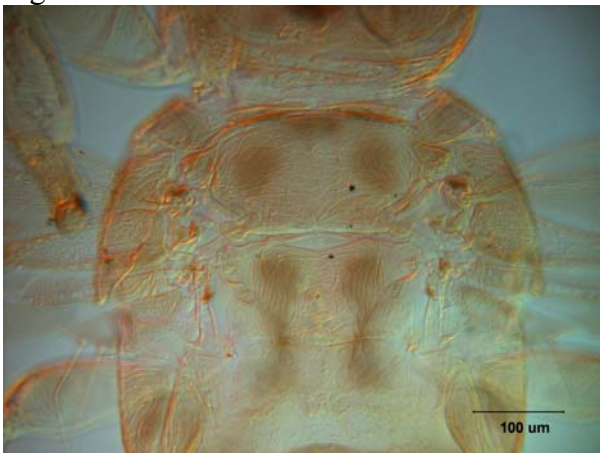


Figure 90. Mesonotum and metanotum.

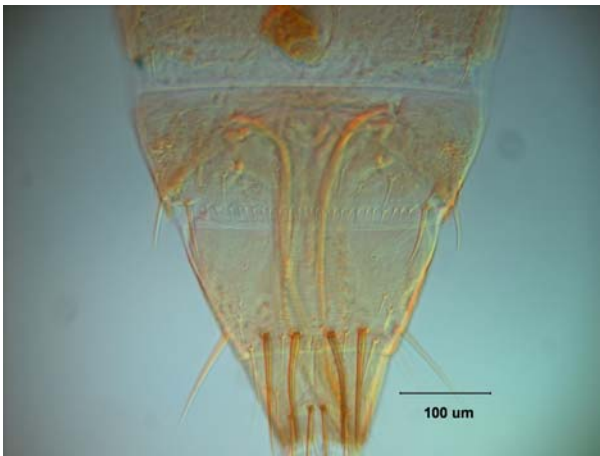


Figure 91. Comb on the eighth abdominal tergite.



Figure 92. Wing.

***Caliothrips fasciapennis* (Hood)**

This thrips is a grasslands inhabiting species. Other closely related species feed on wild lettuce and similar hosts or on beans. It is an incidental on seedling cotton.



Figure 93. Female.



Figure 94. Head.

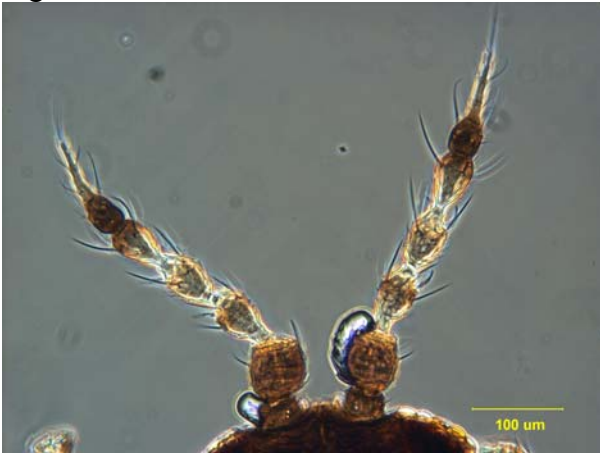


Figure 95. Antenna.

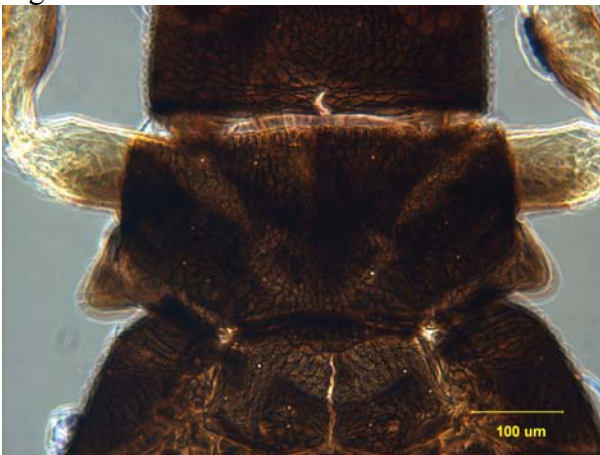


Figure 96. Pronotum.

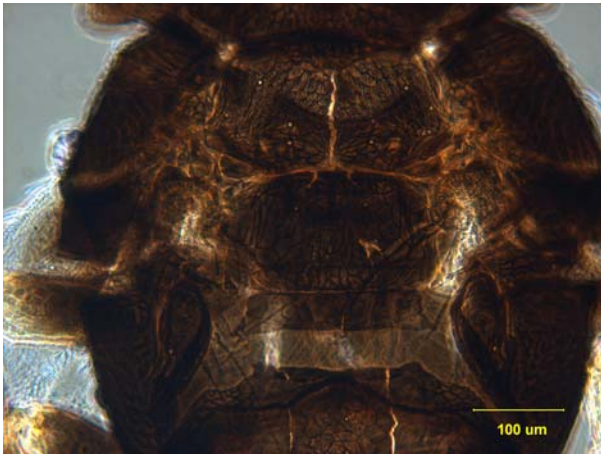


Figure 97. Mesonotum and metanotum.

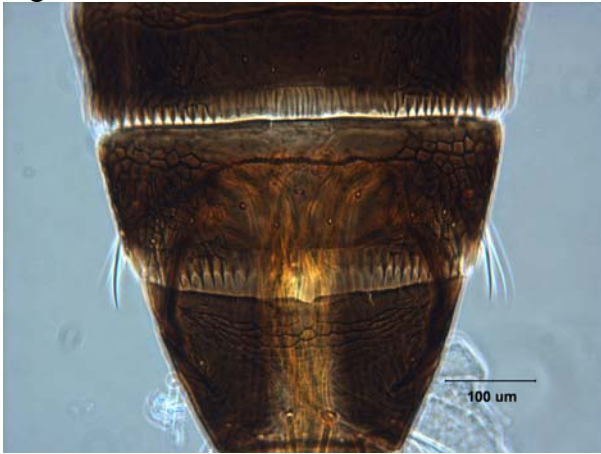


Figure 98. Eighth abdominal tergite.

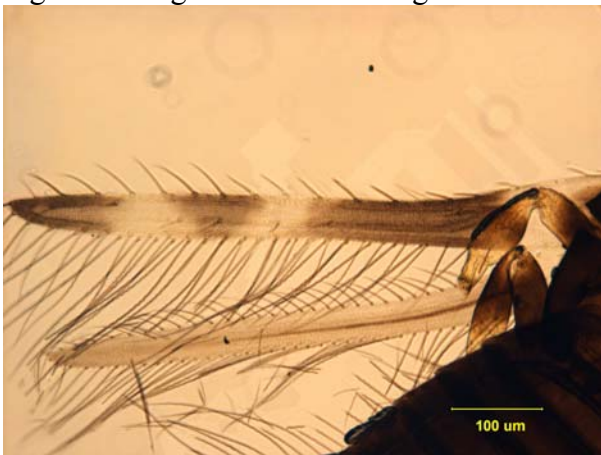


Figure 99. Wing.

***Chirothrips texanus* Andre**

Chirothrips texanus is widely distributed in the United States and is common in grass. It is an incidental on seedling cotton.



Figure 100. Female.

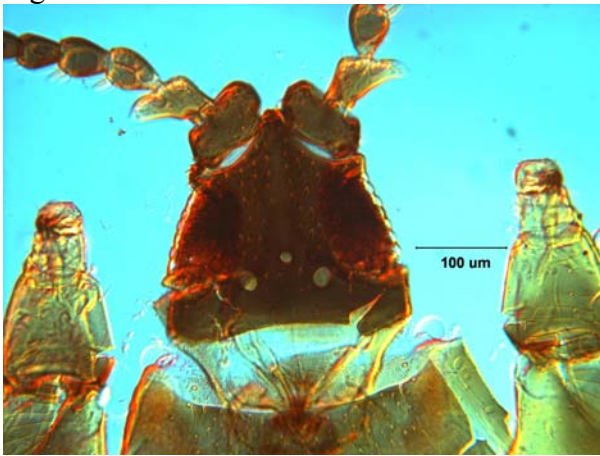


Figure 101. Head.

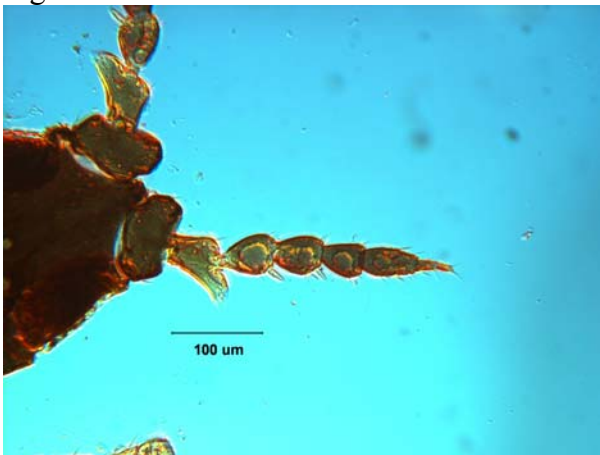


Figure 102. Antenna.

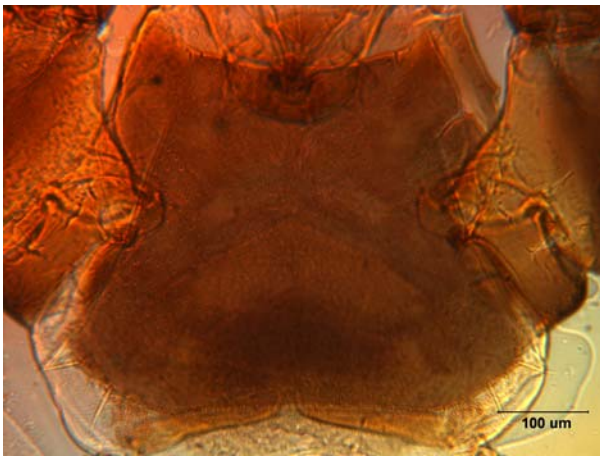


Figure 103. Pronotum.

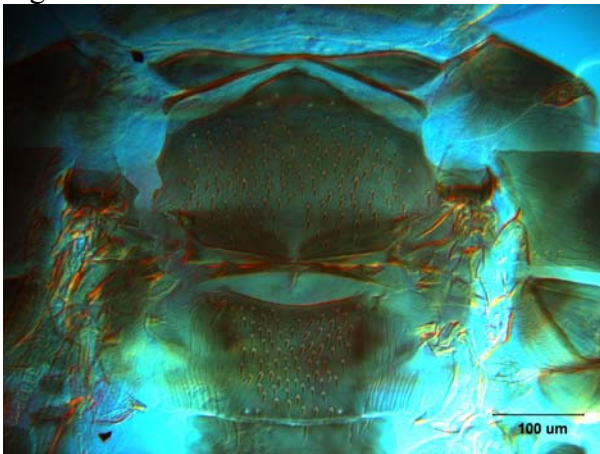


Figure 104. Mesonotum and metanotum.

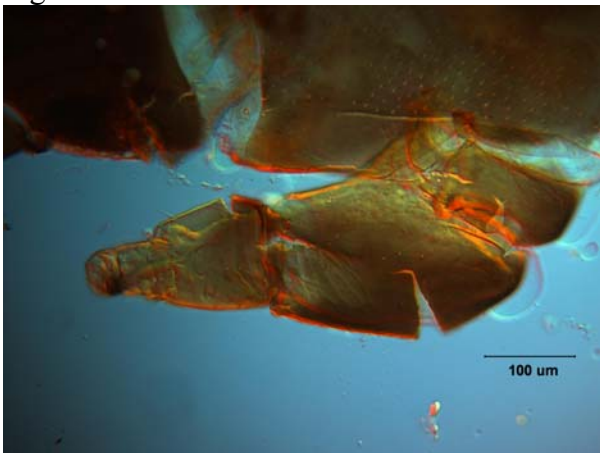


Figure 105.

Echinothrips americanus Morgan – Impatiens thrips

Echinothrips americanus occurs primarily on ornamentals and trees and is common on impatiens and pointsettias plants. It occurs primarily in eastern United States.



Figure 106. Female.



Figure 107. Head.



Figure 108. Antenna (colapsed in this specimen).



Figure 109. Pronotum.

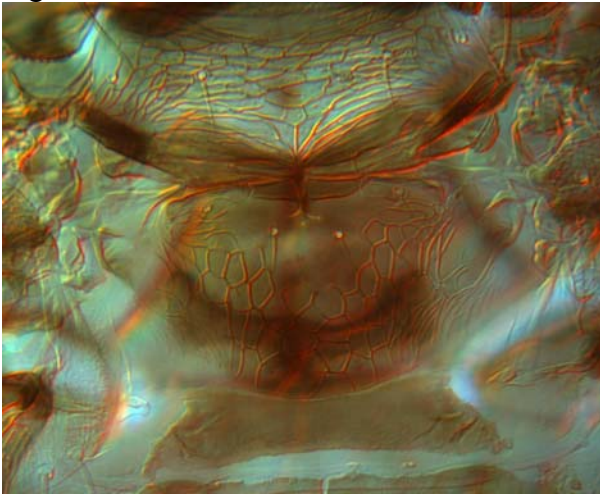


Figure 110. Mesonotum and metanotum.



Figure 111. Eighth abdominal tergite.

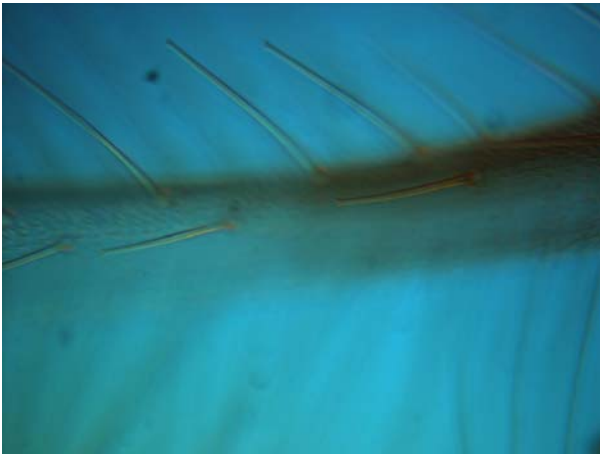


Figure 112. Wing.

Frankliniella bispinosa – Florida flower thrips

Frankliniella bispinosa is primarily a citrus and avocado pest in Florida. Specimens observed for this publication were collected from cotton in Georgia. It may occur in other southeastern states. It is probable that this thrips might be difficult to control with insecticides on cotton because of selection for resistance resulting from the use of insecticides in the citrus industry.



Figure 113. Female.

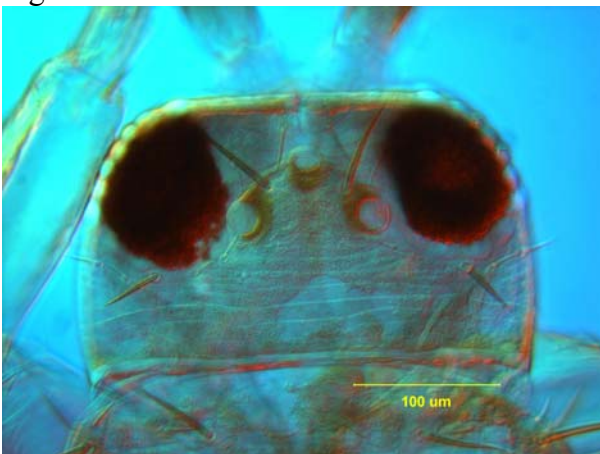


Figure 114. Head.



Figure 115. Antenna.

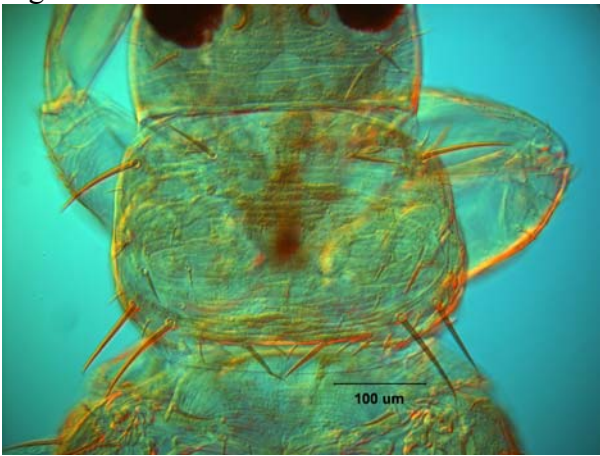


Figure 116. Pronotum.

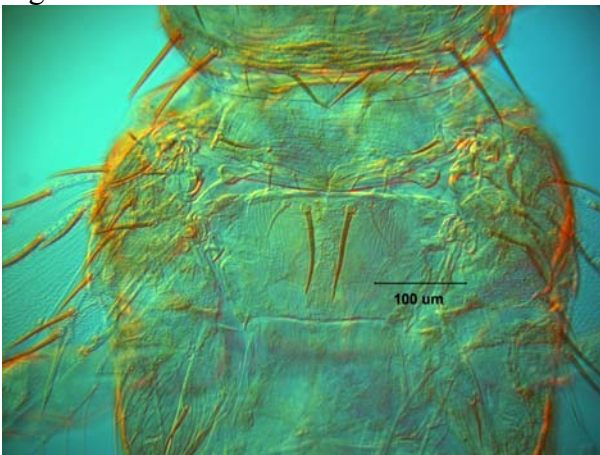


Figure 117. Mesonotum and metanotum.

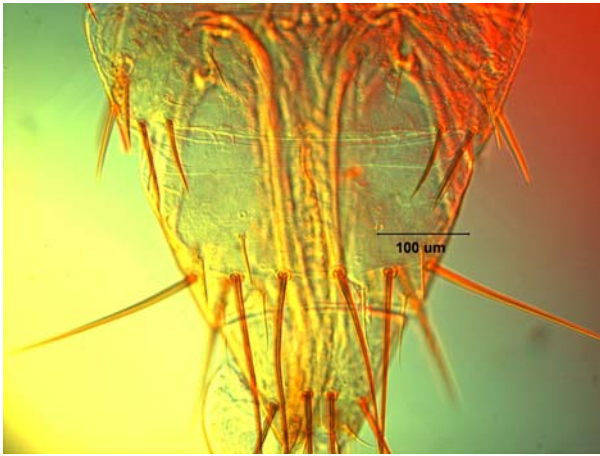


Figure 118. Eighth abdominal tergite.

Frankliniella exigua Hood

Frankliniella exigua specimens in the Beshear thrips collection on deposit at the University of Georgia are well represented. However, Stannard in discussion of *Frankliniella runneri* mentions that *F. exigua* may well be a synonym of *F. runneri*, and that *F. runneri* was reported to be a pest on cotton (Stannard, 1968). We assume that since *F. runneri* is poorly represented in the Beshear collection and is otherwise not common in the literature, that the species more common in the midsouth (if they are different) is *F. exigua*. *F. runneri* is not represented in this key.

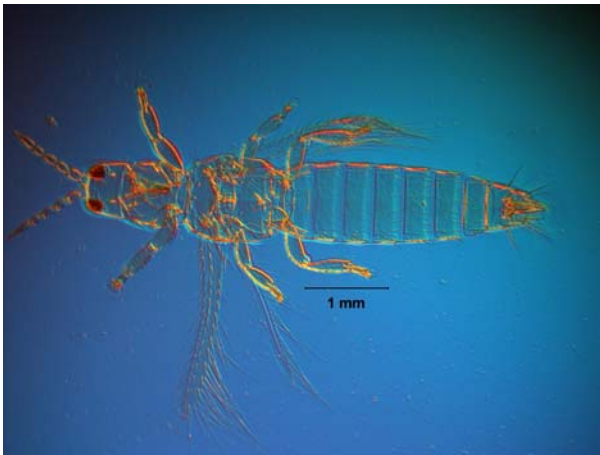


Figure 119. Female.



Figure 120. Head.



Figure 121. Antenna.

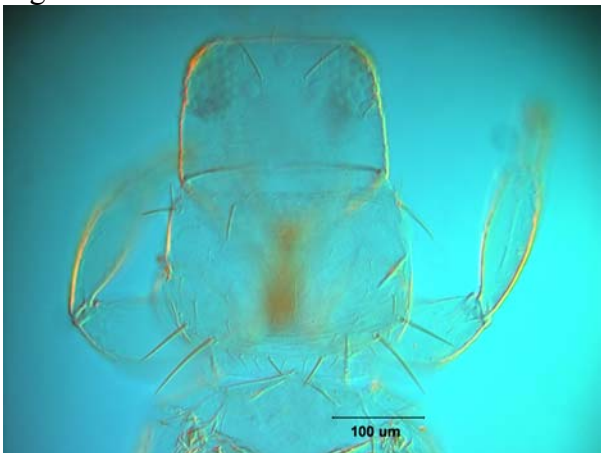


Figure 122. Pronotum.

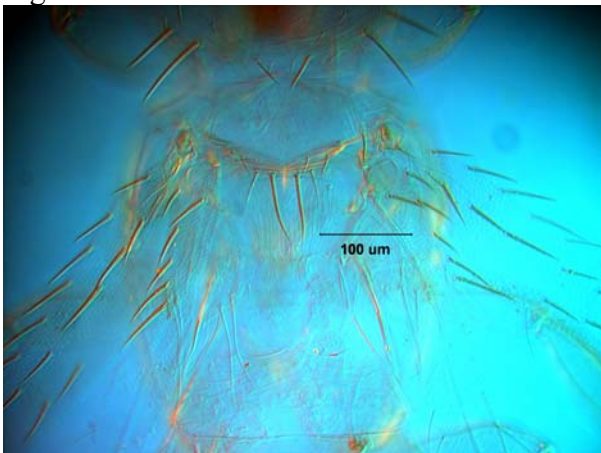


Figure 123. Mesonotum and metanotum.

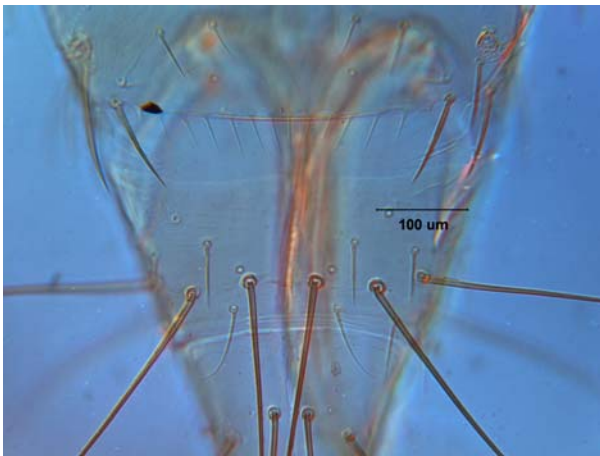


Figure 124. Eighth abdominal tergite.

Frankliniella fusca (Hinds) – Tobacco thrips

Frankliniella fusca is the most common thrips on seedling cotton in the Mid South, composing about 95% of all thrips collected from the seedling crop. It may reach population levels sufficient to severely stunt or kill seedling cotton, but tends to disappear from cotton following the generation developed on seedling cotton. Adults of both sexes of this species may or may not have wings (Macropterous – with wings; Brachypterous – without wings). This species is not a flower thrips and is not attracted to blooms but feeds mostly on leaves. It is easily controlled with systemic insecticides and most contact insecticides.



Figure 125. Female with wings.



Figure 126. Female without wings.



Figure 127. Light form.



Figure 128. Head.



Figure 129. Antenna.

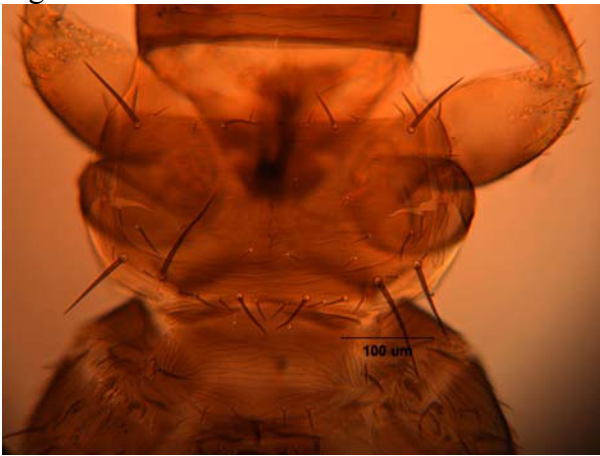


Figure 130. Pronotum.

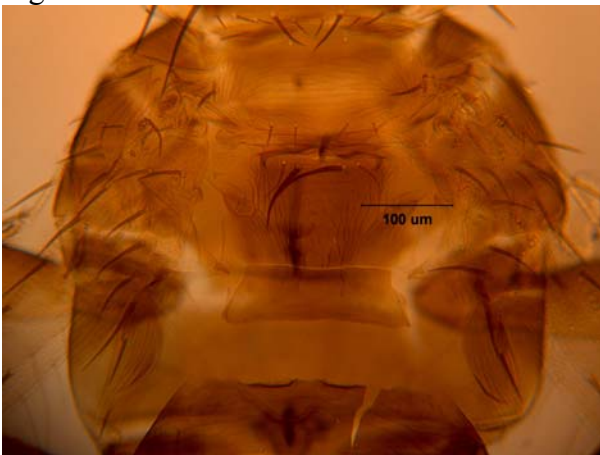


Figure 131. Mesonotum and metanotum.

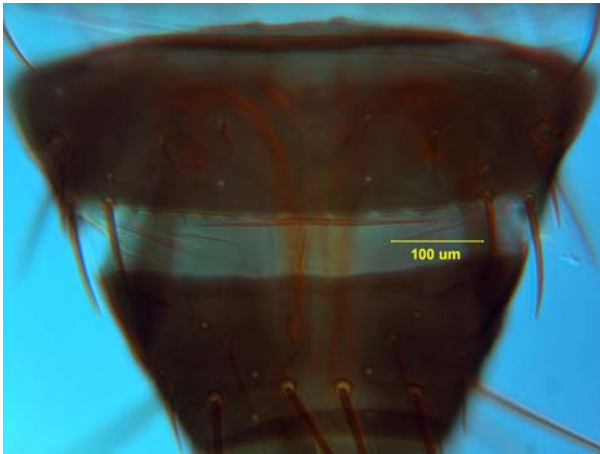


Figure 132. Eighth abdominal tergite.

***Frankliniella occidentalis* (Pergande) – Western Flower Thrips**

Frankliniella occidentalis is common across the cotton belt in the United States and is otherwise distributed world wide. It is considered a beneficial in cotton in California at times during the season as a predator on spider mites. This has not been verified in the Mid-South. It is an annual pest of seedling cotton in some areas of the Mid-South where numbers appear to increase during seasons of spring drought. This thrips has occurred in extremely high numbers in blooming cotton, causing leaves to appear scorched and petals to stick together so that blooms do not open properly. Western flower thrips in seedling cotton are generally light amber in color with some dark areas on the abdomen. They may also be entirely dark brown, superficially resembling tobacco thrips. Because they have been historic pests in greenhouses and field crops, western flower thrips populations may be resistant to many commonly used insecticides



Figure 133. Female, light form.



Figure 134. Female, dark form.



Figure 135. Head.

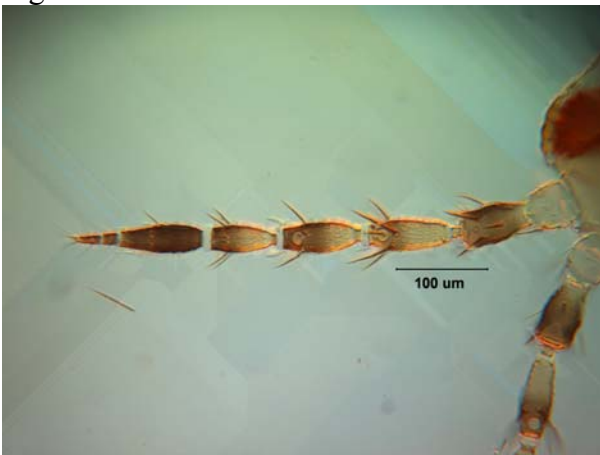


Figure 136. Antennae.



Figure 137. Pronotum.

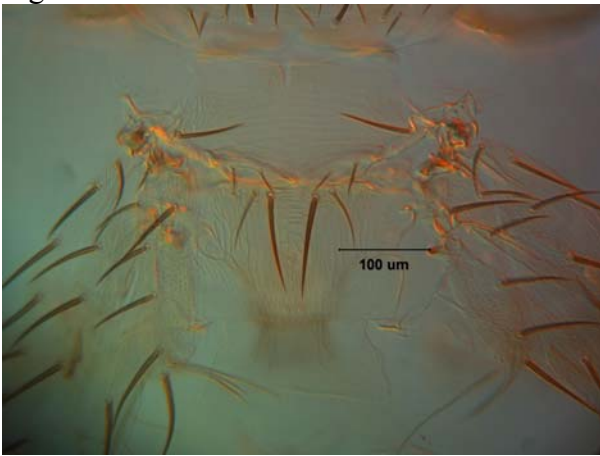


Figure 138. Mesonotum and metanotum.

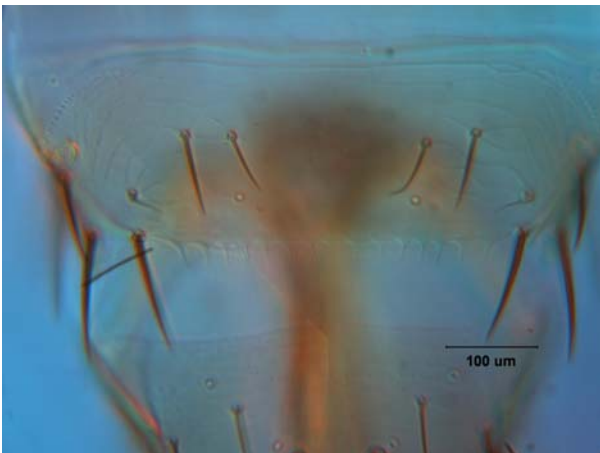


Figure 139. Comb on eighth abdominal tergite.

Frankliniella tritici (Fitch) – Flower thrips (usually called Eastern flower thrips)

Frankliniella tritici is very common throughout the southern United States. It is a true flower thrips that feeds primarily on pollen, but it may occur in relatively high numbers in seedling cotton. It will often be found in the blooms of flowering cotton.

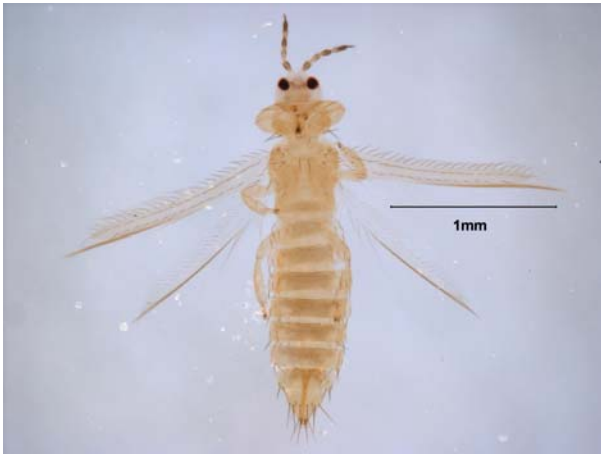


Figure 140. Female.



Figure 141. Head.



Figure 142. Antenna.

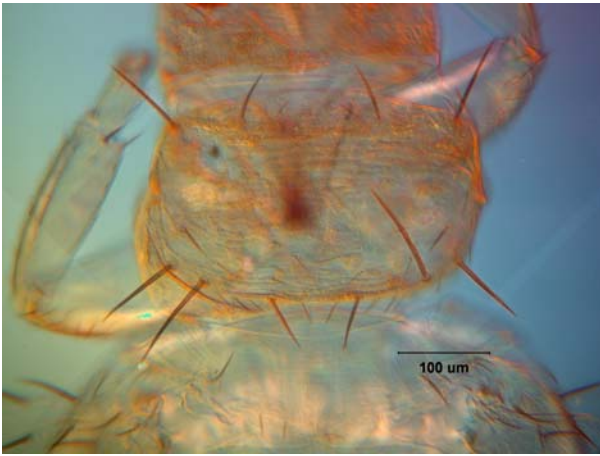


Figure 143. Pronotum.

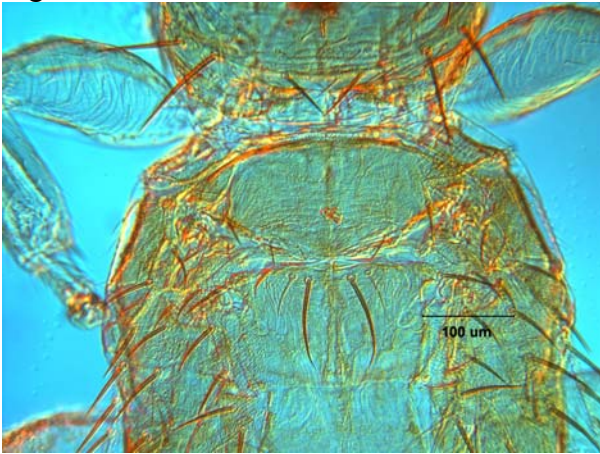


Figure 144. Mesonotum and metanotum.

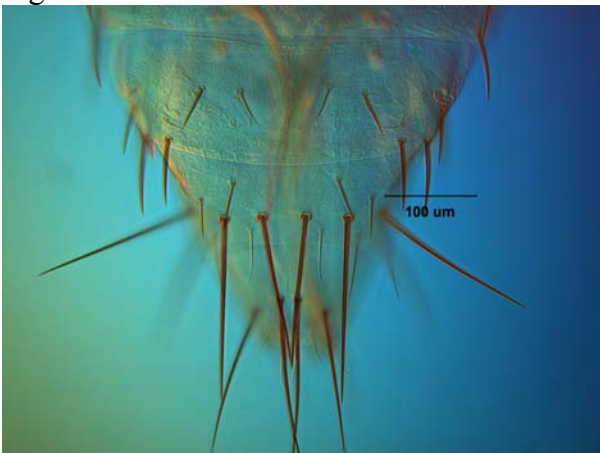


Figure 145. Eighth abdominal tergite.

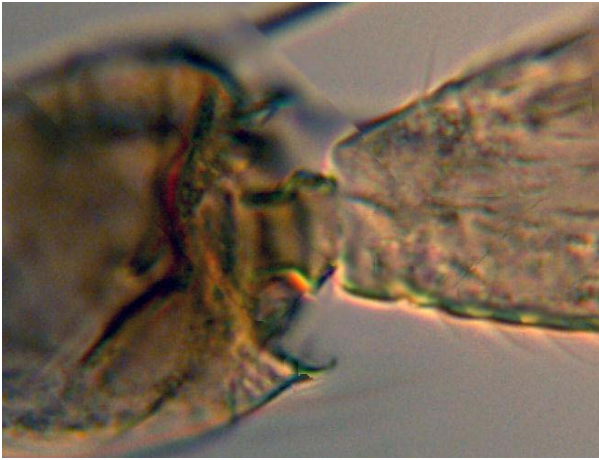


Figure 146. Joint between antennal segments 2 and 3.

***Frankliniella williamsi* Hood – Corn thrips**

Frankliniella williamsi is very common on corn. It occurs in the South Eastern United States on that crop and has been collected from cotton planted near corn. It is considered an incidental insect on cotton.



Figure 147. Female.



Figure 148. Head .



Figure 149. Antenna.

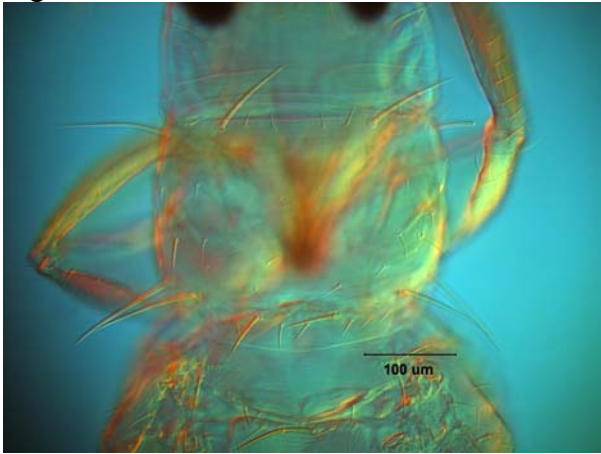


Figure 150. Pronotum.

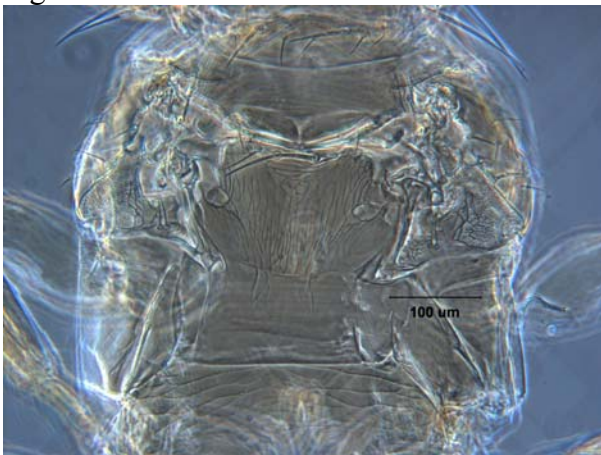


Figure 151. Mesonotum and metanotum.

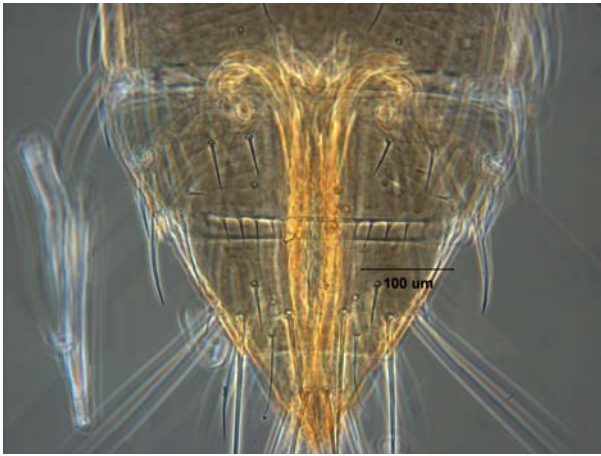


Figure 152. Eighth abdominal tergite.

Limothrips cerealium (Haliday) – Grain thrips

Limothrips cerealium is a thrips that feeds on grain and grasses. It is an incidental on cotton.



Figure 153. Female.



Figure 154. Head.

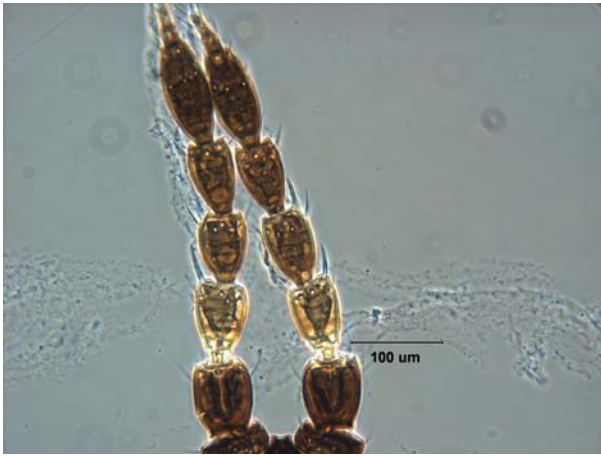


Figure 155. Antenna.

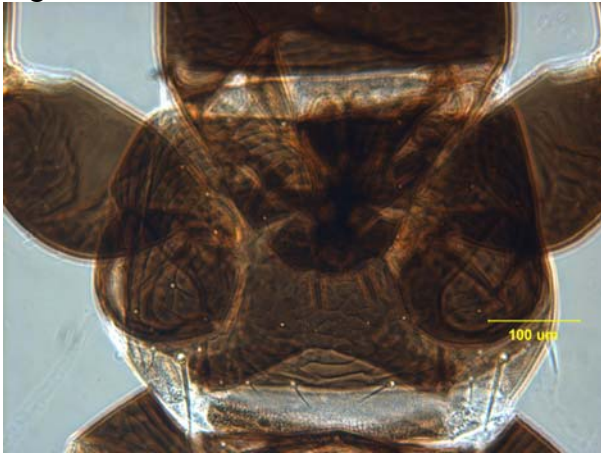


Figure 156. Pronotum.

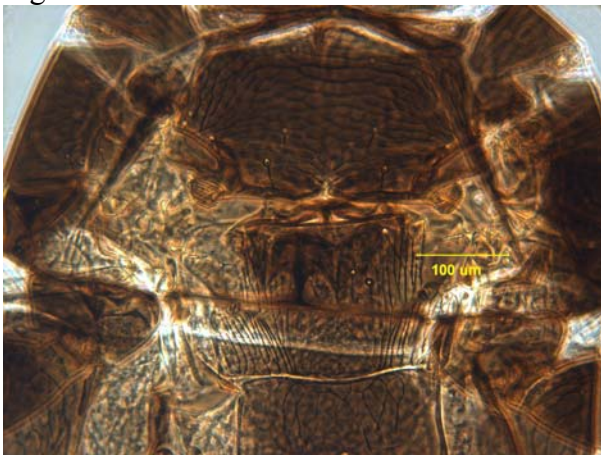


Figure 157. Mesonotum and metanotum.

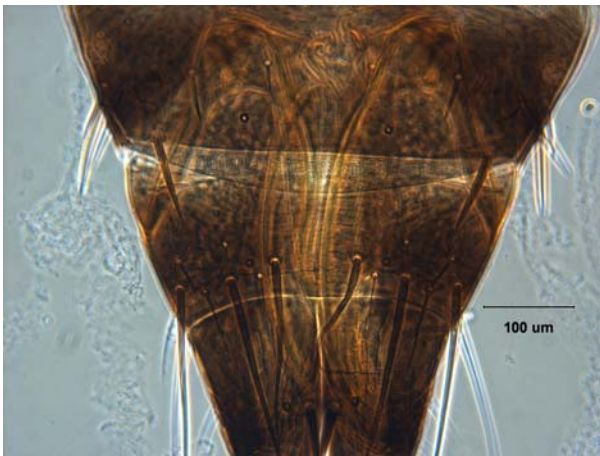


Figure 158. Eighth abdominal tergite.



Figure 159. Wing.

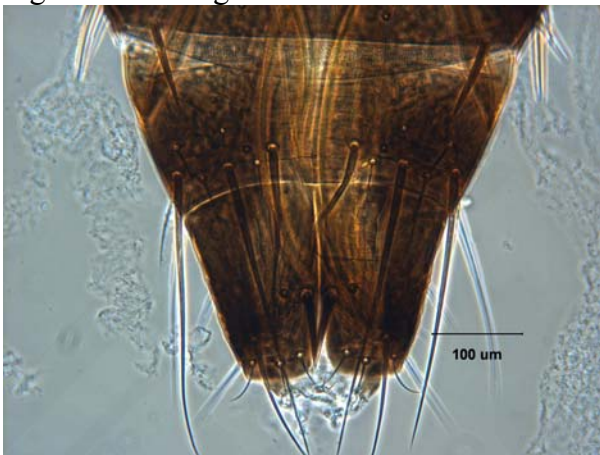


Figure 160. Tenth abdominal tergites.

Microcephalothrips abdominalis (D. L. Crawford) – Composit thrips

Microcephalothrips abdominalis is a very common flower thrips found on composites such as chrysanthemum, zinnia and marigolds. They are often found on seedling cotton or caught on sticky traps or in antifreeze traps. They are not considered a serious pest of cotton.



Figure 161. Female.



Figure 162. Head.



Figure 163. Antenna.

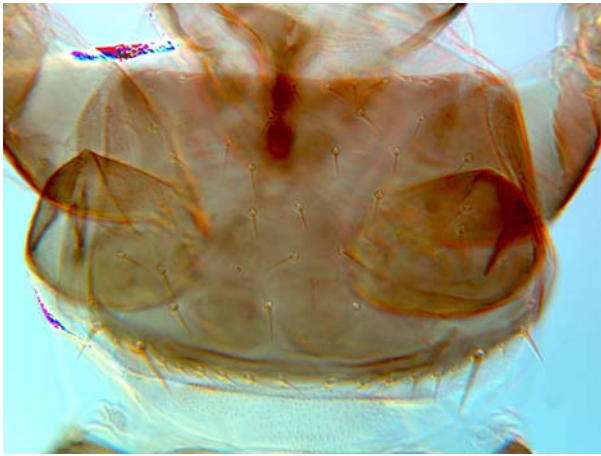


Figure 164. Pronotum.



Figure 165. Mesonotum and metanotum.

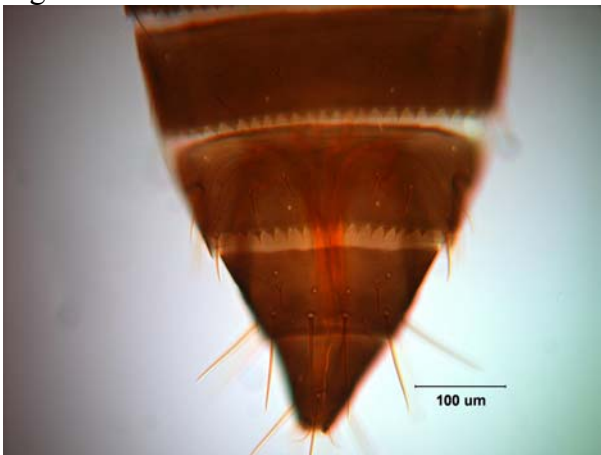


Figure 166. Eighth abdominal tergite.

Neohydatothrips variabilis (Beach) – Soybean thrips

Neohydatothrips variabilis is common throughout the United States and Canada. Its primary hosts are legumes. It is often collected from seedling cotton but is usually not in high numbers. It is not considered a serious pest of seedling cotton.



Figure 167. Female.



Figure 168. Head.

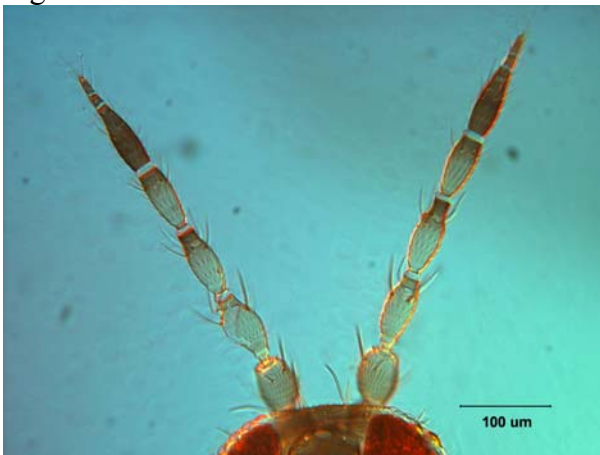


Figure 169. Antenna.

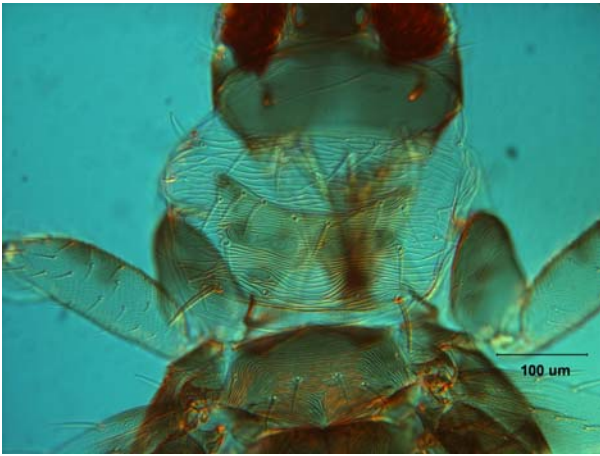


Figure 170. Pronotum.

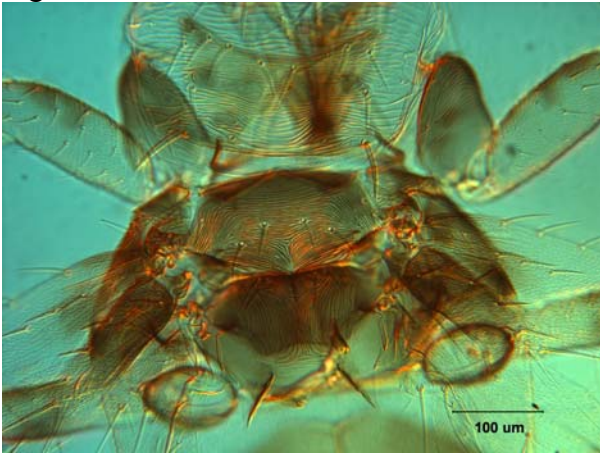


Figure 171. Mesonotum and metanotum.

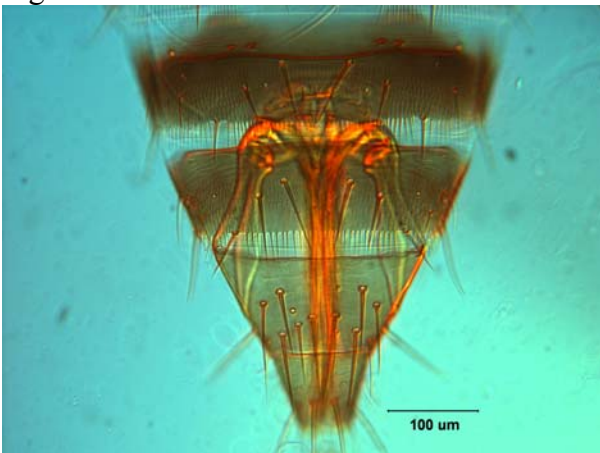


Figure 172. Eighth abdominal tergite.

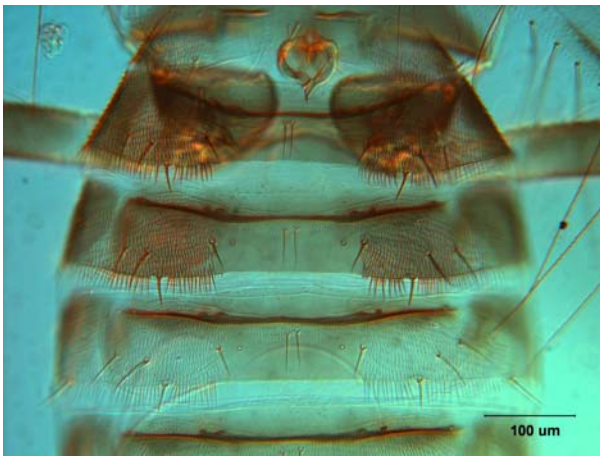


Figure 173. Spines on abdominal tergites.

Plesiothrips perplexus (Beach)

Plesiothrips perplexus is another grass inhabiting species that occurs incidentally on cotton.



Figure 174. Female.



Figure 175. Head.

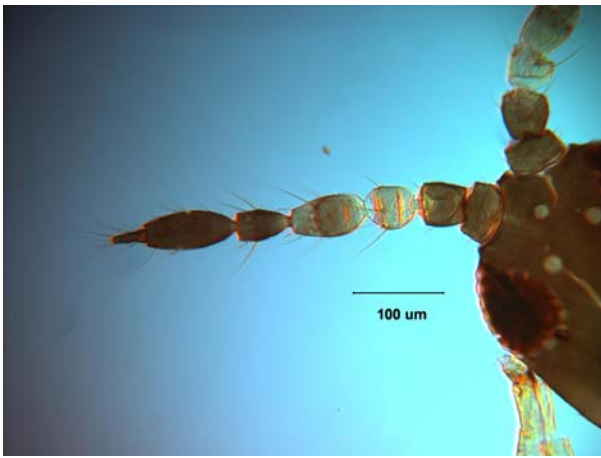


Figure 176. Antenna.

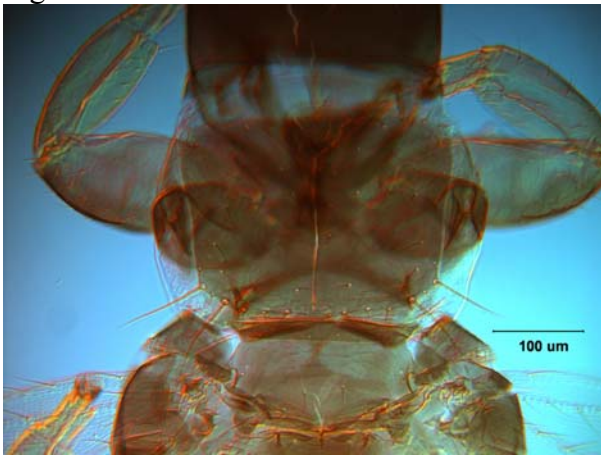


Figure 177. Pronotum.



Figure 178. Mesonotum and metanotum.

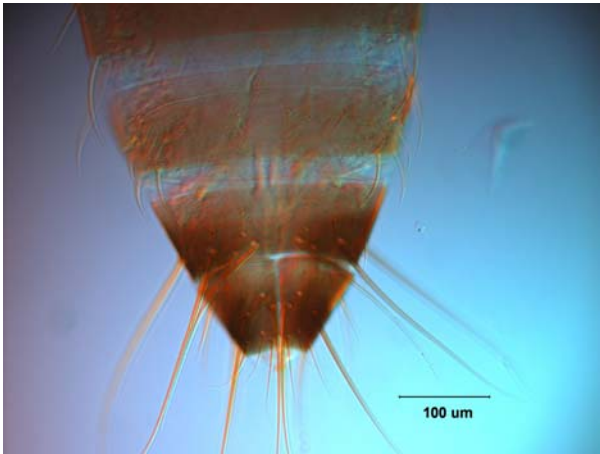


Figure 179. Eighth abdominal tergite.

***Scolothrips palidus* (Beach)**

Scolothrips palidus is a predatory thrips of spider mites. It has been reported only from cotton grown in a greenhouse.

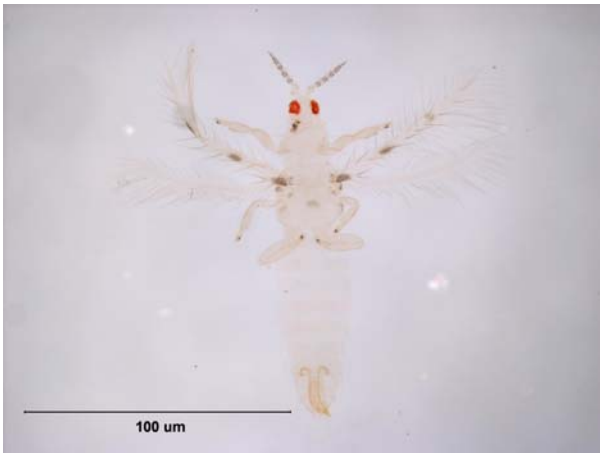


Figure 180. Female.



Figure 181. Head.

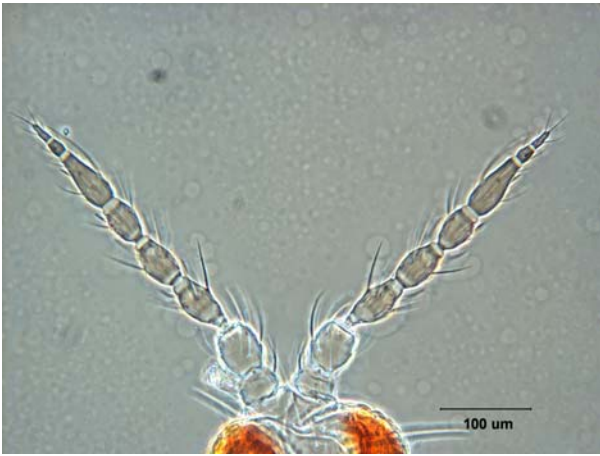


Figure 182. Antenna.



Figure 183. Pronotum.

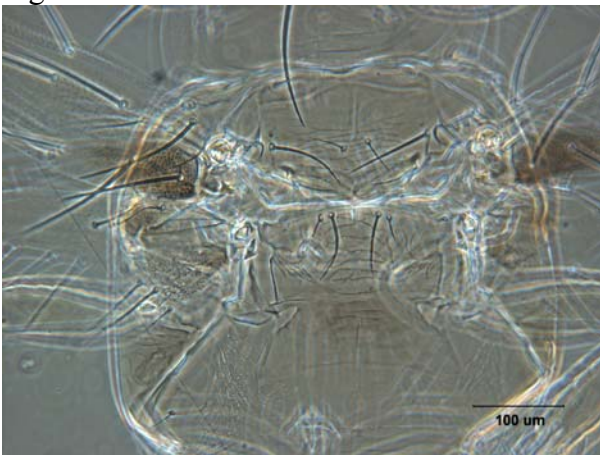


Figure 184. Mesonotum and metanotum.



Figure 185. Eighth abdominal tergite.

Sericothrips cingulatus Hinds

Sericothrips cingulatus is a grass inhabiting species that occurs incidentally on cotton.



Figure 186. Female.



Figure 187. Head.

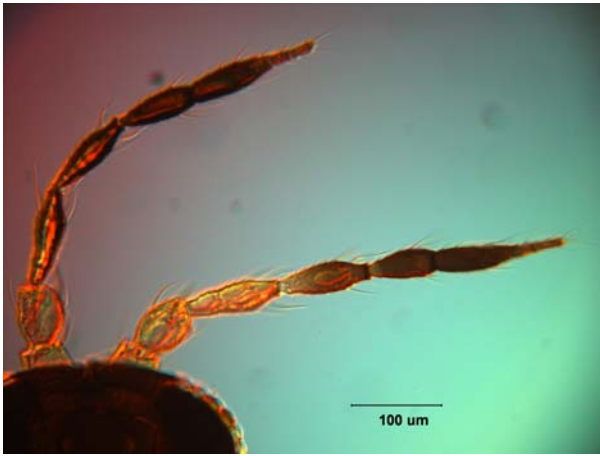


Figure 188. Antenna.

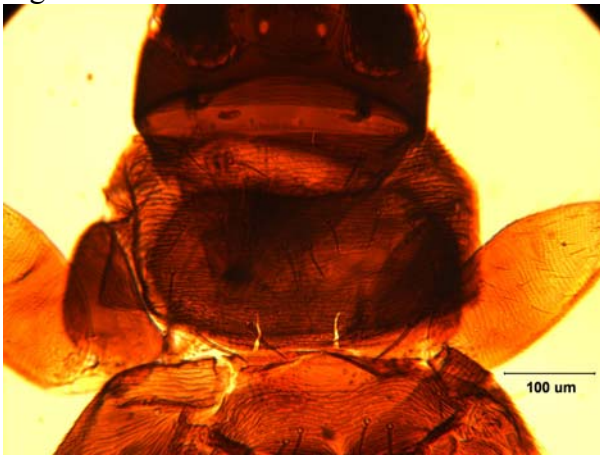


Figure 189. Pronotum.

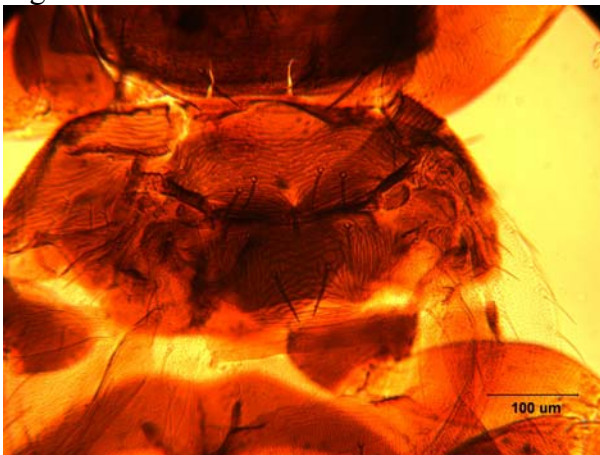


Figure 190. Mesonotum and metanotum.

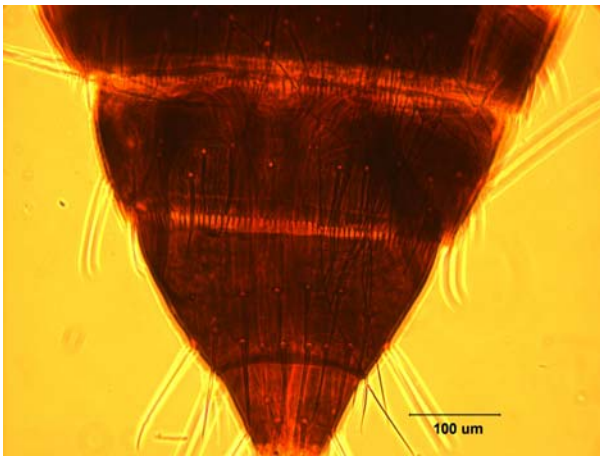


Figure 191. Eighth abdominal tergite.

Thrips tabaci Lindeman – Onion thrips.

Thrips tabaci is distributed world wide. It is not generally a pest of major significance on seedling cotton and generally occurs with other species on that host. Onions are the preferred host, but it may feed on many field and vegetable crops and flowers.



Figure 192. Female.



Figure 193. Head.



Figure 194. Antenna.

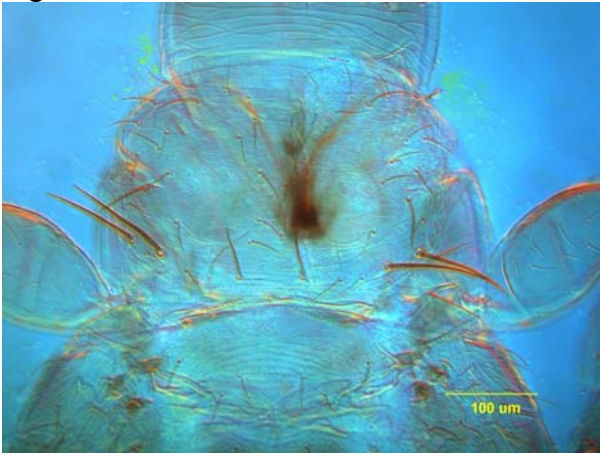


Figure 195. Pronotum.

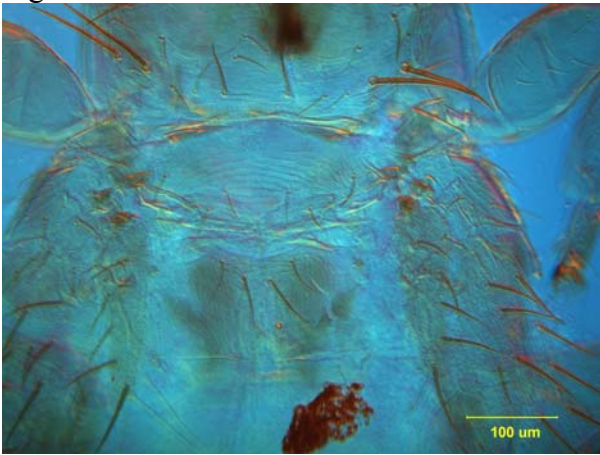


Figure 196. Mesonotum and mentanotum.

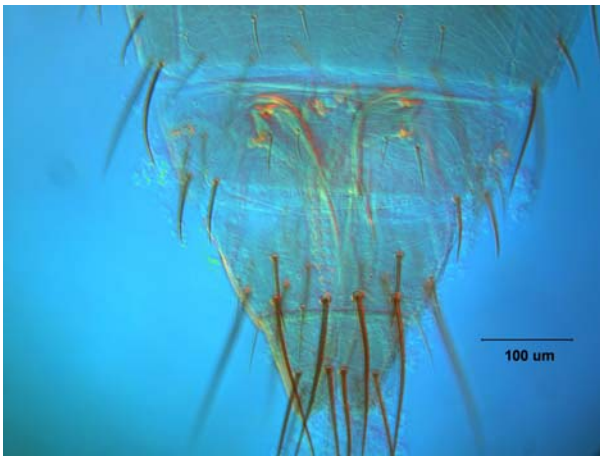


Figure 197. Eighth abdominal tergite.

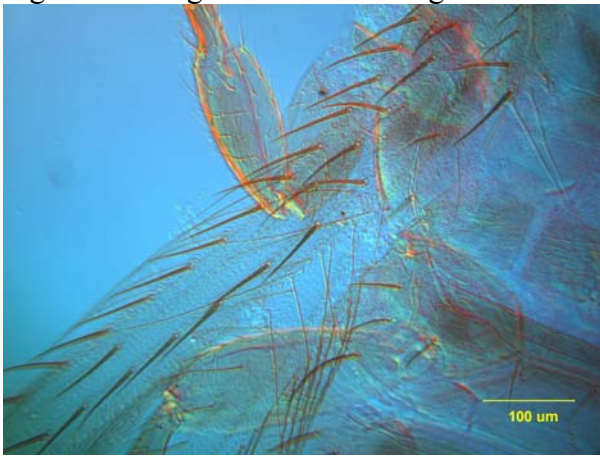


Figure 198. Wing.

Thrips nigripilosus Uzel – Chrysanthemum thrips

Thrips nigripilosus closely resembles *T. tabaci* but is primarily associated with chrysanthemum and similar flowers as its name implies. It is an incidental on cotton.



Figure 199. Female.

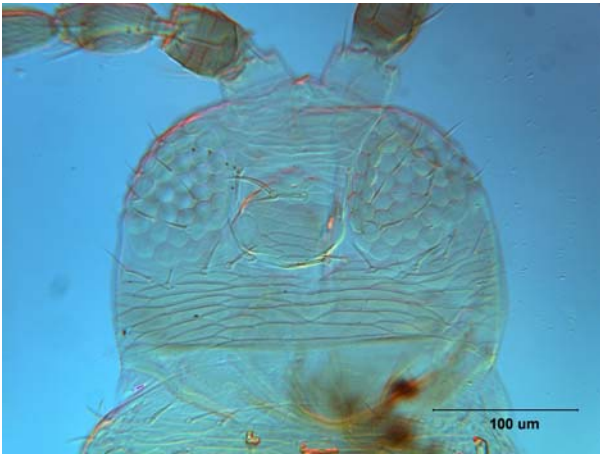


Figure 200. Head.

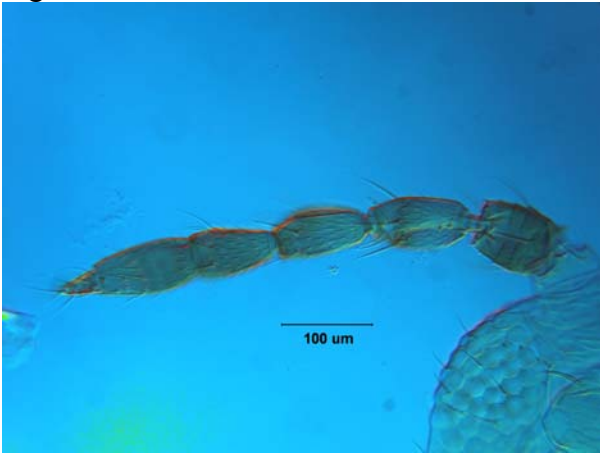


Figure 201. Antenna.

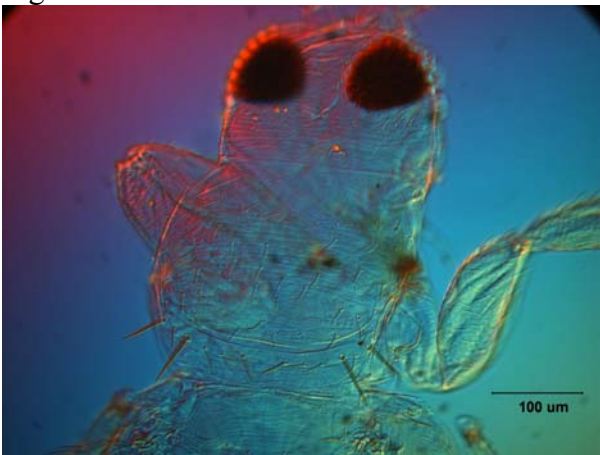


Figure 202. Pronotum.

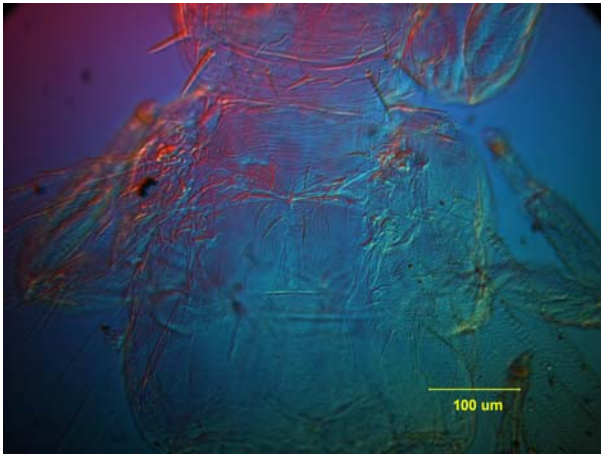


Figure 203. Mesonotum and metanotum.

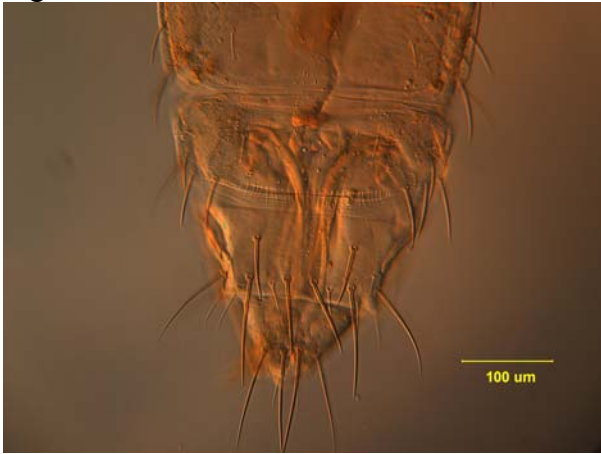


Figure 204. Eighth abdominal tergite.

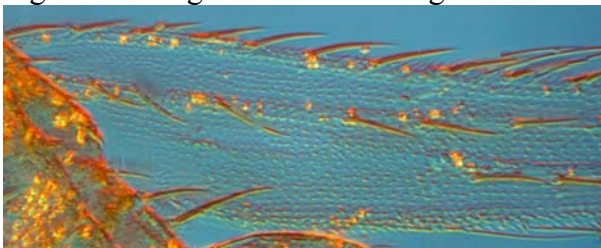


Figure 205. Wing.

Literature Cited and Useful References

Several publications may be useful for identification of thrips that are not cited in this document. Stannard published a descriptive review of all the thrips in Illinois that includes many species in the Mid-south (Stannard 1968). His publication serves as a rich source of references. Nakahara reviewed the genus *Sericothrips* and reassigned *S. variabilis* to the genus *Neohydatothrips* (Nakahara, 1968). Thrips of Georgia were reported by Beshear (Beshear 1973). Sakimura and O'Neill (Sakimura and O'Neill, 1979) redefined the genus *Frankliniella*; however, revision of the *Minuta* group included in that document contains only species indigenous to the Southwest that have not been collected from cotton in the Mid-south.

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