

The name of the order means fringe (thysano-) winged (-ptera). Another name sometimes used for the order is **Physopoda** which means bladder (physo-) foot (-poda). The common name is thrips. Remember that it is thrips in the both the singular and the plural; there is no such thing as a thrip. The Thysanoptera are closely related to the Hemiptera and belong to the hemipteroid group of orders.

Thrips are small to minute insects (0.5-5.0mm). They have slender bodies.

The head is hypognathous to slightly opisthognathous. The compound eyes are present in adults. The antennae are 4-9 segmented. The mouthparts are rasping-sucking, and they are asymmetrical; that is, the right mandible is atrophied and the left mandible is produced as a stylet. A mouth cone is formed by the labrum and clypeus from above, and the labium from below. The laciniae of the maxillae are stylet-like and grooved to form a tubular structure through which they can suck up juices. The mandibular stylet is used to break up plant cells, and the two maxillary stylets join to form a tube through which the plant juices can be sucked up into the head.

The pronotum is well-developed in winged individuals; it may be reduced in wingless individuals. They may be winged or wingless. In winged forms, the wings are narrow, with reduced venation, and are margined with setae. The tarsi are 1 or 2 segmented, and are bladderlike at the tip (hence the old order name).

Cerci are absent.

Life cycle: The life cycle is unusual. The metamorphosis is intermediate between simple and complete.

Reproduction is by bisexual copulation or by parthenogenesis. Females are oviparous (lay eggs) or ovoviviparous (give birth to live young). The first two instars have no wings externally and are called larvae (there is some evidence that wings are developing internally in some species). In the suborder Terebrantia, the third (called the **propupa**) and fourth (called the **pupa**) instars are inactive, do not feed, and have external wings. In the suborder Tubulifera, there are three inactive instars (the propupa and two pupal instars). So, this development resembles gradual metamorphosis because it has two instars with external wing development, but it also resembles complete metamorphosis by having some internal wing development, and by having a pupal instar preceding the adult stage.

Economic importance: There are a number of species considered to be pests. There are 31 species listed with a common name in the ESA list of common names. Plant feeding thrips can also transmit plant viruses (*Thrips tabaci* transmits spotted wilt of tomatoes).

Beneficial species. Some thrips have been used in the biological control of weeds. For example, alligator weed is an introduced pest in Florida (from South America). The thrips, *Aminothrips* sp. was introduced to control it, along with several other insects. Odd uses of thrips for beneficial purposes include the following. Agronomist Ian Forbes noted that thrips prefer to feed on blue lupines that are sweet, just as do cattle. So he selected thrips damaged plants to select for favorable feed lupines for cattle.

Classification: There are two suborders of Thysanoptera: Terebrantia and Tubulifera.

A. Suborder Terebrantia: This suborder is distinguished in that the females have the apex of the abdomen cone shaped or rounded, with a ventral slit to accommodate the saw-like ovipositor (Figs. 23-3A & B). The eggs are C-shaped (kidney shaped). The saw-like ovipositors are used to slit the host plant for insertion of the eggs. The forewings (in forms having wings) are placed parallel over the abdomen when at rest, and have both veins and setae. Most species of this suborder are plant feeders; a few are predators. There are 6 North American families in this suborder, but you will only be responsible for recognizing the two suborders. The families of the Terebrantia are separated primarily on antennal characters, especially the number of segments, and the size and shape of the sensoria on the third and fourth antennal segments.

1. Aeolothripidae: broad-winged or banded thrips. This is the most primitive of living thrips families. They are thought to have evolved as pollen feeders in that they can hold the pollen grain by the palps and pierce the pollen shell by the single mandible, and suck out the contents through the coupled maxillary stylets. On the average, they are larger than most of the other Terebrantia. The ovipositor is curved upward in the female (Fig. 23-3B). The front wings are broad (Fig. 23-4G). The antennae are 9-segmented. Sensoria on the 3rd and 4th antennal segments are long and flat (Fig. 23-5A - these are difficult to see).
2. Merothripidae: large-legged thrips. The large legged thrips are relatively small. Antennae are 8 segmented, and the sensoria are round (Fig. 23-5B). These have a pair of trichobothria on abdominal segment 10 (Fig. 23-6C). The front and hind femora are thickened. We have one common species which occurs under bark, *Merothrips morgani*.
3. Heterothripidae: these are small stout thrips. The antennae are 9-segmented. Segments 3 and 4 have band-like sensoria (Fig. 23-5C). There are about 80 species in the family; 20 of these are known only from fossils from Baltic amber or Oligocene lignite.
4. Thripidae: common thrips. The chief family of the Terebrantia. The females of this family have the ovipositor curved downward (Fig. 23-3A). The antennal sense cones are enlarged like big setae (Figs. 23-5D & E). There are about 1500 species in this family. Most feed on leaves or flowers; several transmit plant viruses; some pollinate flowers; a few prey on mites; some mimic leaf hoppers; and once in a while some attempt to bite people. The most economically important thrips belong to this family. In North Dakota, the barley thrips, *Limothrips denticornis*, is a very important pest. This species has an unusual life history. Post and McBride in 1966 reported that it is the female pupa that is fertilized by the apterous male adult (this is a form of **neoteny** - sexual maturity in larval stage). After fertilization, the males die and only the females overwinter.

B. Suborder Tubulifera: This suborder is characterized by the females having the tip of the abdomen tubular in shape (Fig. 23-3C), and they lack an ovipositor. The wings (if present) lack veins or if a vein is present it is short.

1. Phlaeothripidae: This is the only family in this suborder. There are possibly several thousand species in the family. Many species feed on fungus in leaf mold, under bark, and on or in rotten logs. Some feed on plant leaves or flowers. There are many degenerate and elaborately formed species in the family. There are species that mimic and live in the colonies of ants. There is a species in Australia that is quite large (10-14mm).

Two of Dr. Post's students worked on thrips, so we do have a good reprint collection on the order. Both of these students published their works in the Schaefer-Post series (one is on the Terebrantia and the other is on the Tubulifera).