

# Aquatic Entomology:

## Trichoptera and Lepidoptera with special reference to Texas

**Order: Trichoptera** (caddisflies).

Diagnosing Features:

- small to medium-sized, most are dull-colored, slender body
- four membranous wings which are very hairy and have scales
- wings held tent-like over body
- antennae long and slender, filiform
- chewing mouthparts, well-developed palps but reduced mandibles in adults
- larvae are aquatic some build rock or stick cases

Habitat: near water

Food habits: decomposers and some predators

Metamorphosis: holometabolous

Preservation: alcohol, large adults pinned through mesonotum

Taxa in Texas: 199 species, 51 genera, 20 families.

Classification:

### **Suborder Spicipalpia (Closed-cocoon makers)**

**Family: HYDROBIOSIDAE.**

**Morphology, larvae** --small - medium; front legs with chelate terminus formed by tibia and tarsus; without gills on abdomen

**Ecology, larvae** --live in fast flowing streams where they are predators.

**Texas genera:**

*Atopsyche erigia*, from Austin south and west; another species is in Arizona; this is largely a Neotropical family which is the sister family to Rhyacophilidae.

**Family: GLOSSOMATIDAE.**

**Morphology, larvae** --Saddle shaped or tortoise like portable cases. Anal proleg at with at least two hooks or claws: a dorsal accessory hook, the main hook is ventral.

**Ecology, larvae** --live in fast flowing streams where they are scrapers.

**Texas genera:**

*Culoptila*, 1 species (*C. cantha*). With a stout, hook like seta associated with the tarsal claws.

*Protoptila*, 4 species, at least in the Hill Country, including the Devils River and west Texas. With a long, slender seta associated with the tarsal claws.

**Family: HYDROPTILIDAE.**

**Morphology, larvae** --small!; small claws on anal prolegs.

**Ecology, larvae** --live in a wide variety of lotic and lentic habitats, different genera and life stages fit most every functional feeding group including: collectors, scrapers some are piercers of algae. They are free-living through the first four instars and make cases in the final larval instar. Cases are often bivalved and can incorporate mineral and vegetal matter, hung together with silk. Some make their cases completely from silk.

**Texas genera:**

*Alisotrichia*, 1 species in Texas.

*Hydroptila*, at least 24 species in Texas.

*Ithytrichia*, 1 species in Texas.

*Leucotrichia*, 2 species in Texas.

*Mayatrichia*, 3 species in Texas.

*Metrichia*, 1 species in Texas.  
*Neotrichia*, 9 species in Texas.  
*Ochrotrichia*, 12 species in Texas.  
*Orthotrichia*, 5 species in Texas.  
*Oxyethira*, 17 species in Texas.

Family: **RHYACOPHILIDAE**, not in Texas.

#### **Suborder Annulipalpia (Fixed-retreat makers)**

##### **Family: PHILOPOTAMIDAE.**

**Morphology, larvae** --labrum membranous, clypeus asymmetrically notched in most *Chimarra*, but not in one central Texas species. The key needs this minor revision to account for this species.

**Morphology, adults** --most are small and black, one species, *Chimarra texana* is black with attractive white spots they may rub off in light trap samples.

**Ecology, larvae** --live in fast flowing streams where they are predators in slick tubes.

##### **Texas genera:**

*Chimarra*, 12 species, some of which are widespread and common in Texas.

*Wormaldia*, 1 species, far west Texas.

##### **Family: ECNOMIDAE.**

**Morphology, larvae** --sclerotized meso and metanotum, like in hydroptilids and hydropsychids, but with very large claws on anal prolegs. They also have a strange, long, flattened head (at least in Texas).

**Ecology, larvae** --live in tubes on rocks fast flowing streams.

##### **Texas genera:**

*Austrotinodes texensis*, central and south Texas. See the 1995 paper by David Bowles.

##### **Family: HYDROPSYCHIDAE.**

**Morphology, larvae** --note gills on underside of abdomen, C shaped; not case builders, but do spin extensive nets.

**Morphology, adults** --They have a prominent neck and the tips of the wings parted more than many caddis adults.

**Ecology, larvae** --live in a wide variety of streams where they are predators which spin nets to trap prey and debris. They can be extremely abundant and many are tolerant of silty and murky water.

##### **Texas genera:**

*Ceratopsyche*, 1 species, west Texas.

*Cheumatopsyche*, 9 species, scattered and widespread in Texas.

*Diplectrona*, 1 species, east Texas?

*Hydropsyche*, 8 species, scattered and widespread in Texas.

*Leptonema*, 1 species, probably in southernmost Texas, but conceivably from Big Bend.

*Macrostemum*, 1 species, east Texas?

*Potamyia*, 1 species, east Texas?

*Smicridea*, 2 species, south and west Texas.

##### **Family: POLYCENTROPODIDAE.**

**Morphology, larvae** -- sharp trochantin. Roundheads.

**Ecology, larvae** --live in a wide variety of fixed retreats on rocks in streams.

##### **Texas genera:**

*Cernotina*, 4 species scattered throughout Texas.

*Cymellus*, at least 1 species in Texas.

*Neureclipsis*, 2 species in Texas.

*Paranyctiophylax*, 2 species in Texas.

*Phylocentropus*, 2 species in east Texas. Sometimes placed in its own family Dipseudopsidae (Wiggins 1996), see discussion under that family.

*Polycentropus*, 7 species scattered throughout Texas.

*Polyplectropus*, 3 species in south Texas. All U.S. records are from Texas, but they occur further south into Mexico and South America.

**Family: DIPSEUDOPSIDAE.**

**Morphology, larvae** --unsclerotized meso- and metanotum. The tarsus of all legs are strangely flattened. Round heads.

**Ecology, larvae** --live in silk tubes covered with sand. The entrance to the tube extends above the level of the substrate.

**Texas genera:**

*Phylocentropus*, 2 species, east Texas.

**Family: PSYCHOMIIDAE.**

**Morphology, larvae** -- hatchet shaped trochantin. Roundheads.

**Ecology, larvae** --make a retreat on submerged logs and branches. Probably collectors or scrapers.

**Texas genera:**

*Lype*, 1 species in east Texas.

**Family: XIPHOCENTRONIDAE.**

**Morphology, larvae** -- tibia and tarsus of each leg fused. Round heads.

**Ecology, larvae** --make a tube retreat at the waters edge, the tube may extend above the water line. Probably collectors or scrapers.

**Texas genera:**

*Xiphocentron*, 1 species, *messapus* in south Texas, north into part of the Hill Country, at least as far north as Travis County.

**Suborder Integripalpia (Portable-case makers)**

**Family: BRACHYCENTRIDAE.**

**Morphology, larvae** -- no humps on abdomen; makes a square or round portable case; in the most common genus (*Brachycentrus*) it is square in crosssection.

**Ecology, larvae** --*Brachycentrus* attaches its case with silk to the upper side of rocks then hangs out its legs and filter feeds.

**Texas genera:**

*Brachycentrus*, 1 species in east Texas. It is widespread in areas with more topographic relief.

**Family: LEPIDOSTOMATIDAE.**

**Morphology, larvae** --lateral humps on abdomen (dorsal hump absent); mesonotum largely sclerotized; antenna very close to eye; portable cases of various types.

**Ecology, larvae** --lotic; all univoltine. Mostly shredders.

**Texas genera:**

*Lepidostoma*, 2 species in Texas. I don't know its distribution here. It is widespread in areas with more topographic relief.

**Family: LIMNEPHILIDAE.**

**Morphology, larvae** --lateral and dorsal humps on abdomen; antenna midway between eye and mandible; mesonotum largely sclerotized; portable cases of a wide variety of materials.

**Ecology, larvae** --lentic and lotic; univoltine and semivoltine.

**Notes**--Several families have been split off recently from the Limnephilidae: Goeridae, Rossianidae, Apataniidae, and Uenoidae.

**Texas genera:**

*Hesperophylax*, 1 species in Texas. Western.

*Ironoquia*, 1 species in Texas. Eastern.

*Limnephilus*, 4 species in Texas. Western.

*Pycnopsyche*, 3 species in Texas. I don't know the distribution.

**Family: ROSSIANIDAE**, not in Texas.

**Family: APATANIIDAE**, not in Texas.

**Family: UENOIDAE**, not in Texas.

**Family: GOERIDAE**, not in Texas.

**Family: PHRYGANEIDAE.**

**Morphology, larvae** --mesonotum and metanotum membranous; sa3 setal cluster on metanotum; prosternal horn; large; portable case builder, often with prominent spiral arrangement; two dark head stripes.

**Ecology, larvae** --lentic and lotic; univoltine.

**Texas genera:**

*Agrypnia*, 1 species in Texas. I don't know its distribution

*Ptilostomis*, 2 species in Texas. I don't know the distribution.

**Family: CALAMOCERATIDAE.**

**Morphology, larvae** --labrum with transverse row of at least 16 setae; mesonotum sclerotized, metanotum membranous; hind tarsal claw similar to those on other legs; portable case of carefully cut leaves, with cowl and flanges.

**Ecology, larvae** --

**Texas genera:**

*Phylloicus*, 2 species in Texas, both western, one, *P. ornatus* extending into the Hill Country as far east as Travis County.

**Family: LEPTOCERIDAE.**

**Morphology, larvae** --antennae very long; cased portable, often very long.

**Ecology, larvae** --both lotic and lentic, even within a species. All food habits. All univoltine. Some specialists on sponge.

**Texas genera:**

*Ceraclea*, 7 species in Texas

*Leptocerus*, 1 species in Texas. I don't know the distribution.

*Nectopsyche*, 6 species in Texas.

*Oecetis*, 10 species in Texas.

*Triaenodes*, 7 species in Texas.

**Family: MOLANIDAE.**

**Morphology, larvae** --hind tarsus reduced to a small setose stub or slender filament; flattened portable case of precisely arranged sand grains, with cowl and flanges.

**Ecology, larvae** --headwater streams and springs. Univoltine.

**Texas genera:**

*Molanna*, 2 species in Texas. Eastern and northern.

**Family: ODONTOCERIDAE.**

**Morphology, larvae** --antenna very close to mandible on anterior head margin; abdominal humps present; mesonotum sclerotized and metanotum membranous; fore trochantin small, not hooked.

**Ecology, larvae** --lotic

**Texas genera:**

*Marilia*, 2 species in Texas. Western.

**Family: HELICOPSYCHIDAE.**

**Morphology, larvae**-- spiral, snail-like portable case; truncate head with hypognathous mouthparts; anal claw pectinate; fore trochantin elongate.

**Ecology, larvae**--usually lotic rarely lentic. Univoltine, bivoltine, multivoltine.

**Texas genera:**

*Helicopsyche*, 3 species in Texas.

**Family: SERICOSTOMATIDAE.**

**Morphology, larvae**--hooked fore trochantin; mesonotum sclerotized, metanotum membranous; abdominal humps present; portable case curved with sand or small rocks.

**Ecology, larvae**--lotic.

**Texas genera:**

*Agarodes*, 2 species in Texas.

**Family: BERAETIDAE**, not in Texas.

**Order: Lepidoptera** (moths and butterflies).

Diagnosing Features:

scales on wings

adult mouthparts are sucking, larvae have chewing mouthparts

large compound eyes

Habitat: ubiquitous

Food habits: diverse; many are plant feeders

Metamorphosis: holometabolous

Preservations: pinned and spread

Notes: Lepidoptera can be split into 3 primary groups, the moths, skippers and butterflies. Moths are generally nocturnal and the fore and hind wings are hooked together by a frenulum or jugum. Butterflies are generally diurnal and have clavate antennae. Their hind wings overlap, but are not hooked together. Skippers are generally diurnal and have a combination of characters shared with both butterflies and moths.

Families

**Family: PYRALIDAE.**

**Morphology, larvae** -- most commonly with prognathous heads (some may be hypognathous). Most common family of aquatic Lepidoptera.

**Ecology, larvae** -- *Petrophila* make silk tube retreats in riffles in moderate current, the tube be coated with debris. Later they pupate beneath the debris laden tube, which is reinforced over the top of a depression on a rock and aerated using a series of portholes around the edge. Other pyralids make cases of living macrophyte leaves. Some are scrapers others are shredders of living macrophyte tissue.

**Notes**--The genus *Petrophila* needs some taxonomic attention with regards to larvae. Some "round headed" forms produce *Petrophila* adults, but don't key properly using current concepts such as in Lange's in Merritt & Cummins 1996.

**Texas genera:**

*Munroessa*

*Parapoynx*

*Synclita*

*Petrophila* There are probably other genera, but I haven't encountered them yet.