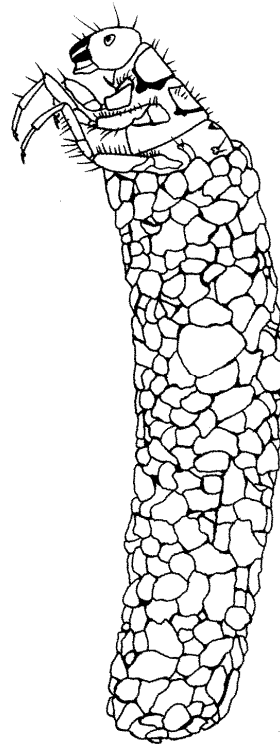


CHAPTER 10

TRICHOPTERA (Caddisflies)



Draft
June 17, 2009

10

ORDER TRICHOPTERA

Caddisflies

Trichoptera is the largest order of insects in which most members are truly aquatic. Trichoptera are close relatives of butterflies and moths (Lepidoptera) and like Lepidoptera, caddisflies have the ability to spin silk. This adaptation may be largely responsible for the success of this group. Silk is used to build retreats, to build nets for collecting food, for construction of cases, for anchoring to the substrate, and to spin a cocoon for the pupa. Almost all caddisflies live in a case or retreat with the exception of Rhyacophilidae. Caddisflies are important in aquatic ecosystems because they process organic material and are an important food source for fish. This group displays a variety of feeding habits such as filter/collectors, collector/gatherers, scrapers, shredders, piercer/herbivores, and predators. Caddisflies are most abundant in running (lotic) waters. Like Ephemeroptera and Plecoptera, many Trichoptera species are sensitive to pollution.

Trichoptera Morphology

Larval Trichoptera resemble caterpillars except Trichoptera lack abdominal prolegs with crochets (see fig 11.2). Trichoptera can be identified by their short antennae, sclerotized head, sclerotized plate on thoracic segment one (and sometimes also on segments 2 or 3), soft abdomen, three pairs of segmented legs, and an abdomen that terminates in a pair of prolegs bearing hooks (Figure 10.1).

Characteristics used to separate trichopteran families include sclerotization of the thoracic segments, presence or absence of abdominal humps, position and length of antennae, and the shape of the prolegs and associated anal claw. In many taxa, the shape and construction materials of a retreat or case can also be diagnostic (Figure 10.2, Figure 10.3, Figure 10.4). However in macroinvertebrate samples, the case is sometimes lost and morphological characters must be relied upon.

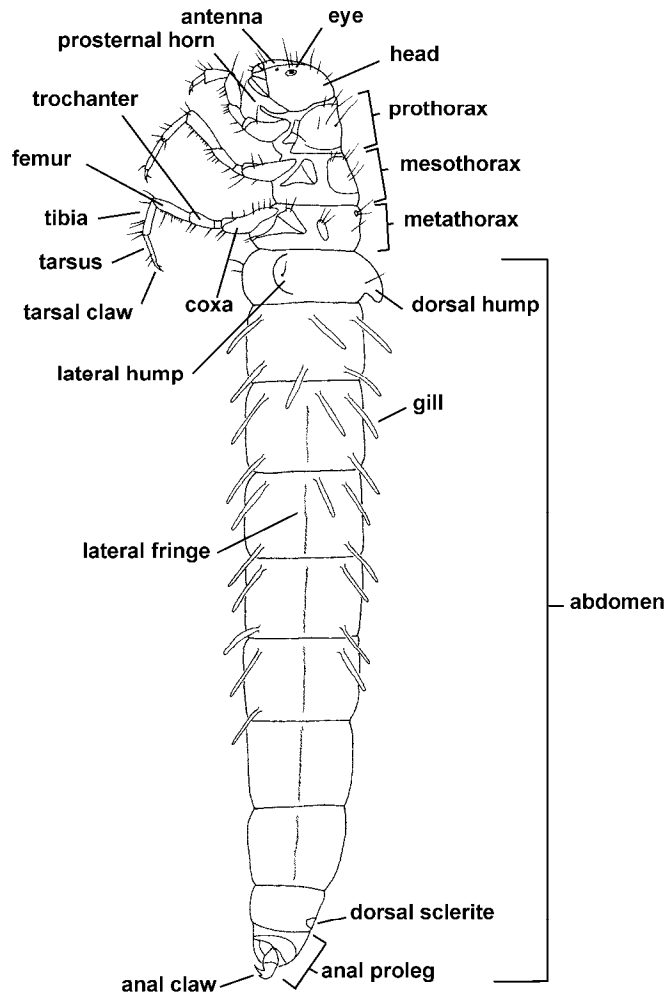


Figure 10.1: Lateral view of trichopteran larva.

Examples of Trichopteran Cases

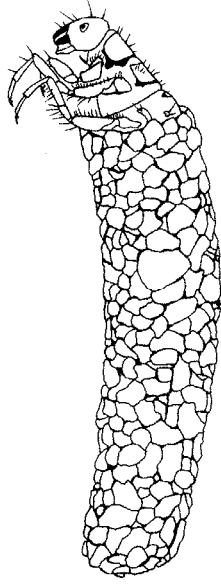


Figure 10.2: *Hesperophylax designatus* (Limnephilidae) larva in case, Lateral View.

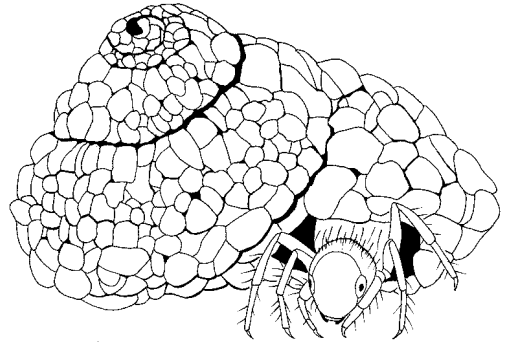


Figure 10.3: *Helicopsyche* sp. (Helicopsychidae) larva in case.

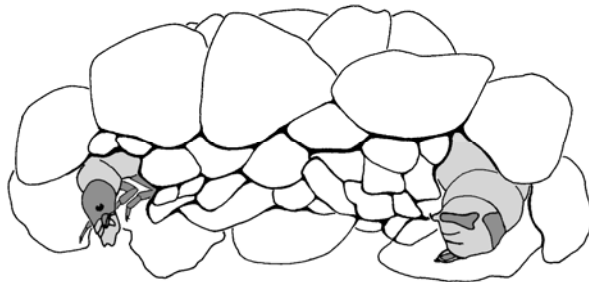


Figure 10.4: *Glossosoma* sp. (Glossosomatidae) larva in case, Lateral View.

Key to Trichoptera Families (Larvae)

1. Anal claw-comb shaped (many small teeth) (Figure 10.5); body curled; larva in snail shaped case constructed of sand grains (Figure 10.6); **not known from Mongolia**
**Helicopsychidae p. 126**

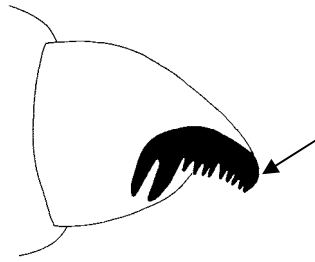


Figure 10.5: Anal proleg of *Helicopsyche* sp. (Helicopsychidae) larva, Lateral View.

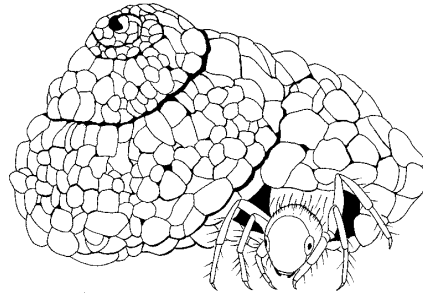


Figure 10.6: *Helicopsyche* sp. (Helicopsychidae) larva in case.

- 1'. Anal claw hook-shaped (Figure 10.8, Figure 10.9); body not curled; larval case straight or curved or not building a case (e.g., Figure 10.7)2



Figure 10.8: Anal proleg of *Glossosoma* sp. (Glossosomatidae) larva, Lateral View.

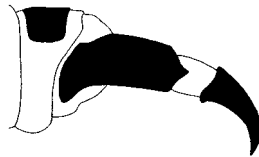


Figure 10.9: Anal proleg of *Rhyacophila* sp. (Rhyacophilidae) larva, Lateral View.

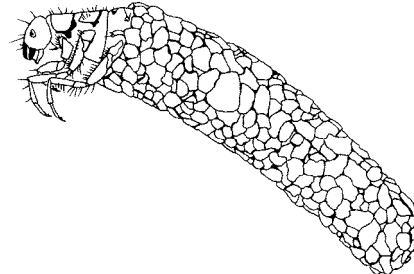


Figure 10.7: *Hesperophylax designatus* (Limnephilidae) larva in retreat, Lateral View.

- 2(1'). Dorsum (top) of all three thoracic segments covered in sclerotized (hardened) plates (Figure 10.10 – shaded)3

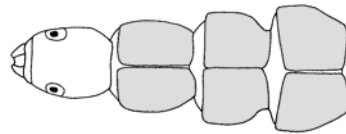


Figure 10.10: Head and thorax of *Ochrotrichia* sp. (Hydroptilidae) larva, Dorsal View.

- 2'. Dorsum of thoracic segment 3 (metanotum) mostly membranous (fleshy) (Figure 10.11 – shaded); some small plates (sclerites) may be present but not covering more than 50% of notum (Figure 10.11); some larvae lack hardened plates on thoracic segments 2 and 34

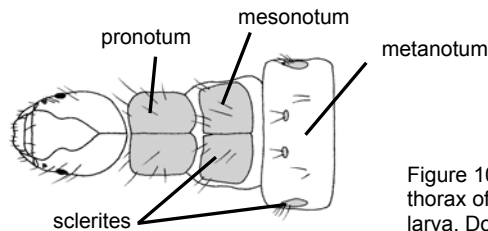


Figure 10.11: Head and thorax of Limnephilidae larva, Dorsal View.

- 3(2). Abdomen with rows of branched gills on ventral side of abdomen (Figure 10.12); brush of hairs at end of abdomen (Figure 10.12); not building a case **Hydropsychidae p. 126**

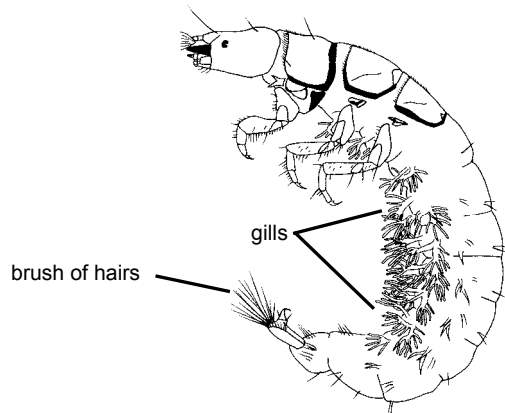


Figure 10.12:
Cheumatopsyche pettiti
(Hydropsychidae) larva,
Lateral View.

- 3'. Branched gills absent from abdomen (Figure 10.13); only 2-3 hairs at end of abdomen (Figure 10.13); constructing portable cases of various materials; small (< 6mm) **Hydroptilidae p. 127**

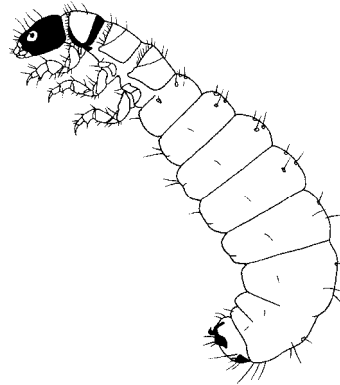


Figure 10.13:
Ochrotrichia sp.
(Hydroptilidae) larva,
Lateral View.

- 4(2'). Thoracic segment 2 mostly membranous (Figure 10.14) or with only a few small plates covering less than half of the notum (Figure 10.15) 5

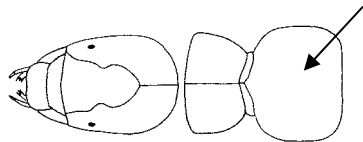


Figure 10.14: Head and Thoracic segments 1 and 2 of *Polycentropus* sp. (Polycentropodidae) larva, Dorsal View.

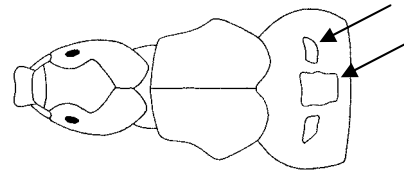


Figure 10.15: Head and Thoracic segments 1 and 2 of *Protoptila* sp. (Glossosomatidae) larva, Dorsal View.

- 4'. Thoracic segment 2 with sclerotized (hardened) plates (Figure 10.16) 11

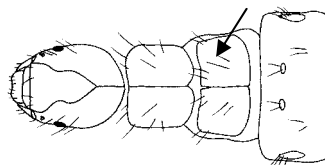


Figure 10.16: Head and Thorax of Limnephilidae larva, Dorsal View.

- 5(4). Dorsum of abdominal segment 9 membranous (Figure 10.17); larvae not building a portable case..... 6

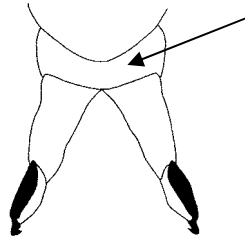


Figure 10.17: Anal prolegs of *Chimarra* sp. (Philopotamidae) larva, Dorsal View.

- 5'. Dorsum of abdominal segment 9 with a sclerotized (hardened) plate – note: sometimes this sclerite is difficult to see and is only recognizable by its shiny surface (Figure 10.18); larvae building or not building a portable case 9

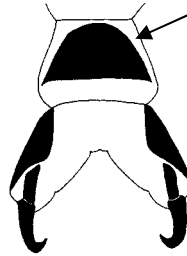


Figure 10.18: Anal prolegs of *Rhyacophila* sp. (Rhyacophilidae) larva, Dorsal View.

- 6(5). Labrum (structure extending between mouthparts) T-shaped and membranous – note: this structure is sometimes retracted in preserved species (Figure 10.19); not known from Mongolia **Philopotamidae p. 130**

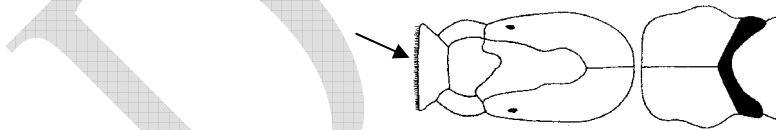


Figure 10.19: Head and first thoracic segment of *Chimarra* sp. (Philopotamidae) larva, Dorsal View.

- 6'. Labrum sclerotized (hardened) and rounded (Figure 10.20) 7

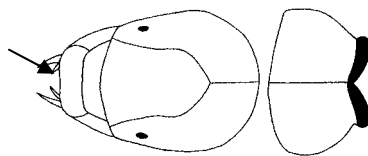


Figure 10.20: Head and first thoracic segment of *Polycentropus* sp. (Polycentropodidae) larva, Dorsal View.

7(6'). Head more than 2 times as long as wide (Figure 10.21)..... **Stenopsychidae p. 133**

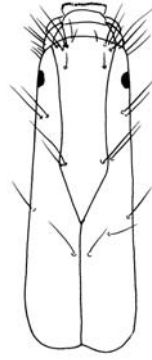


Figure 10.21: Head
Stenopsychidae sp.
(*Stenopsychidae*) larva,
Dorsal View.

7'. Head not more than 2 time as long as wide (Figure 10.22) **8**



Figure 10.22: Head
Polycentropus sp.
(*Polycentropodidae*) larva,
Dorsal View.

8(7'). Trochantin broad and hatchet-shaped at apex (Figure 10.23).... **Psychomyiidae p. 131**



Figure 10.23: Head and 1st thoracic
segment of *Lype diversa*
(*Psychomyiidae*) larva with detail of
trochanter, Lateral View.

8'. Trochantin pointed at apex (Figure 10.24) **Polycentropodidae p. 131**

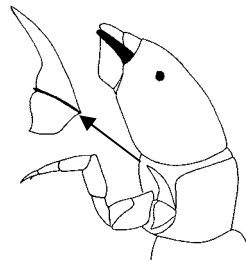


Figure 10.24: Head and 1st thoracic
segment of *Cymellus fraternus*
(*Polycentropodidae*) larva with
detail of trochanter, Lateral View.

- 9(5). Abdominal segment 1 with hump (Figure 10.26); prosternal horn present (Figure 10.25); often large.....**Phryganeidae p. 130**

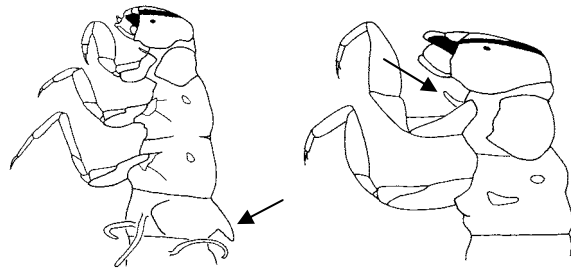


Figure 10.26: Head, thorax and 1st abdominal segment of *Phryganea cinerea* (Phryganeidae) larva, Lateral View.

Figure 10.25: Head and thorax segments 1 and 2 of *Ptilostomis* sp. (Phryganeidae) larva, Lateral View.

- 9'. Abdominal segment 1 without hump (Figure 10.27); prosternal horn absent (Figure 10.27)..... 10

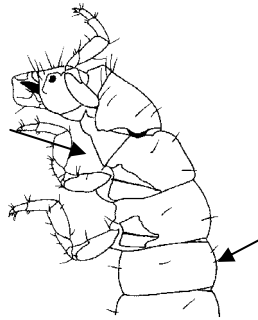


Figure 10.27: Head, thorax and 1st abdominal segment of *Glossosoma* sp. (Glossosomatidae) larva, Lateral View.

- 10(9'). Anal proleg free of abdominal segment 9 (Figure 10.28); not building a case.....**Rhyacophilidae p. 132**

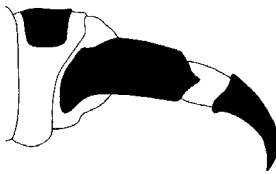


Figure 10.28: Anal proleg of *Rhyacophila* sp. (Rhyacophilidae) larva, Lateral View.

- 10'. Half of anal proleg joined to abdominal segment 9 (Figure 10.30); larva constructing a tortoise-like case (Figure 10.29).....**Glossosomatidae p. 125**

Figure 10.30: Anal proleg of *Glossosoma* sp. (Glossosomatidae) larva, Lateral View.

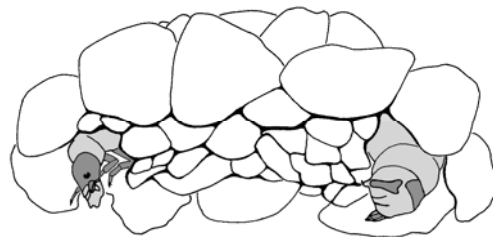
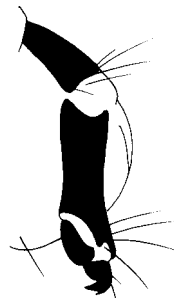


Figure 10.29: *Glossosoma* sp. (Glossosomatidae) larva in case, Lateral View.

- 11(4). Antennae relatively long and prominent (length at least 6x width) (Figure 10.32); in one genus, the antennae are short but a pair of dark, curved lines are present on the posterior of the mesonotum (thoracic segment 2) (Figure 10.31) **Leptoceridae p. 128**

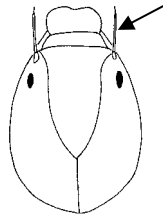


Figure 10.32: Head of *Triaenodes injustus* (Leptoceridae) larva, Dorsal View.

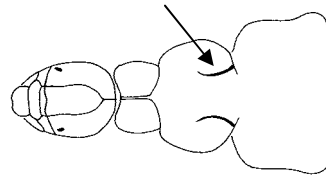


Figure 10.31: Head and thorax of *Ceraclea* sp. (Leptoceridae) larva, Dorsal View.

- 11'. Antennae short (length less than 6x width) (Figure 10.33, Figure 10.34) 12

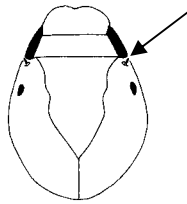


Figure 10.33: Head of *Agrypnia* sp. (Phryganeidae) larva, Dorsal View.

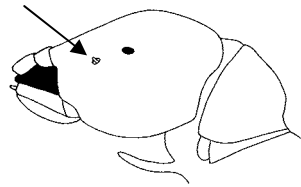


Figure 10.34: Head of *Ironoquia* sp. (Limnephilidae) larva, Lateral View.

- 12(11'). Tarsal claw on hind leg smaller than tarsal claws on fore and middle legs with hind tarsal claw stout and covered in setae (Figure 10.35) **Molannidae p. 129**

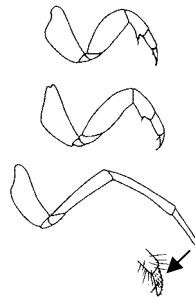


Figure 10.35: Prothoracic, mesothoracic, and metathoracic legs of *Molanna* sp. (Molannidae) larva with detail of metathoracic tarsal claw, Lateral View.

- 12'. Tarsal claws on hind leg similar to claws on other legs (Figure 10.36) 13

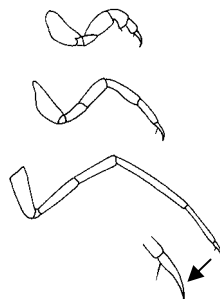


Figure 10.36: Prothoracic, mesothoracic, and metathoracic legs of *Triaenodes* sp. (Leptoceridae) larva with detail of metathoracic tarsal claw, Lateral View.

- 13(12). Abdominal segment 1 lacking lateral humps (Figure 10.37); pronotum divided by a crease (Figure 10.37).....**Brachycentridae p. 124**

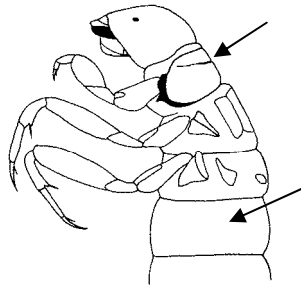


Figure 10.37: Head, thorax, and abdominal segment 1 of *Brachycentrus* sp. (Brachycentridae) larva, Lateral View.

- 13'. Abdominal segment 1 with lateral humps (Figure 10.38); no crease dividing pronotum (Figure 10.38)..... 14

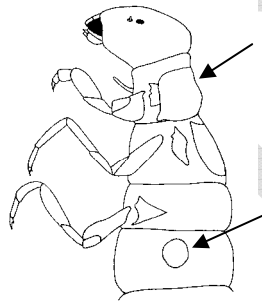


Figure 10.38: Head, thorax, and abdominal segment 1 of *Lepidostoma* sp. (Lepidostomatidae) larva, Lateral View.

- 14(13'). Mesothoracic pleura with prominent processes (Figure 10.39).....**Goeridae p. 125**

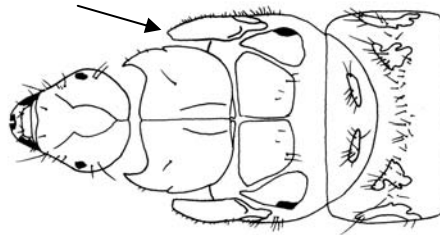


Figure 10.39: Head and thorax of *Goera archaon* (Goeridae) larva, Dorsal View.

- 14'. Mesopleuron without prominent processes (Figure 10.40)..... 15

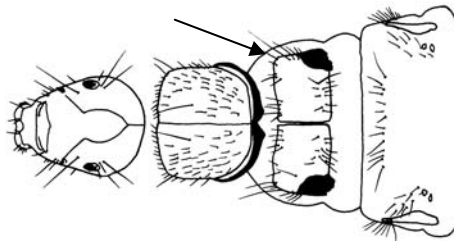


Figure 10.40: Head and thorax of *Apatania arizona* (Apataniidae) larva, Dorsal View.

- 15(14'). Antenna located close to eye (Figure 10.41); abdominal segment 1 without median dorsal hump (Figure 10.42).....**Lepidostomatidae p. 127**

Figure 10.41: Head and prothorax of *Lepidostoma* sp. (Lepidostomatidae) larva, Lateral View.

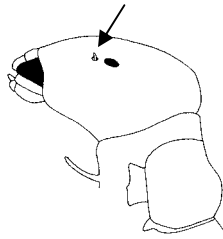
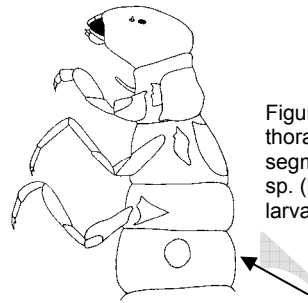


Figure 10.42: Head, thorax, and abdominal segment 1 of *Lepidostoma* sp. (Lepidostomatidae) larva, Lateral View.



- 15'. Antenna not located close to eye (Figure 10.44, Figure 10.45); abdominal segment 1 with median dorsal hump (Figure 10.43)..... 16

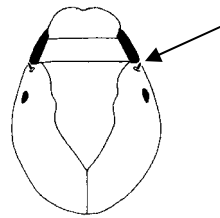


Figure 10.45: Head of *Agrypnia* sp. (Phryganeidae) larva, Dorsal View.

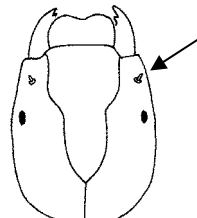


Figure 10.44: Head of *Nemotaulius* sp. (Limnephilidae) larva, Dorsal View.

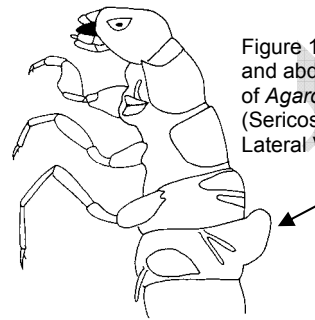


Figure 10.43: Head, thorax, and abdominal segment 1 of *Agarodes* sp. (Sericostomatidae) larva, Lateral View.

- 16(16'). Antennae located close to mandible (Figure 10.46, Figure 10.47); prosternal horn absent (Figure 10.46)..... 17

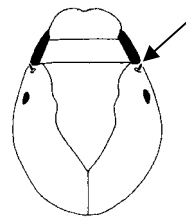


Figure 10.47: Head of *Agrypnia* sp. (Phryganeidae) larva, Dorsal View.

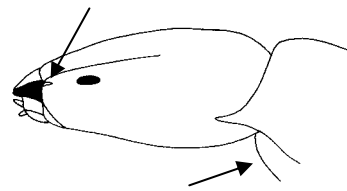


Figure 10.46: Head of *Psilotreta* sp. (Odontoceridae) larva, Lateral View.

- 16'. Antenna located midway between eye and mandible (Figure 10.48, Figure 10.49); prosternal horn present although sometimes small (Figure 10.49)..... 18

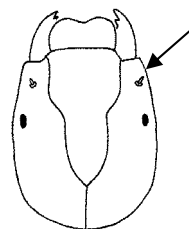


Figure 10.48: Head of *Nemotaulius* sp. (Limnephilidae) larva, Dorsal View.

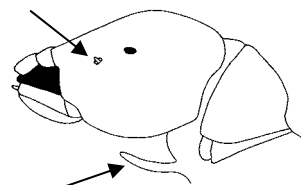


Figure 10.49: Head of *Ironoquia* sp. (Limnephilidae) larva, Lateral View.

- 17(16). Anal proleg with about 30 long setae (Figure 10.50); tibia and tarsus tan; **not known from Mongolia**.....**Sericostomatidae p. 132**

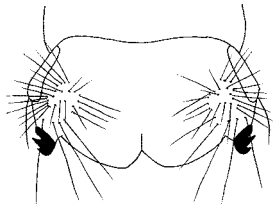


Figure 10.50: Anal prolegs of *Agarodes* sp. (Sericostomatidae) larva, Dorsal View.

- 17'. Anal proleg with only 3-5 long setae (Figure 10.51); tibia and tarsus black; **not known from Mongolia**.....**Odontoceridae p. 129**

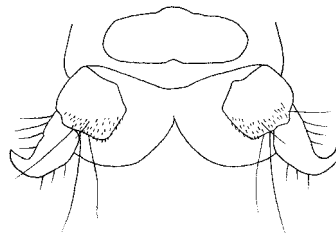


Figure 10.51: Anal prolegs of *Pseudogoera* sp. (Odontoceridae) larva, Dorsal View.

- 18(16'). Anterior margin of mesonotum notched on either side of midline (Figure 10.52); **not known from Mongolia**.....**Uenoidae p. 133**

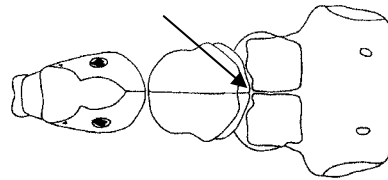


Figure 10.52: Head and Thorax of *Neophylax rickeri* (Uenoidae) larva, Dorsal View.

- 18'. Anterior margin of mesonotum not notched at midline (Figure 10.53) 19

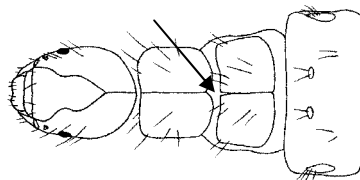


Figure 10.53: Head and Thorax of Limnephilidae larva, Dorsal View.

19(18'). Mandibles not toothed (Figure 10.54)..... **Apataniidae p. 124**

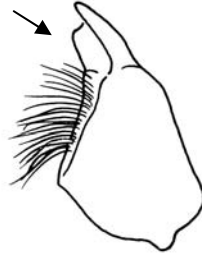


Figure 10.54: Mandible of *Allomyia scotti* (Apataniidae) larva, Ventral View.

19'. Mandibles toothed (as in Figure 10.)..... **Limnephilidae p. 128**



Figure 10.55: Mouthparts of Leptoceridae larva, Ventral View.

DRAFT

TRICHOPTERA

Trichoptera Family Descriptions

Apataniidae

- Common Name:** Apataniid Case-Maker Caddisflies
Feeding Group: Scrapers (also Shredders, Collector/Gatherers)
Tolerance Value: 1 (Low)
Habitat: Apataniid case-maker caddisflies largely inhabit cool lotic or flowing waters. Some are known from cool lakes at high elevation or high latitudes. They are either found on hard substrates such as rocks or logs with their cases attached to the substrate or they are found in aquatic moss.
- Size:** Medium (7-12 mm)
Characteristics: Antennae close to midway between eye and mandible; mandible in most genera with flat edge or untoothed (suited for scraping); ventral apotome wedge shaped; pronotum and mesonotum sclerotized; metanotum mostly membranous usually with small sclerites; in most species there is no Sa1 sclerite, but a transverse band of setae is present; lateral and dorsal humps present on abdominal segment 1; gills single or lacking.

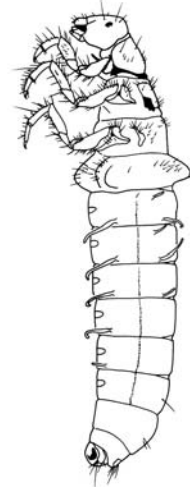


Figure 10.56:
Apatania arizona
(Apataniidae) larva,
Lateral View.

- Notes:** Cases are largely constructed of small pieces of rock although one uncommon genus (not known from Mongolia) incorporates plant fragments into the case. Larvae of European *Apatania* possess a gland on the prothorax that produces a secretion that has a paralyzing effect on insect predators. Lake Baikal supports 15 endemic species of apatanids.

Brachycentridae

- Common Name:** Humpless Case-Maker Caddisflies
Feeding Group: Collector/Filterers, Collector/Gatherers, Shredders
Tolerance Value: 1 (Low)
Habitat: Humpless case-maker caddisflies live in flowing waters from small springs to large rivers. They are either found on hard substrates such as rocks or logs with their cases attached to the substrate or they are found in aquatic moss.
- Size:** Medium (8-13 mm)
Characteristics: Antennae close to anterior margin of head capsule; pronotum and mesonotum sclerotized; metanotum mostly membranous usually with small sclerites; pronotum divided by crease; no lateral or dorsal humps on abdominal segment 1; gills single or lacking.
- Notes:** Brachycentrid caddisfly larvae build cases from strips of material, which are assembled into an elongate case with four sides (most common) or rounded sides. The most common brachycentrid genus uses its middle and hind legs to filter food from the water and feeds on diatoms from the substrate in front of its case.

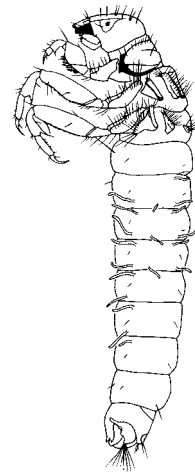


Figure 10.57:
Brachycentrus americanus
(Brachycentridae) larva,
Lateral View.

Glossosomatidae

Common Name: Saddle Case-Maker Caddisflies
Tolerance Value: 0 (Low)
Feeding Group: Scrapers
Habitat: Glossosomatid caddisflies most commonly live in cool, clear flowing waters, but they can also be found in large rivers and lake edges with sufficient current and substrate.
Size: Small to Medium (3-10 mm)
Characteristics: Only pronotum sclerotized; mesonotum and metanotum entirely membranous or with small sclerites; abdominal segment 1 without hump; prosternal horn absent; abdominal gills absent; a sclerotized plate is present on top of abdominal segment nine; half of anal proleg joined to abdominal segment 9.
Notes: The case of these caddisflies resembles the shell of a tortoise (see Fig. 10.4). They are commonly seen on top of rocks in streams where they scrape algae and microorganisms from the surface of the rock. The case allows them to feed without being exposed to predators.

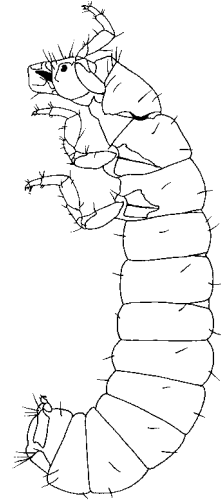


Figure 10.58:
Glossosoma sp.
 (Glossosomatidae) larva, Lateral View.

Goeridae

Common Name: Goerid Case-Maker Caddisflies
Tolerance Value: 1 (Low)
Feeding Group: Scrapers
Habitat: Goerid caddisflies are most common in cool streams, but they live in flowing waters which range from small springs to large rivers. They are often associated with hygropetric habitats (i.e., waters running over a vertical surface). Most larvae of this family scrape periphyton from exposed rock surfaces.
Size: Medium (6-11 mm)
Characteristics: Antennae located midway between eye and mandible; mandibles in most genera untoothed with smooth edge (suited for scraping); prosternal horn present; pronotum and mesonotum heavily sclerotized; mesothoracic pleura with prominent processes; metanotum mostly membranous with small sclerites; dorsal and lateral humps present on abdominal segment 1; abdominal gills variable; chloride epithelia present ventrally.
Notes: Goerid larvae construct tubular cases of small rock fragments, often with larger rocks attached along the side of the case. Some genera construct cases of small rocks in the form of a simple tube. The unusual extensions of the mesothoracic pleura, along with other thoracic sclerites, fit together to close off the anterior opening of the case when the larva withdraws into the case.

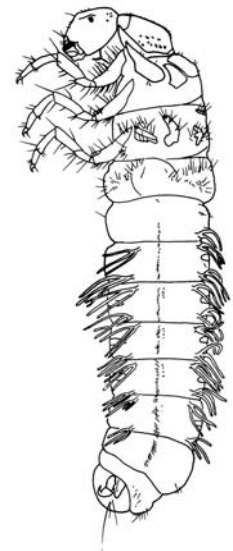


Figure 10.59:
Goera archaon
 (Goeridae) larva, Lateral View.

Helicopsychidae

Common Name: Snail Case-Maker Caddisflies
Feeding Group: Scrapers
Tolerance Value: 3 (Low)
Habitat: These caddisflies are most commonly found in streams with sand deposits. They are also found on wave-swept shores of lakes. Snail case-maker caddisflies are usually attached to rocks and logs.

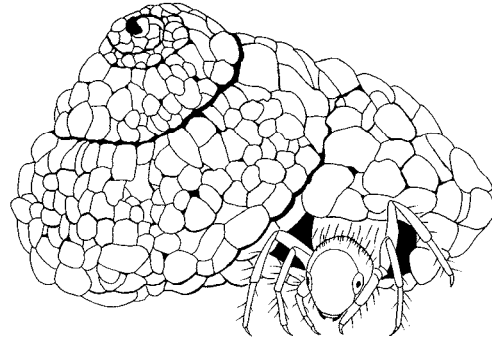


Figure 10.60: *Helicopsyche* sp. (Helicopsychidae) larva in retreat.

Size: Small (8 mm) – the case is usually about the size of a pea.

Characteristics: Body curled; all three thoracic segments with sclerotized dorsal plates; stout setae present on anterior edge of pronotum; prosternal horn absent; branched gills present on anterior abdominal segments; anal claw comb shaped (many small teeth); case shaped like a snail.

Notes: **Not known from Mongolia.** These caddisflies were first described as a snail with the peculiar habit of cementing grains of sand to the outside of its shell. The peculiar case of this family of caddisflies is more difficult to crush, which protects the larva as it grazes on exposed substrates.

Hydropsychidae

Common Name: Common Net-Spinner Caddisflies
Feeding Group: Collector/Filterers
Tolerance Value: 4 (Moderate)
Habitat: Hydropsychid caddisflies are restricted to flowing waters, from small spring streams to large rivers. They are most commonly collected from areas with cobble or bedrock substrate where solid structures are available on which to attach their nets. They can also be common on large woody debris and submerged vegetation.



Figure 10.61: *Cheumatopsyche pettiti* (Hydropsychidae) larva, Lateral View.

Size: Medium to Large (9-30 mm)

Characteristics: The nota (tops) of all thoracic segments with sclerotized plates; most abdominal segments with tufts of finely branched gills; anal prolegs terminating in a brush of long setae.

Notes: These caddisflies build tubular retreats and spin silk nets nearby which are used to collect detritus from the water. From time to time they extend their heads from their retreats and glean material that has collected in the net. Hydropsychid caddisflies defend their retreats. In some situations, such as below pond outflows and downstream of sewage treatment plants, they can reach large densities.

Hydroptilidae

- Common Name:** Micro Caddisflies
Feeding Group: Scrapers
Tolerance Value: 4 (Moderate)
Habitat: Micro caddisflies are found in all types of streams and lakes and are often associated with submerged vegetation.
Size: Very small (2-6 mm)
Characteristics: Small size; nota (tops) of all thoracic segments with sclerotized plates; no gills on abdominal segments.
Notes: These small caddisflies have an interesting life history. The first four instars are very small free-living (*i.e.*, do not build a case) caddisflies that tend to be very active. When they molt into their fifth instar, their abdomens become enlarged and swollen, they build cases, and they become less active. Hydroptilid caddisflies most commonly build cases with sand, algae, silk, or detritus, but the shapes vary considerably.

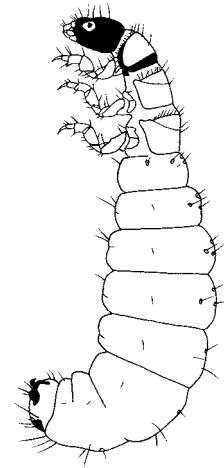


Figure 10.62:
Ochrotrichia sp.
 (Hydroptilidae) larva,
 Lateral View.

Lepidostomatidae

- Common Name:** Lepidostomatid Case-Maker Caddisflies
Feeding Group: Shredders
Tolerance Value: 1 (Low)
Habitat: Lepidostomatid caddisfly larvae most commonly live in cool, flowing waters in areas of slow current where detritus collects. They are sometimes also found on lake shores and in backwaters in large rivers.
Size: Medium (7-13 mm)
Characteristics: Antennae located close to eye; prosternal horn present; lateral humps present on abdominal segment 1; pronotum and mesonotum heavily sclerotized; metanotum mostly membranous usually with small sclerites; dorsal hump on abdominal segment absent; gills single or absent; a sclerotized plate is present on top of abdominal segment nine.
Notes: The most common species in this family build four-sided cases from square pieces of bark and leaves. The early instars build tubular cases out of sand.

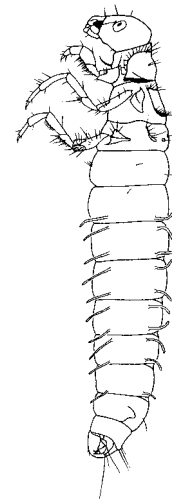


Figure 10.63:
Lepidostoma sp.
 (Lepidostomatidae)
 larva, Lateral View.

Leptoceridae

- Common Name:** Long-Horned Case-Maker Caddisflies
Feeding Group: Collector/Gatherers, Shredders
Tolerance Value: 4 (Moderate)
Habitat: Leptocerid caddisfly larvae are common in all types of freshwaters, but they are most common in standing waters such as marshes, ponds, and lakes.
Size: Small to Medium (7-15 mm)
Characteristics: Antennae relatively long and prominent (length at least 6x width) in most species (*exception:* in the genus *Ceraclea* the antennae are short but a pair of dark lines on the posterior of the mesonotum separate this taxon from other caddisflies); pronotum and mesonotum sclerotized (lightly sclerotized on mesonotum); metanotum mostly membranous usually with small sclerites; hind legs longer than fore and middle legs; abdominal gills variable (usually simple).
Notes: These caddisflies build cases from a variety of materials including sand, rock particles, silk, plant fragments, and freshwater sponge spicules. The shapes and sizes of these cases also vary considerably. Some species are free-swimming and use their long, setose legs to propel them and their lightweight case.

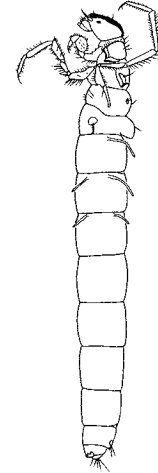


Figure 10.64:
Nectopsyche gracilis
(Leptoceridae) larva,
Lateral View.

Limnephilidae

- Common Name:** Northern Case-Maker Caddisflies
Feeding Group: Shredders
Tolerance Value: 4 (Moderate)
Habitat: Limnephilid larvae occur in a wide range of habitats including small springs, large rivers, lakes, and marshes. They can be found just about anywhere in these habitats such as in snags, on rocks, and in vegetation.
Size: Medium to large (8-35 mm)
Characteristics: Antennae located midway between eye and mandible; prosternal horn present; pronotum and mesonotum heavily sclerotized; metanotum mostly membranous usually with small sclerites; anterior margin of mesonotum not notched at midline; dorsal and lateral humps present on abdominal segment 1; abdominal gills variable; a sclerotized plate present top of abdominal segment nine; chloride epithelia often present dorsally, laterally, and ventrally.
Notes: Limnephilid caddisflies use a variety of materials including sand grains, sticks, and plant fragments to build their cases. The habitat influences the species present and the materials used in case construction. For example, species inhabiting cool flowing waters generally construct cases from mineral materials, whereas species in slow-moving warm waters often construct cases from vegetative material.

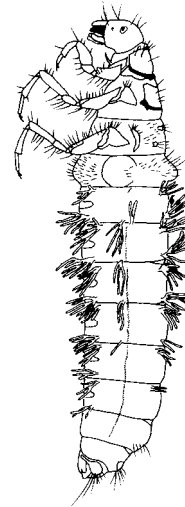


Figure 10.65:
Hesperophylax
designatus
(Limnephilidae) larva,
Lateral View.

Molannidae

- Common Name:** Hood Case-Maker Caddisflies
Feeding Group: Scrapers, Collector/Gatherers
Tolerance Value: 6 (High)
Habitat: Molannid caddisfly larvae occur in lakes and slower sections of rivers and streams in areas of sand deposition.
Size: Medium (up to 19 mm)
Characteristics: Pronotum and mesonotum sclerotized (lightly sclerotized on mesonotum); metanotum mostly membranous; tarsal claw on hind leg smaller than tarsal claws on fore and middle legs; hind tarsal claw stout and covered in setae; hind legs longer than fore and middle legs; abdominal gills simple or branched; a sclerotized plate is present on top of abdominal segment nine.

Notes: The cases of molannid caddisflies are constructed of sand and are shaped as a flattened tube with a hood that extends over the opening of the case. The hood allows the larvae to feed and move about while being concealed under the hood. These larvae are difficult to see in the field because their cases often blend with the substrate and are not often spotted until a larva moves its case.

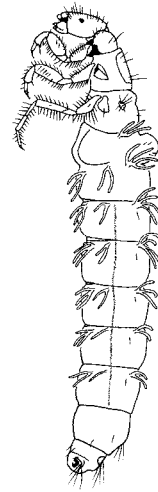


Figure 10.66:
Molanna flavicornis
(Molannidae) larva,
Lateral View.

Odontoceridae

- Common Name:** Strong Case-Maker Caddisflies
Feeding Group: Scrapers
Tolerance Value: 0 (Low)
Habitat: Odontocerid caddisflies live in running waters either in swift or slow portions of small to medium streams. They are most commonly found in areas of gravel or sand.
Size: Medium (9-20 mm)
Characteristics: Antennae located close to mandible; prosternal horn absent; pronotum and mesonotum heavily sclerotized; metanotum mostly membranous usually with small sclerites; dorsal and lateral humps present on abdominal segment 1; a sclerotized plate present on top of abdominal segment nine.

Notes: **Not known from Mongolia.** The cases of these caddisfly larvae are elongate tubes constructed of sand or stone particles of equal size. As their name suggests, the cases of some species of this family are very sturdy and are well adapted for burrowing.

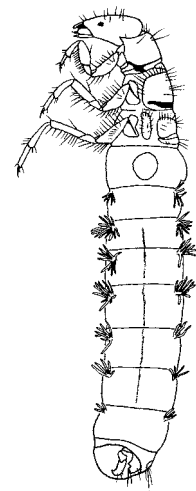


Figure 10.67:
Psilotreta rufa
(Odontoceridae) larva,
Lateral View.

Philopotamidae

- Common Name:** Finger-Net Caddisflies
Feeding Group: Collector/Filterers
Tolerance Value: 3 (Low)
Habitat: Philopotamid caddisflies are found in flowing waters, from small streams to large rivers. They usually occur under rocks and logs.
Size: Medium (13-17 mm)
Characteristics: Labrum T-shaped and membranous; head capsule brownish-orange without markings; only pronotum sclerotized with posterior edge black; mesonotum and metanotum entirely membranous; abdomen white in preserved specimens; abdominal gills absent.
Notes: **Not known from Mongolia.** Finger-net caddisflies build long tube-shaped nets with fine mesh to filter particles out of the water. Fine particles trapped in the net grow a bacterial and fungal slime that is scraped from the net using the T-shaped labrum.

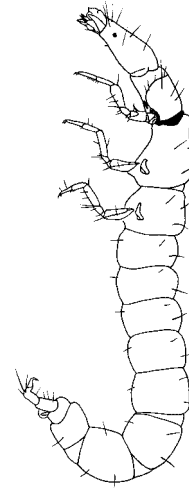


Figure 10.68:
Chimarra sp.
 (Philopotamidae)
 larva, Lateral View.

Phryganeidae

- Common Name:** Giant Case-Maker Caddisflies
Feeding Group: Predators, Herbivores
Tolerance Value: 4 (Moderate)
Habitat: Phryganeid caddisfly larvae are commonly collected at the edges of ponds and lakes, in marshes, and in areas of slow current in streams. They are usually found in submerged aquatic vegetation, in overhanging grasses, and in accumulations of coarse detritus.
Size: Large (20-45 mm)
Characteristics: Head and pronotum marked with conspicuous stripes; prosternal horn present; only pronotum well sclerotized; dorsal and lateral humps present on abdominal segment 1; a sclerotized plate is present on top of abdominal segment nine.
Notes: These caddisflies can be very large when the larvae are full grown. Giant case-maker caddisflies feed on aquatic vegetation, filamentous algae, and invertebrates. Some species feed on vegetation when they are younger and then switch to invertebrates as they develop. These caddisflies build elongate cases constructed of plant fragments. Unlike other caddisflies, giant case-maker caddisflies can easily abandon their cases when they are disturbed.



Figure 10.69:
Phryganea cinerea
 (Phryganeidae) larva,
 Lateral View.

Polycentropodidae

Common Name: Tube-Making and Trumpet-Net Caddisflies
Feeding Group: Collector/Filterers, Predators
Tolerance Value: 6 (High)
Habitat: Polycentropid caddisflies live in slow-flowing streams and rivers and in lakes and ponds. These caddisflies are generally found in warmer waters than many other trichopteran families. They build silken retreats on rocks and logs.
Size: Medium (8-25 mm)
Characteristics: Labrum rounded and sclerotized; only pronotum sclerotized; mesonotum and metanotum entirely membranous; trochantin pointed at apex; no sclerotized plate on top of abdominal segment nine; abdominal gills absent.
Notes: Polycentropid caddisflies generally feed on invertebrates either by filtering them from the water or by ambushing invertebrates when they come close to the retreat. In some species, silk threads extended from the retreat are used to sense approaching prey. As with spiders, when a prey item touches a silk thread the polycentropid caddisfly senses the vibrations and attacks its victim.

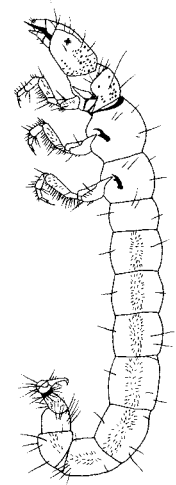


Figure 10.70:
Polycentropus sp.
 (Polycentropodidae)
 larva, Lateral View.

Psychomyiidae

Common Name: Tube-Making and Trumpet-Net Caddisflies
Feeding Group: Collector/Gatherers
Tolerance Value: 2 (Low)
Habitat: Psychomyiid caddisfly larvae generally live in cool flowing waters and are located on rocks and logs where they build silk tubes.
Size: Medium (10-15 mm)
Characteristics: Only pronotum sclerotized with posterior edge black; mesonotum and metanotum entirely membranous; mesonotum swollen and larger than other thoracic segments; trochantin broad and hatchet shaped at apex; abdominal gills absent.
Notes: These caddisflies do not use their tubes to filter food from the water, but instead consume diatoms and detritus from the substrate in front of the retreat.

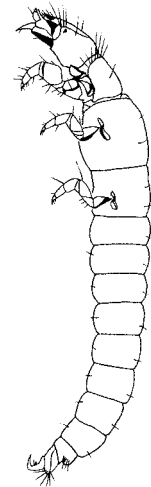


Figure 10.71:
Psychomyia (prob.
lumina) (Psychomyiidae)
 larva, Lateral View.

Rhyacophilidae

- Common Name:** Free-Living Caddisflies
Feeding Group: Predators
Tolerance Value: 0 (Low)
Habitat: Rhyacophilid caddisfly larvae inhabit flowing waters and are most commonly found in clear, fast-flowing streams. They live under rocks or in clumps of moss and algae.
Size: Medium to large (12-32 mm)
Characteristics: Only pronotum sclerotized; mesonotum and metanotum entirely membranous; abdominal segment 1 without hump; prosternal horn absent; abdominal gills variable; a sclerotized plate is present on top of abdominal segment nine; anal proleg long; claws on anal prolegs large.
Notes: Free-living caddisflies one of the few caddisflies that do not build cases or retreats as larvae. The larvae roam the substrate searching for small invertebrates. These caddisflies attach a silk thread to the substrate in order to keep from being swept away in fast currents. Before pupation they construct a dome-shaped shelter to protect the pupa. Larvae are often green when alive but preserved specimens are often purple.

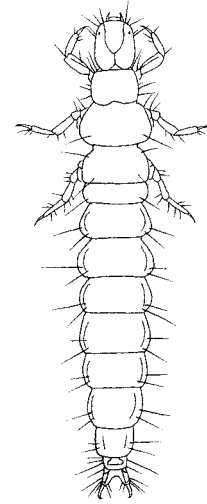


Figure 10.72:
Rhyacophila
(Rhyacophilidae) larva,
Lateral View.

Sericostomatidae

- Common Name:** Sericostomatid Case-Maker Caddisflies
Feeding Group: Shredders
Tolerance Value: 3 (Low)
Habitat: Sericostomatid caddisfly larvae live in small streams, rivers, and along the edges of lakes.
Size: Medium (up to 19 mm)
Characteristics: Pronotum often with an anterolateral point; pronotum and mesonotum heavily sclerotized; metanotum mostly membranous usually with small sclerites; hind legs longer than mid legs; lateral humps present on abdominal segment 1; abdominal gills single or branched; a sclerotized plate is absent from top of abdominal segment nine; anal proleg with about 30 long setae.
Notes: **Not known from Mongolia.** These caddisfly larvae build cases from sand. They are not commonly collected because the most common genus often burrows into the substrate.

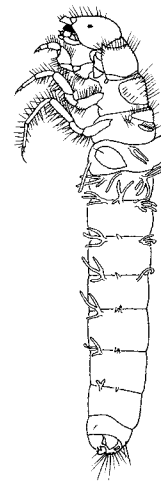


Figure 10.73:
Agarodes distinctus
(Sericostomatidae)
larva, Lateral View.

Stenopsychidae

- Common Name:** Stenopschid Net-Spinner Caddisflies
Feeding Group: Collector/Filterers
Tolerance Value: unknown
Habitat: Stenopschid caddisflies are found in large rivers in strong currents.
Size: Large (30-52 mm)
Characteristics: Labrum sclerotized; head capsule more than 2 times as long as wide; only pronotum sclerotized; mesonotum and metanotum entirely membranous; abdominal gills absent.
Notes: Stenopsychid caddisflies build retreats from stones and filter nets. The filter nets are used to filter small invertebrates, algae, and small particles out of the water. In some situations these species can reach huge abundances. The retreats can also foul flumes in hydroelectric generators and reduce generator efficiency. Due to their large size and abundance, they are the most common aquatic insect gathered as food in Japan.

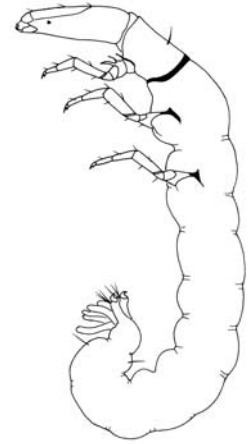


Figure 10.74:
Stenopsyche siamensis
(Stenopsychidae) larva,
Lateral View.

Uenoidae

- Common Name:** Uenoid Case-Maker Caddisflies
Feeding Group: Scrapers
Tolerance Value: 3 (Low)
Habitat: Uenoid caddisfly larvae most commonly live in cool, small streams with fast current, but they sometimes also occur in some larger, warmer streams. They are usually found on stones.
Size: Small to Medium (6-15 mm)
Characteristics: Antennae located midway between eye and mandible; prosternal horn present; pronotum and mesonotum heavily sclerotized; metanotum mostly membranous usually with small sclerites; anterior margin of mesonotum notched on either side of midline; dorsal and lateral humps present on abdominal segment 1; a sclerotized plate present on top of abdominal segment nine.
Notes: **Not known from Mongolia.** This family of caddisflies is very similar to the Limnephilidae. These caddisfly larvae feed on diatoms and small organic particles that they scrape from rocks or other solid substrates. The cases of the most common species of uenoid caddisflies are constructed of sand or stone pieces with several larger stones attached to the sides of the case.

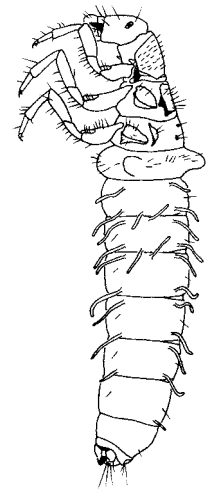


Figure 10.75:
Neophylax rickeri
(Uenoidae) larva,
Lateral View.

Families and Genera of Trichoptera Known from Mongolia

Rhyacophilidae <i>Rhyacophila</i>	Psychomyiidae <i>Psychomyia</i>	Limnephilidae (continued) Chaetopterygini <i>Annitella</i> <i>Brachypsyche</i> <i>Chaetopteryx</i>
Glossosomatidae Glossosomatinae <i>Anagapetus</i> <i>Glossosoma</i> Agapetinae <i>Agapetus</i> <i>Padunia</i>	Phryganeidae <i>Agrypnia</i> <i>Hagenella</i> <i>Oligotricha</i> <i>Phryganea</i> <i>Semblis</i>	Goeridae <i>Archithremma</i> <i>Goera</i>
Hydroptilidae Hydroptilinae <i>Agraylea</i> <i>Hydroptila</i> <i>Oxyethira</i> <i>Stactobia</i>	Brachycentridae <i>Brachycentrus</i> <i>Micrasema</i>	Apataniidae <i>Allomyia</i> <i>Apatania</i> <i>Apataniana</i> *
Stenopsychidae <i>Stenopsyche</i>	Limnephilidae Dicosmoecinae <i>Dicosmoecus</i> <i>Ecclisomyia</i> <i>Ironoquia</i>	Lepidostomatidae <i>Lepidostoma</i>
Hydropsychidae Arctopsychinae <i>Arctopsyche</i> <i>Parapsyche</i> *	Limnephilinae Limnephilini <i>Anabolia</i> <i>Anisogamodes</i> <i>Arctopora</i> <i>Asynarchus</i> <i>Clostoea</i> <i>Grammotaulius</i> <i>Lenarchus</i> <i>Lepnevaina</i> <i>Limnephilus</i> <i>Nemotaulius</i> <i>Philarctus</i>	Molannidae <i>Molanna</i> <i>Molannodes</i>
Hydropsychinae <i>Cheumatopsyche</i> <i>Hydropsyche</i> <i>Potamyia</i> <i>Synaptopsyche</i>	Stenophylacini <i>Hydatophylax</i> <i>Halesus</i> <i>Potamophylax</i> <i>Stenophylax</i>	Leptoceridae Triplectidinae <i>Triplectides</i> *
Macronematinae <i>Macrostemum</i>		Leptocerinae Athripsodini <i>Ceraclea</i> Nectopsychini <i>Parasetodes</i> Triaenodini <i>Triaenodes</i> Oecetini <i>Oecetis</i> Setodini <i>Setodes</i> Mystacidini <i>Mystacides</i>
Polycentropodidae <i>Neucentropus</i> <i>Neureclipsis</i> <i>Plectrocnemia</i> <i>Polycentropus</i>		

* Occurrence in Mongolia needs to be confirmed.