A Key to Common Aquatic Invertebrates of Vashon Island, Washington

The production of this key was funded by a Partners in Education grant (PIE) to the Vashon Island School District.

Introduction, Acknowledgements, and Caveats

This key is intended to assist in the identification of the aquatic invertebrate organisms collected over 2 years of sampling of several stream sites on Vashon Island.

It's pretty certain that not all of the aquatic organisms that live in Vashon streams have been collected in these sampling events: streams can support dozens of aquatic invertebrate taxa. Thus, this key cannot be considered complete or comprehensive: you may…….and if you study Vashon's invertebrate fauna with purpose, you probably WILL……encounter animals that are not included here.

The very best supplement, which you should consult if you find specimens that do not "key out" by using this key, is the CD guide "**Stream Bugs as Biomonitors: A Guide to Pacific Northwest Macroinvertebrate Monitoring and Identification"** By Jeff Adams with Mace Vaughan and Scott Hoffman Black, published by and available from the Xerces Society:

www.xerces.org

Many of the photographs used in this key came from this CD guide, and are reproduced with the kind permission of Jeff Adams and the Xerces Society, for which we are very grateful. Photographs attributable to Jeff are marked by a green border in this key. Several photos of the family Tipulidae (Diptera) are from Walters, D.M., M.A. Ford, and R.E. Zuellig. 2017. North American Aquatic Macroinvertebrate Digital Reference Collection.

https://sciencebase.usgs.gov/naamdrc 3/9/2017.

Photos from this resource are marked by a blue border. All other photos are by Rhithron Associates, Inc.

Aquatic invertebrates: the two major groups

Crustacea: for example, Ostracods: seed shrimp
Molluscs: Clams
Gastropods: Snails
Acari: Mites
Amphipoda: Scuds
Oligochaeta: Worms
Nemertea: Proboscis worms
Nematoda: Nematodes
Turbellaria: Flatworms

Ephemeroptera: mayflies
Plecoptera: stoneflies
Trichoptera: Caddisflies
Coleoptera: Beetles
Diptera: True flies

Non-Insects

Nine major groups of non-insect organisms have been collected from Vashon streams.

Shell present

No shell
Go to non-insect B

Clam-like shell

Snail-like shell: snails

Tiny (1 – 3 mm) and the shell is fragile. The creature inside the shell has many leg-like appendages.

Sub-phylum: Crustacea
Class: Ostracoda

Larger (1 – 5mm), with a more robust shell. The creature inside the shell doesn't have leg-like appendages.

Phylum: Mollusca
Family: Sphaeriidae
Genus: *Pisidium*

Shell coiled in a flat spiral.

Gastropoda
Family: Planorbidae

Shell coiled in a conical spiral.

Several families, including Hydrobiidae

Non-Insect B

More than 3 pairs of legs or other jointed appendages present.

Without legs: body either segmented or not: wormlike in appearance.
Go to Non-Insect C

Four pairs of jointed legs.
Tick-like. Aquatic mites.

Class: Arachnida
Sub-Class: Acari

More than 4 pairs of jointed legs and appendages.

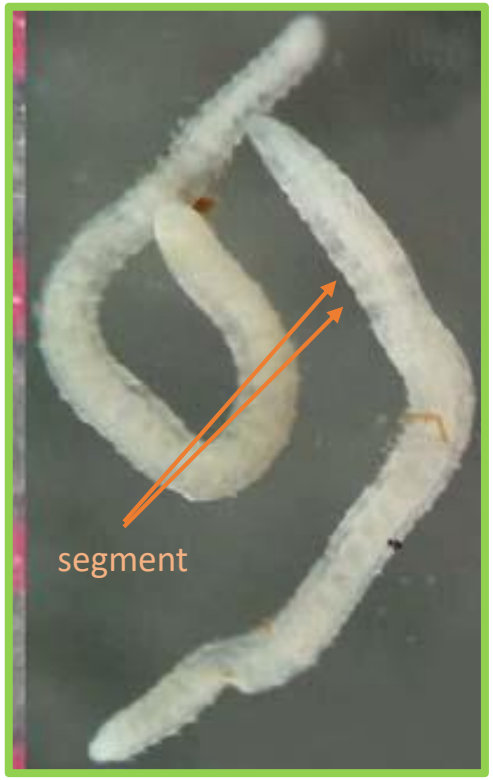
Order: Amphipoda

Non-Insect C

Worm-like, with segmented body. Aquatic and semi-aquatic worms.

Elongated body without Segments.

Body not elongated and not segmented, flattened in profile. About 5 mm long. May have the pharynx protruding from the middle of the body.



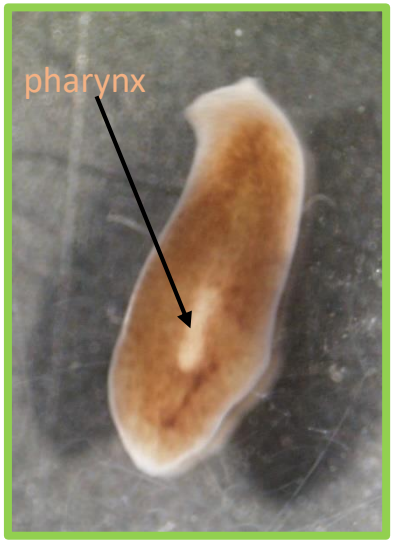
Class: Oligochaeta

Fleshy, unsegmented body: may have a proboscis protruding. About 3 -6 mm long.

Phylum: Nemertea
Genus: *Prostoma*

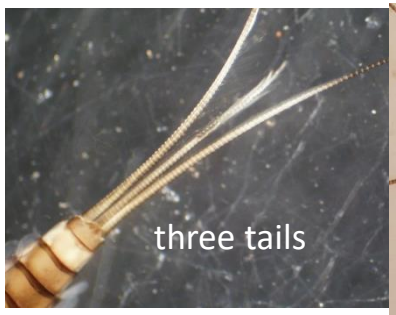
Tough, thin, shiny body. Parasitic forms may be several centimeters long, while free-living forms are usually less than 5mm long.

Phylum: Nemata



Class: Turbellaria

Insects: Guide to the Aquatic Insect Orders



gills on middle abdominal segments

Ephemeroptera: the mayflies

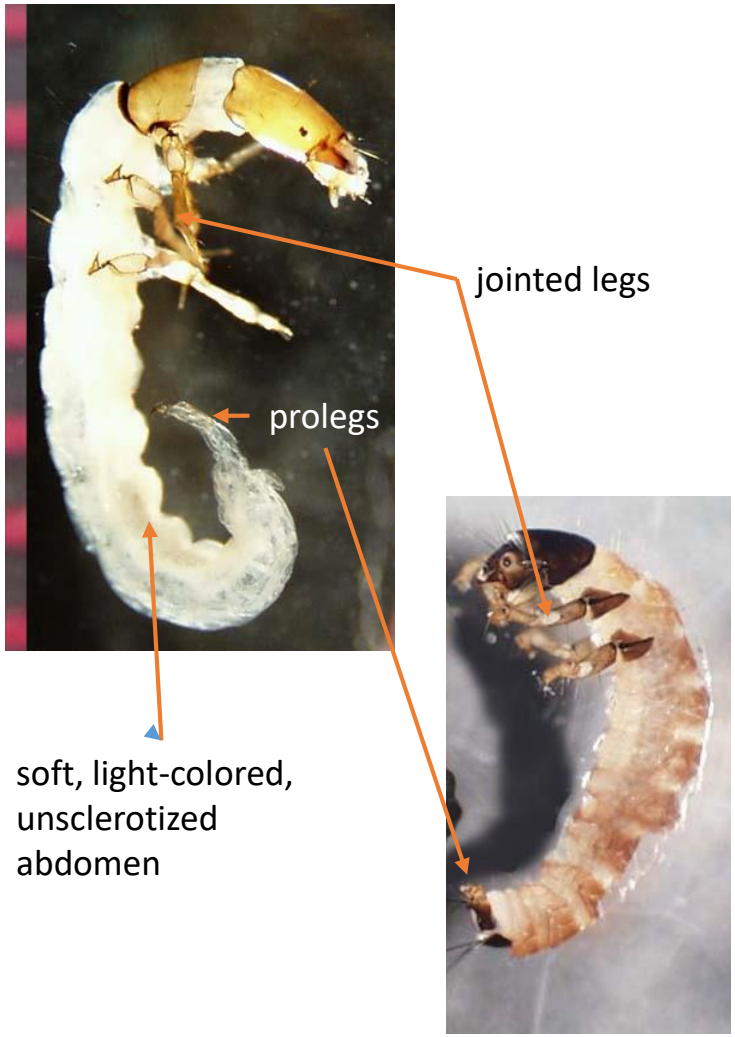
Key characters:

- Jointed legs, sclerotized body
- Two or three tails (cerci), which are segmented
- Middle abdominal segments (segments 4 – 8) with gills
- One claw at the end of each leg

Plecoptera: the stoneflies

Key characters:

- Jointed legs, sclerotized body
- Two tails (cerci), which are segmented
- Middle abdominal segments (segments 4-8) without gills (abdominal segments 1, 2, or 3, and the last abdominal segment, may have gills)
- Two claws at the end of each leg



Trichoptera: the caddisflies

Key characters:

- Jointed legs on thoracic segments, but unjointed prolegs present at the end of the abdomen as well.
- Unsclerotized abdomen. Sclera confined to head and legs, some thoracic segments, anal prolegs
- Anal prolegs end in a single hook

beetle adult: dark, shiny, heavily sclerotized body

beetle larva: jointed legs

sclerotized plates on body segments

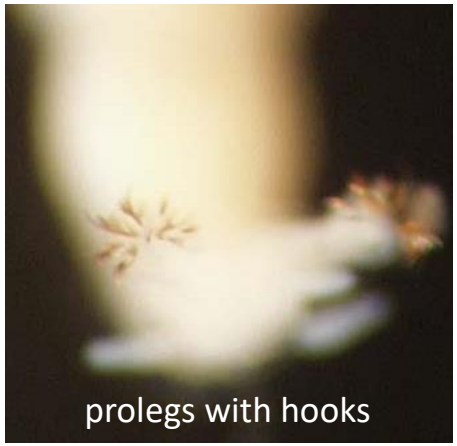
Coleoptera: the beetles

Key characters:

- Both adults and larvae are aquatic in some families
- Adult beetles are hard-bodied, heavily sclerotized. They are usually shiny and dark colored, but they may be colorful
- Beetle larvae *usually* have jointed legs
- Beetle larvae may have sclerotized plates on all body segments, or just on their heads and thoracic segments

head retracted, reduced to rods

prolegs



Diptera: the true flies

Key characters:

- Without jointed legs. Prolegs with tiny hooks may be present or not
- Body may be completely or partly sclerotized, or completely unsclerotized
- The head is sclerotized or partly sclerotized, but may be retracted into the thorax

Ephemeroptera

Four mayfly families have been collected on Vashon.

Body not flattened, eyes pointed to the sides (laterally). Gills attached to the *sides* of the abdominal segments (lateral).

Body not flattened, eyes pointed laterally. Lamellate gills attached to the *back* of the abdominal segments (dorsal).

Family: Ephemerellidae
Go to Ephemeroptera B

Body flattened, with eyes pointed upward (dorsally). Gills attached laterally or to the *underside* of the abdominal segments (ventral).

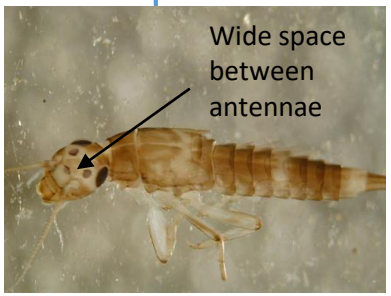
Family: Heptageniidae
Go to Ephemeroptera C

Gills simple and platelike (lamellate).

Family: Baetidae

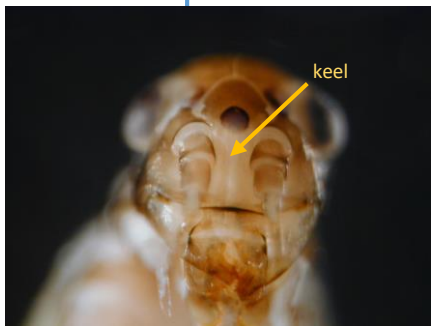
Gills slender and forked.

Family: Leptophlebiidae
Genus: *Paraleptophlebia*



Genus: *Baetis*

Baetis and *Diphetor* look very similar. One way to tell the two genera apart is to examine the space between the antennae. In *Baetis*, the space is wide. In *Diphetor*, the space is narrow, and there is a raised keel on the face, in between the bases of the antennae.



Genus: *Diphetor*

Ephemeroptera B With eyes lateral and lamellate gills attached to abdominal segments dorsally

Family: Ephemerellidae

Genus: *Ephemerella*

Ephemeroptera C

With eyes pointed upward and body flattened

Family: Heptageniidae

Three tails

Two tails

Front (anterior) margin of head with a shallow notch. Maxillary palps visible from above.

Genus: *Cinygmula*

notch

maxillary palp

No notch on the anterior margin of head and Maxillary palps not visible from above.

Genus: *Cinygma*

Paired bumps (tubercles) on the dorsum of the abdominal segments.

Genus: *Ironodes*

tubercles

Without paired tubercles on the dorsum of the abdominal segments.

Genus: *Epeorus*

Plecoptera

Seven stonefly families have been collected on Vashon.

Branching gills present near the bases of each leg and also on the underside (dorsum) of the first two abdominal segments.

Branching gills present near the bases of each leg, but NOT on the first two abdominal segments.

No branching gills near the bases of the legs.
Go to Plecoptera B

Family: Pteronarcyidae

Branching gills
a. near bases of legs
b. on abdominal segments

Family: Perlidae

Genus: *Pteronarcys*

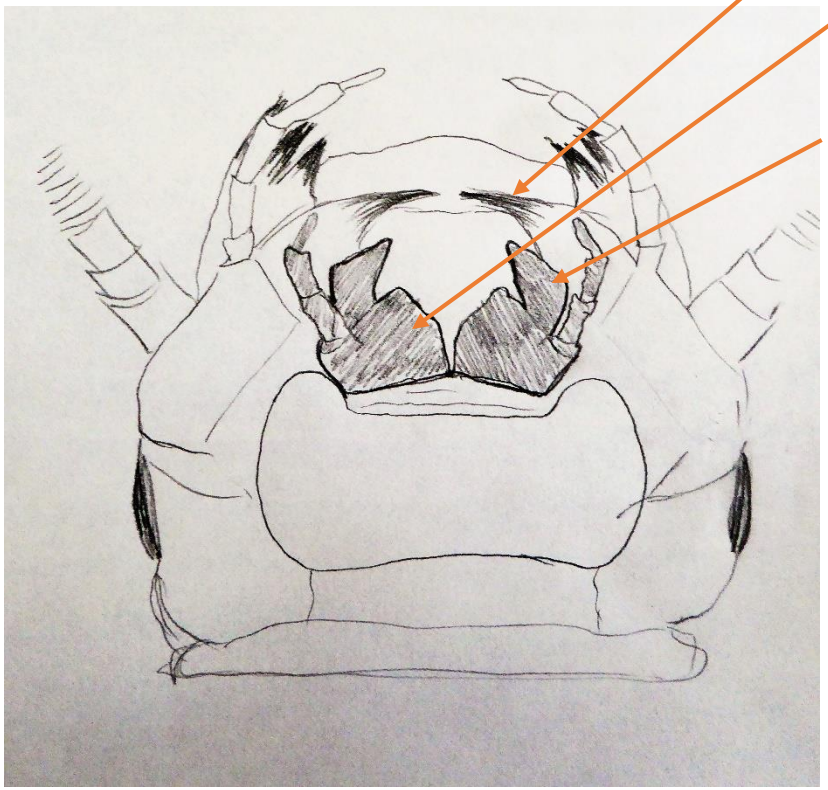
Genus: *Hesperoperla*

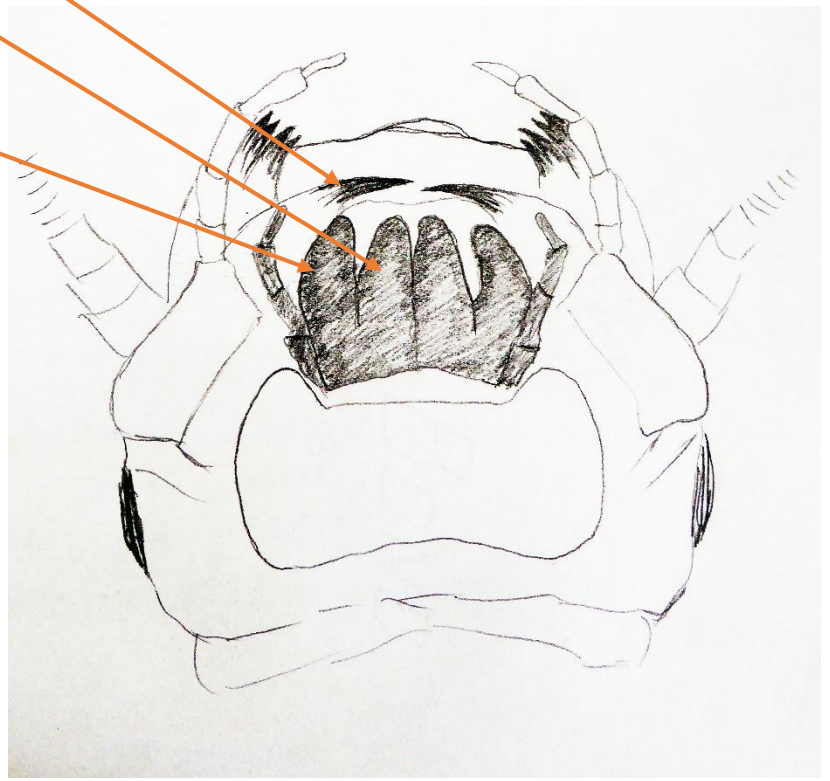
Plecoptera B

For some of the choices in these groups, it is necessary to examine the mouthparts, which are on the underside (ventrum) of the head.

Glossa shorter than paraglossa.
Go to Plecoptera C

Glossa and paraglossa about the same length.
Go to Plecoptera E





Plecoptera C

With glossa shorter than paraglossa

Tails (cerci) as long as, or longer than abdomen. Body usually has a distinct color pattern.

Family: Perlodidae

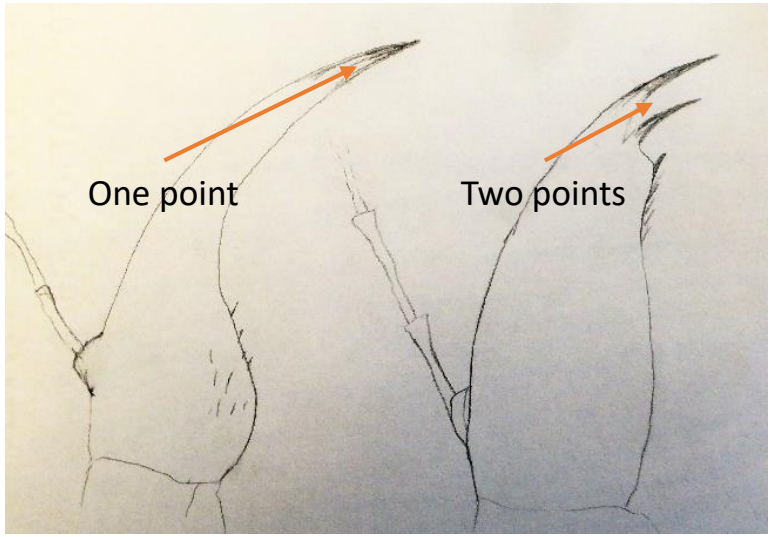
Cerci ¾ the length of the abdomen or shorter. Body usually not patterned.

Family: Chloroperlidae
Go to Plecoptera D

Maxilla with single point.

Maxilla with more than one point.

Genus: *Kogotus*



Genus: *Skwala*

Plecoptera D Cerci ¾ the length of the abdomen or shorter

Family: Chloroperlidae

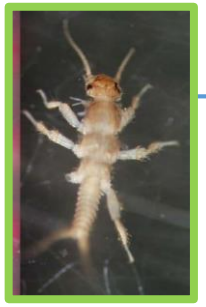
Thoracic sterna bare. —— With dark hairs on the thoracic sterna.

Genus: *Suwallia*

Genus: *Sweltsa*

Plecoptera E With glossa as long as paraglossa

Hind legs extend to or beyond the end of the abdomen.



Hind legs do not extend to the end of the abdomen.
Go to Plecoptera F

Family: Nemouridae

No gills in the neck region (cervical).

Genus: *Soyedina*

With cervical gills.

Cervical gills

Without a row of stout hairs on each femur. Cervical gills with several branches.

Genus: *Malenka*

With a straight row of stout hairs on each femur. Two fingerlike cervical gills on each side.

Genus: *Zapada*

Plecoptera F Hind legs not extending to the end of the abdomen

Abdomen appearing slightly swollen at the distal end.

Family: Capniidae

Abdomen appearing about the same width over its entire length.

Family: Leuctridae
Genus: *Despaxia*

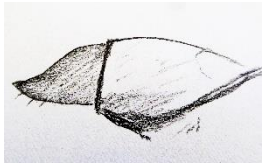
Trichoptera

Eight caddis fly families have been collected on Vashon.

Each segment of the thorax completely covered dorsally with sclerotized plates.

Family: Hydropsychidae

Fore trochantin with a single point.



Genus: *Parapsyche*

Fore trochantin with two points.

Genus: *Hydropsyche*

Third thoracic segment not completely covered with a dorsal plate, but either completely fleshy or with small plates.

Second thoracic segment with well-developed plates.
Go to Trichoptera B

Second thoracic segment completely fleshy.
Go to Trichoptera D

Thoracic segments

1

2

3

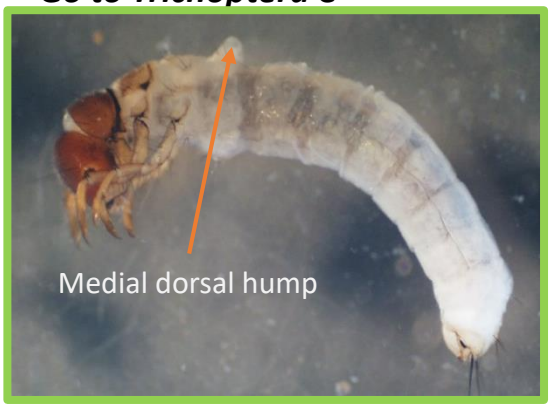
Trichoptera B

With well-developed plates on thoracic segment 2

No medial dorsal hump on the first abdominal segment.

With a medial dorsal hump on the first abdominal segment.

Go to Trichoptera C



Lateral humps on the first abdominal segment. Antenna a tiny bump very near the anterior margin of the eye.

Family: Lepidostomatidae

Genus: *Lepidostoma*

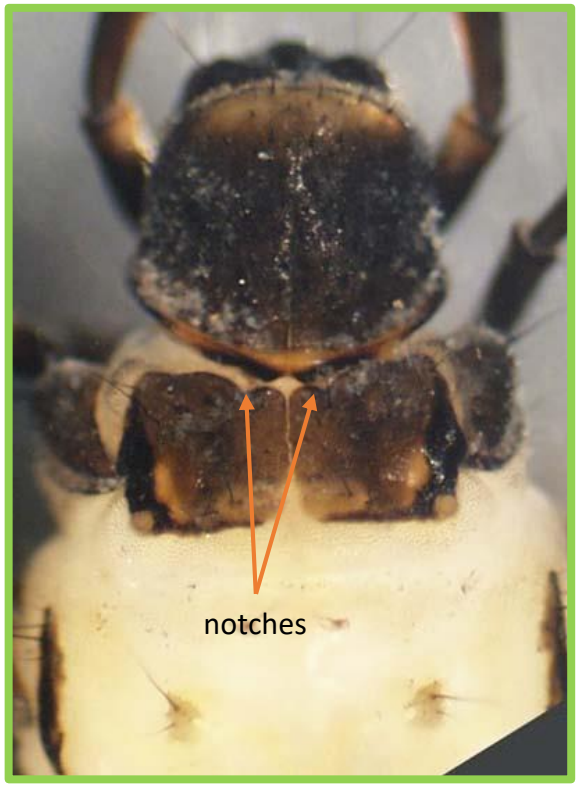
No lateral humps on first abdominal segment. Numerous hairs on the anterior margin of the plate on the second thoracic segment.

Family: Brachycentridae

Genus: *Micrasema*

Trichoptera C With medial dorsal hump on first abdominal segment

Plates on the second thoracic segment with medial notches.



Family: Uenoidae
Genus: *Neophylax*

Plates on the second thoracic segment not notched.

Family: Limnephilidae

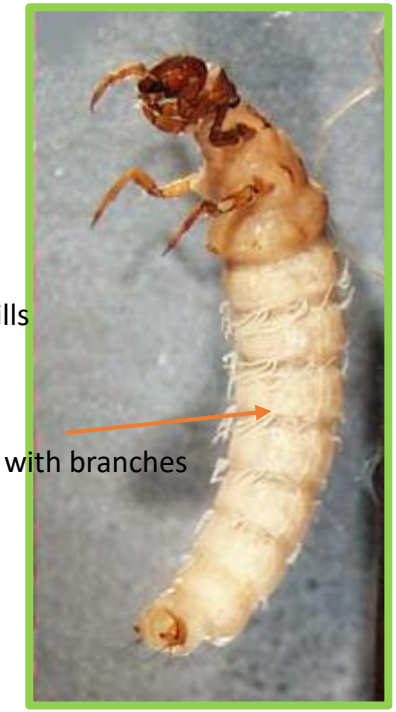
Plate on first thoracic segment with dense fringe of long hairs.

Genus: *Cryptochia*

Abdominal gills single.

Genus: *Psychoglypha*

Abdominal gills with branches.



Genus: *Onocosmoecus*

Trichoptera D

Thoracic segment 2 fleshy

Anal proleg smaller, strongly attached to the last abdominal segment.

Family: Glossosomatidae
Genus: *Glossosoma*

Anal proleg longer, largely free of the last abdominal segment.

Dorsal plate on the eighth abdominal segment.

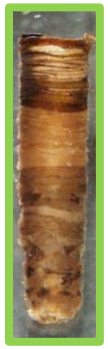
Family: Rhyacophilidae
Genus: *Rhyacophila*

No dorsal plate on the eighth abdominal segment.

Family: Philopotamidae
Genus: *Wormadia*

Trichoptera: portable cases

Genus: *Lepidostoma*



Genus: *Micrasema*

The portable cases that caddisflies build are often unique to a species, and may be useful for identification.

Genus: *Neophylax*

Genus: *Cryptochia*

Genus: *Psychoglypha*

Genus: *Onocosmoecus*

Genus: *Glossosoma*

Hydropsyche builds stationary retreats, which usually don't show up in benthic samples. *Ryacophila* and *Wormaldia* are free-living, and don't build cases or retreats.

Coleoptera

Three aquatic beetle families have been collected on Vashon

Hard elytra, which hide the flight wings, cover the second and third thoracic segments, and all abdominal segments: *Coleoptera adults.*

Elytra and wings absent: *Coleoptera larvae*.
Family: Elmidae.
Go to Coleoptera C

Long labial palps protrude, while the antennae are tucked ventrally.

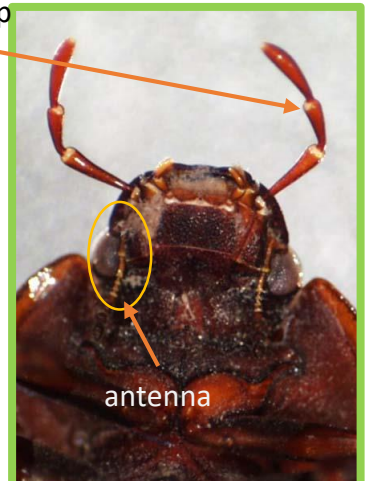
Labial palps are short and don't protrude.
Family: Elmidae
Go to Coleoptera B

Small (2 -3mm), elongate

Family: Hydraenidae
Genus: *Hydraena*

Larger (5 – 10mm), robust

Family: Hydrophilidae
Genus: *Ametor*



Coleoptera B

Adults, labial palps don't protrude

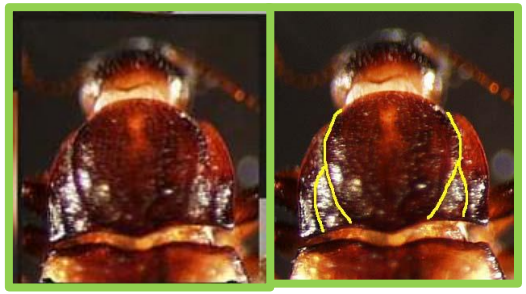
Family: Elmidae

More than 5mm long. Black, with large humps on the pronotum.

Genus: *Lara*

Smaller; up to 5mm long

Pronotum (the plate on the first thoracic segment) with distinct forked grooves.



Genus: *Cleptelmis*

Short, unforked grooves on the pronotum.

Genus: *Heterlimnius*

Smooth pronotum, without grooves.

Genus: *Narpus*

Coleoptera C

Elytra and wings absent; larvae

Family: Elmidae

With spines along the sides of the body.

Genus: *Lara*

Without spines along the sides.

Top of the head covered in short spines, body usually yellow, long and tubular.

Genus: *Narpus*

No spines on the top of the head.

Body more cylindrical. Postpleurites (the plates on either side of the first thoracic segment, ventrally) composed of one part.

Postpleurite one part

Genus: *Cleptelmis*

Body more tapered. Postpleurites composed of two parts.

Postpleurite two parts

Genus: *Heterlimnius*

Diptera

Nine families of aquatic true flies have been collected on Vashon.

Sclerotized head is external and clearly visible.

Head is not clearly visible, and may be reduced to a few internal rods.
Go to Diptera D

Club-shaped body, with proleg under the head, and tiny hooks on the posterior end.

Family: Simuliidae
Genus: *Simulium*

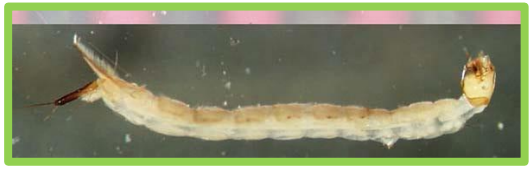
Abdomen ending in a long respiratory tube. Three pairs of prolegs on anterior segments.

Family: Ptychopteridae
Genus: *Ptychoptera*

One or two pairs of prolegs on anterior segments. Short lobes and hairs on the posterior abdominal segment.

Family: Dixidae

One pair of prolegs



Genus: *Meringodixa*

Two pairs of prolegs

Genus: *Dixa*

Head visible, but not like any of these
Go to Diptera B

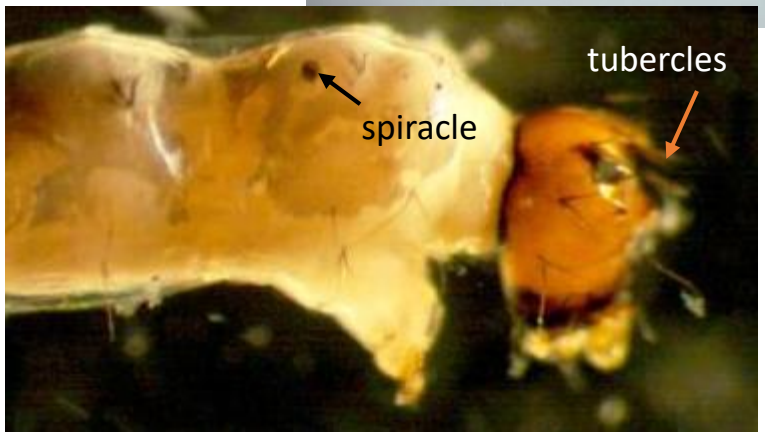
Diptera B

Head visible

With a single pair of prolegs on the segment just below the head and a pair of prolegs on the posterior end of the body.

No prolegs.
Go to Diptera C

Head with tubercles. Tiny spiracles on the segment just below the head, and also near the posterior end.



Family: Thaumaleidae
Genus: *Thaumalea*

Head without tubercles. No spiracles.

Family: Chironomidae
Not keyed further
25 genera in this family have been collected in Vashon streams

Diptera C Head visible, no prolegs

Stiff, needle-shaped body. No sclerites.

Family: Ceratopogonidae

Body not needle-shaped. With 2 or 3 dark sclerites on each body segment.

Family: Psychodidae
Genus group: *Pericoma/Telmatoscopus*

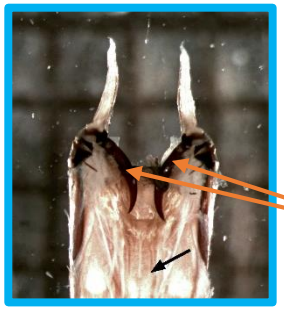
Diptera D

Head not clearly visible, internal or retractable. Head may be completely or partially sclerotized, or may be reduced to just a few dark rods. To distinguish these groups, you need to see the mouthparts, in particular, the mandibles. This may require cutting through the anterior integument to expose the head.

Mandibles move in a horizontal plane, like pincers.

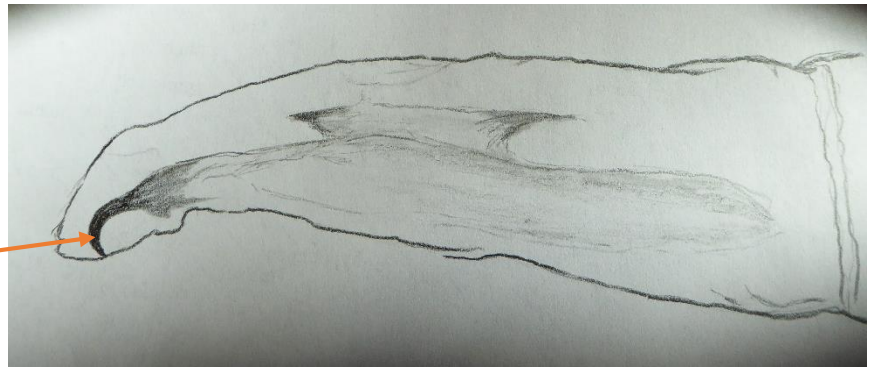
Mandibles move in a vertical plane, like hooks or fangs.
Go to Diptera E

Family: Tipulidae



These are ventral views.

mandibles



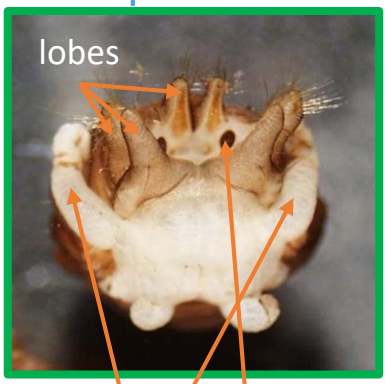
This is a lateral view.

Six genera in the family Tipulidae have been collected from Vashon Island streams. **Key to Tipulidae genera continued on the next page……..**

Diptera D: *continued*

Family: Tipulidae

Spiracular disc with 6 lobes. Spiracles separated by more than the width of a spiracle.



spiracular disc

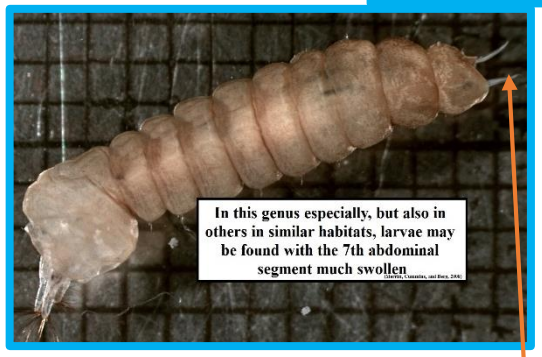
Genus: *Tipula*

Spiracular disc with 5 or fewer lobes or lobes absent.

Maxillae protrude, even when head is retracted.

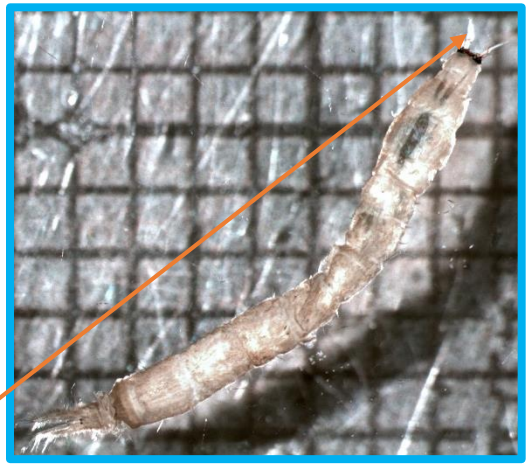
Maxillae don't protrude.
Go to next page

Spiracular disc with 4 lobes with dark pigmented areas and a fringe of long hairs.



Genus: *Hexatoma*

Lobes of spiracular disc with moderately long hairs, giving it a fuzzy appearance.



maxillae

Genus: *Limnophila*

Key to Tipulidae genera continued on the next page……..

Diptera D: *continued*

Family: Tipulidae

Spiracular disc with 5 or fewer lobes or lobes absent. Maxillae don't protrude.

Body long and thin, light colored.

2 long lobes on spiracular disc, spiracles very small.
Prolegs with tiny hooks on body segments 3 – 7.

Genus: *Dicranota*

Body ends in a single tapering lobe. No spiracles.

Genus: *Hesperoconopa*

Body ends with a blunt spiracular disc with 5 very short lobes, and small spiracles.

Genus: *Rhabdomastix*

Diptera E Head not clearly visible, internal, and not entirely sclerotized.
May be reduced to just a few dark rods. Mandibles move up and down, like hooks or fangs.

Prolegs with tiny hooks on seven abdominal segments. Head capsule reduced to a pair of slender rods.

prolegs

Family: Empididae

No prolegs. Body cylindrical, with smooth shiny surface.

Family: Pelechorhynchidae
Genus: *Glutops*

Glossary

abdomen	the third, or posterior, major division of an insect body. Consists of 9 or 10 segments. May bear **prolegs** in larvae, but bears no jointed legs in either larval or adult stages.
anal proleg	proleg on the last abdominal segment (see **proleg**)
cerci	slender paired appendages on the last abdominal segment. Often called “tails.”
cervical	located in the neck region
dorsal	located on the **dorsum** – the upper surface, or “back”
elytra	in beetles, the heavily **sclerotized** wing that covers the more fragile flight wings
femur	the third segment of a jointed leg, and usually the most stout segment.
flight wings	in an adult insect, the fragile, membranous wings used to fly
fore trochantin	in caddisfly larvae, a small **sclerite** protruding forward from the side of the **sclerotized** plate on the first **thoracic** segment
glossa	a structure that forms part of an insect’s mouthparts. It is composed of two lobes, and is sometimes called a “tongue.” The **glossa** and **paraglossa** are both part of the **labium**.
integument	the outer layer of an insect, including the epidermis and the cuticle. The insect “skin”.

keel	a raised ridge
labial palp	a **palp** on the **labium**, which is a mouthpart structure that forms the floor of an insect's mouth
lamellate	thin and platelike, or leaflike
lateral	on or towards the side of the body
mandible	a mouthpart structure, part of the insect jaw, used for capturing food items, or for chewing.
maxilla	a mouthpart structure, part of the insect jaw, used in manipulating food items.
maxillary palp	a **palp** on the **maxilla**
medial	in or towards the middle of the body
palp	fingerlike appendage, usually segmented, and borne by certain mouthpart structures. They are tactile organs.
paraglossa	a structure that forms part of an insect's mouthparts. It is composed of two lobes lying at either side of the **glossa.** The **glossa** and **paraglossa** are both part of the **labium**.
pharynx	in planarians, the pharynx is a whitish tube that functions as a mouth and a throat. It is used to capture food items and transport them to the gut.

postpleurite	in larvae of elmid beetles, a **sclerotized** plate on the **ventral** surface of the first **thoracic** segment, alongside the base of the leg
proboscis	an extendable mouth structure. In this key, it pertains to the stinging/capture organ of a nemertean.
proleg	a fleshy appendage with spines or hooks on the apex. It functions as a leg in an insect larva
pronotum	the **dorsal** part of the first **thoracic** segment
sclera, sclerite	a hardened, dark-colored covering or plate
spiracle	a small opening used in breathing
spiracular disc	in tipulid larvae, the area on the posterior end of the body containing the spiracles
sternum, sterna	the **ventral** area of any body segment
thoracic	on the **thorax**
thorax	the second, or middle, major division of an insect's body. Consists of 3 segments, and which bear the jointed legs in both adults and some larvae (for example, mayflies, stoneflies, and caddisflies)
tubercle	knoblike bumps
ventral	on the under surface of the body