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# California Digital Reference Collection

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This is a digital resource tool to assist citizen scientists identify and learn about California's stream dwelling benthic macroinvertebrates and water quality.

Made to be portable for easy streamside access.

Created to assist identification of most organisms to the family level.

When using other field guides or taxonomy books, you can refer to this collection of images.



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CLEAN WATER TEAM  
STATE WATER RESOURCES CONTROL BOARD  
CALIFORNIA ENVIRONMENTAL PROTECTION AGENCY



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A similar version of this document was available online at:  
[www.dfg.ca.gov/abl/Lab/referencecollection.asp](http://www.dfg.ca.gov/abl/Lab/referencecollection.asp).

This version - April 2014.

# Benthic Macroinvertebrate (BMI)

**Benthic** - live on, under, and around rocks and sediment on the bottoms of lakes, rivers, and streams.

**Macro-** are visible to the eye without the aid of a microscope.

**Invertebrates-** organisms without backbones

Some of the organisms you may find will be larvae (immature) and some will be adults.

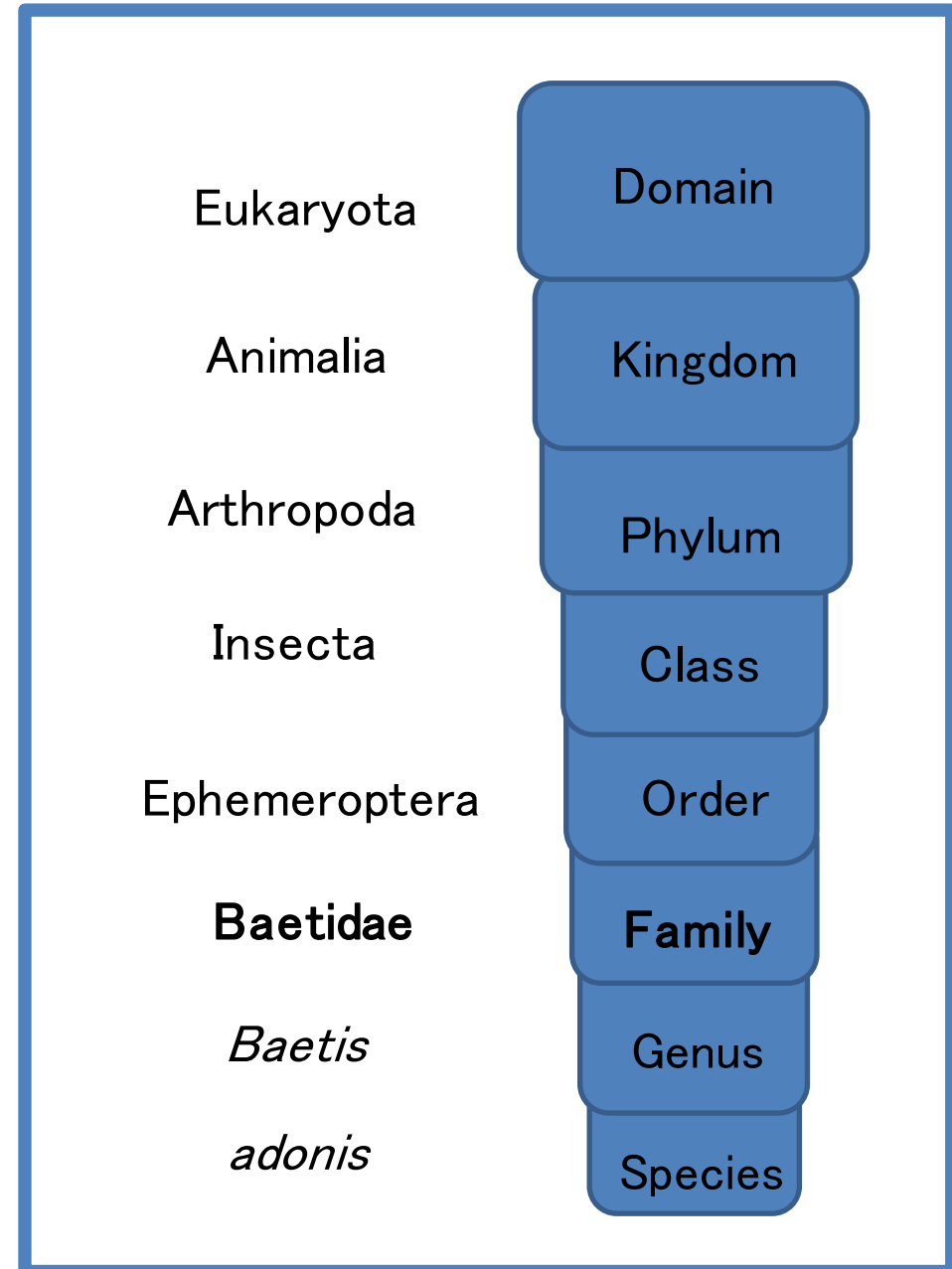














A larval *Baetis adonis* mayfly.



An adult Elmide, riffle beetle.







# Taxonomic Hierarchy







 ORDER	HABITUS PHOTO	DISTINGUISHING CHARACTERISTICS
<b>Ephemeroptera</b> (mayflies)		Three "tails" or cerci, with gills on abdomen (either dorsal or lateral, usually plate-like) and one tarsal claw.
<b>Odonata</b> (dragonflies, damselflies)		Mask-like labium; gills are internalized within the abdomen (Dragonflies) or external on the end of the abdomen (Damselflies).
<b>Plecoptera</b> (stoneflies)		Two "tails" or cerci; gills (either plumose or finger-like) present on thorax, or on thorax and first few abdominal segments, two tarsal claws.
<b>Hemiptera</b> (true bugs)		Two pairs of wings – first set of wings half membranous and half sclerotized (looks like an "X"); piercing-sucking mouthparts
<b>Megaloptera</b> (alderflies, dobsonflies, fishflies)		Developed mandibles, four-segmented antennae. Head and thorax are patterned; the head is also quadrate. Two claws on fore legs. Segmented lateral gills on abdomen.
<b>Neuroptera</b> (spongeflies)		Slender, slender legs with single claws. Transparent gills on sides of abdominal segments. Mouthparts elongate and segmented.
<b>Trichoptera</b> (caddisflies)		Segmented, just anal prolegs with claws; thorax partially or fully sclerotized, membranous abdomen. May have a "case" built of various materials
<b>Lepidoptera</b> (moths, butterflies)		Head is distinct with a ring of simple eyes. Thorax and legs are segmented. Prolegs and anal prolegs present on abdominal segments.
<b>Coleoptera</b> (beetles)		No anal prolegs but possibly claws. Bodies of larvae may be completely sclerotized; adults have a hardened first pair of wings ("elytra").
<b>Diptera</b> (true flies)		Head may be sclerotized (and visible) or reduced. Legs are not sclerotized. Body fleshy (possibly with clawed prolegs) with various types of breathing structures on the tail end.
<b>Non-Insects</b>		Various characteristics, please see non-insects page.

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# Plecoptera
















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## Perlidae





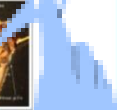
Key Characters	Paraglossae much longer than glossae; tips of paraglossae distinctively rounded. Filamentous and highly branched gills extending laterally from ventral side of thorax. Usually predacious.
Tolerance	1
Distribution	CA, OR, WA, NV, AZ


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# TOUCH SCREEN NAVIGATION

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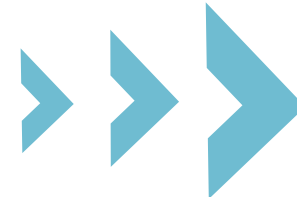
## Perlidae

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Anatomic Detail



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## Perlidae



**Identification Tips**

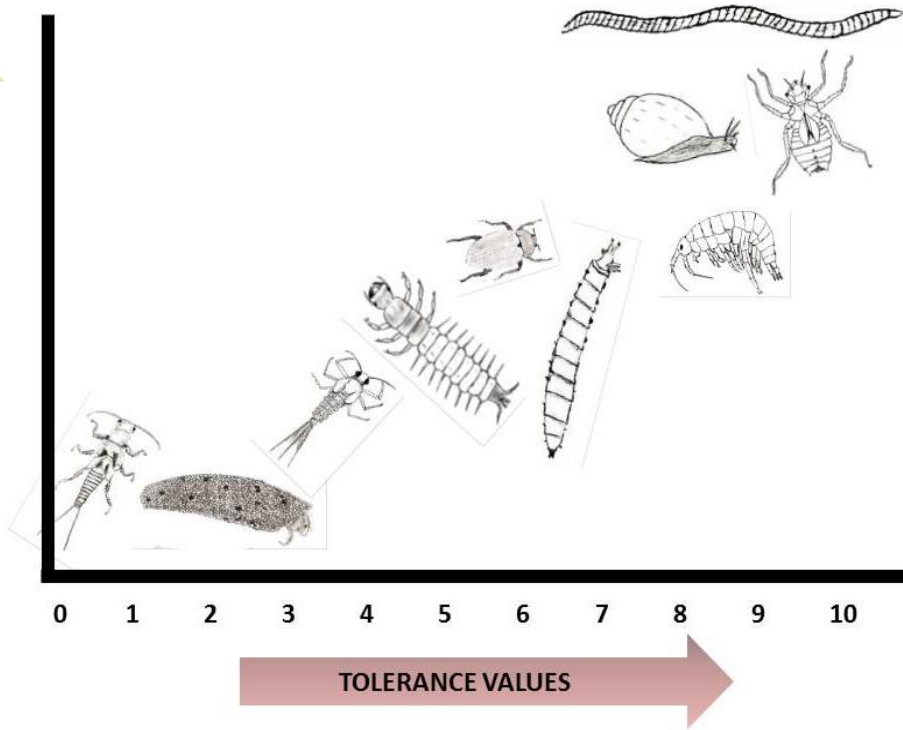
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Tolerance	1
Distribution	CA, OR, WA, NV, AZ

**Tolerance Values**

**Distribution**

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ANTHROPOGENIC DISTURBANCE



Many benthic macroinvertebrate families can only be found in select locations within preferred habitat are not found everywhere in California.

Some of the benthic macroinvertebrates found in California can also be found in its neighboring states, other western states, Canada and or Mexico.



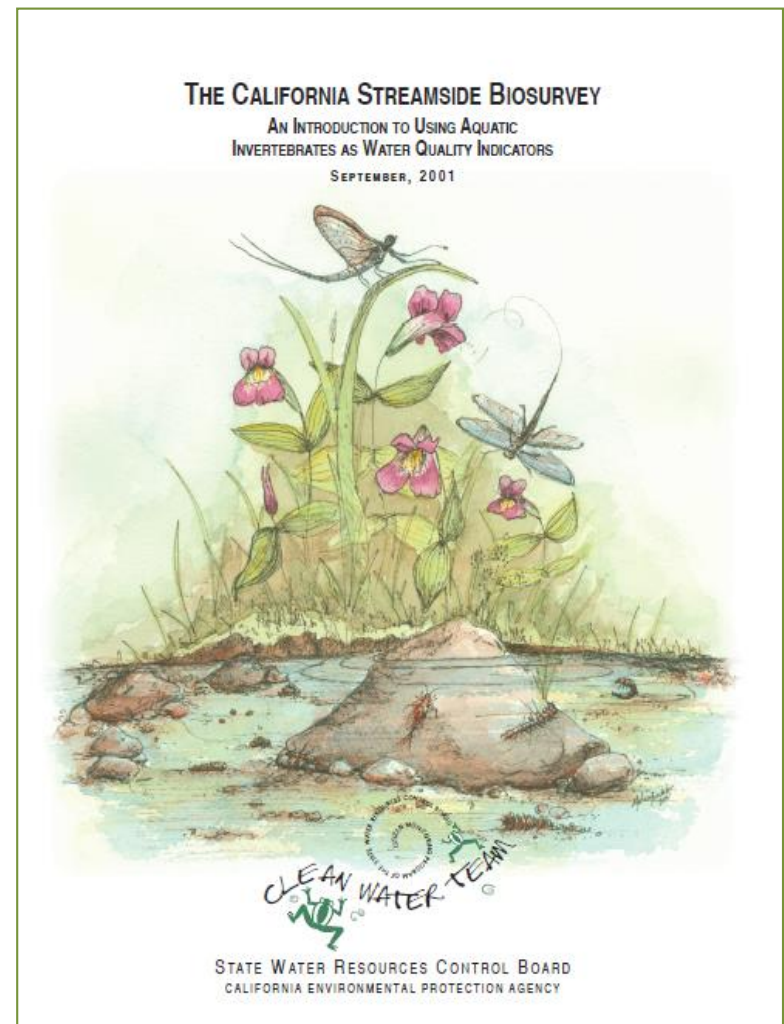
**Tolerance Values** provide a measure of the sensitivity of aquatic organisms to anthropogenic disturbances and have historically provided a useful tool for assessing the biological condition of streams and rivers.

Tolerance are based on a family's tolerance, ranging from 0 (least tolerant) to 10 (most tolerant).

A **biosurvey** is literally a "life-survey", a simple test of stream health that involves collecting and classifying stream life. The biosurvey described here, and more extensive sampling known as **bioassessment**, are tools for measuring stream water quality and habitat health based on the types of invertebrate organisms that live on the stream bottom.

Aquatic insects and other invertebrates are the most common form of animal life in streams. They live among algae, aquatic plants, and many microscopic organisms (like bacteria).

**Macroinvertebrates** (those invertebrates visible to the unaided eye) play many roles in the aquatic food web--they help break down organic debris, recycle nutrients, and provide food for fish, amphibians and riparian birds. Some of these organisms can live and even thrive under polluted conditions but many others require clean and cold water to survive. **The variety and types of organisms present are indicators of the health of the stream.**



[The California Streamside Biosurvey](http://www.waterboards.ca.gov/water_issues/programs/swamp/cwt_guidance.shtml#30) & [Bio-encuesta para los arroyos de California](http://www.waterboards.ca.gov/water_issues/programs/swamp/cwt_guidance.shtml#30)













[www.waterboards.ca.gov/water\\_issues/programs/swamp/cwt\\_guidance.shtml#30](http://www.waterboards.ca.gov/water_issues/programs/swamp/cwt_guidance.shtml#30)

**Citizen Science & Water Quality Monitoring**

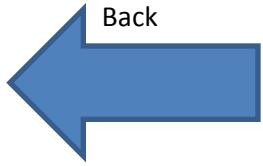
[www.waterboards.ca.gov/water\\_issues/programs/swamp/cwt\\_volunteer.shtml](http://www.waterboards.ca.gov/water_issues/programs/swamp/cwt_volunteer.shtml)

**The Standard Taxonomic Effort List** is a complete list of all the bentic macroinvertebrates found in California's wadeable streams. <http://safit.org/ste.html>

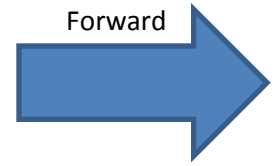
Collection of BMIs in CA requires a CDFW [Scientific Collecting Permit](http://www.waterboards.ca.gov/water_issues/programs/swamp/cwt_guidance.shtml#30) (SCP).

 <b>ORDER</b>	<b>HABITUS PHOTO</b>	<b>DISTINGUISHING CHARACTERISTICS</b>
<b>Ephemeroptera</b> (mayflies)		Three "tails" or cerci, with gills on abdomen (either dorsal or lateral, usually plate-like) and one tarsal claw.
<b>Odonata</b> (dragonflies, damselflies)		Mask-like labium; gills are internalized within the abdomen (Dragonflies) or external on the end of the abdomen (Damselflies).
<b>Plecoptera</b> (stoneflies)		Two "tails" or cerci; gills (either plumose or finger-like) present on thorax, or on thorax and first few abdominal segments, two tarsal claws.
<b>Hemiptera</b> (true bugs)		"Half wings" – first set of wings half membranous and half sclerotized (looks like an "X"); piercing-sucking mouthparts
<b>Megaloptera</b> (alderflies, dobsonflies, fishflies)		Well-developed mandibles, four-segmented antennae. Head and abdomen are patterned; the head is also quadrate. Two claws on thoracic legs. Segmented lateral gills on abdomen.
<b>Neuroptera</b> (spongeflies)		Long antennae, slender legs with single claws. Transparent gills on ventral side of abdominal segments. Mouthparts elongate and unsegmented.
<b>Trichoptera</b> (caddisflies)		No "tails," just anal prolegs with claws; thorax partially or fully sclerotized, membranous abdomen. May have a "case" built of various materials
<b>Lepidoptera</b> (moths, butterflies)		Head is distinct with a ring of simple eyes. Thorax and legs are segmented. Prolegs and anal prolegs present on abdominal segments.
<b>Coleoptera</b> (beetles)		No anal prolegs but possibly claws. Bodies of larvae may be completely sclerotized; adults have a hardened first pair of wings ("elytra").
<b>Diptera</b> (true flies)		Head may be sclerotized (and visible) or reduced. Legs are not sclerotized. Body fleshy (possibly with clawed prolegs) with various types of breathing structures on the tail end.
<b>Non-Insects</b>		Various characteristics, please see non-insects page.

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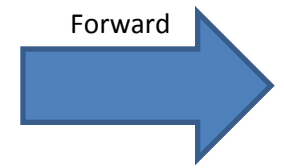
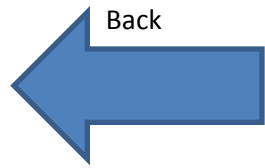
# Ephemeroptera

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<a href="#"><u>Ameletidae</u></a>	<a href="#"><u>Ametropodidae</u></a>	<a href="#"><u>Baetidae</u></a>	<a href="#"><u>Baetiscidae</u></a>	<a href="#"><u>Caenidae</u></a>	<a href="#"><u>Ephemerellidae</u></a>	<a href="#"><u>Ephemeridae</u></a>
						
<a href="#"><u>Heptageniidae</u></a>	<a href="#"><u>Isonychiidae</u></a>	<a href="#"><u>Leptohiphidae</u></a>	<a href="#"><u>Leptophlebiidae</u></a>	<a href="#"><u>Oligoneuriidae</u></a>	<a href="#"><u>Polymitarciidae</u></a>	<a href="#"><u>Siphonuridae</u></a>



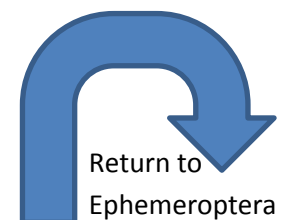
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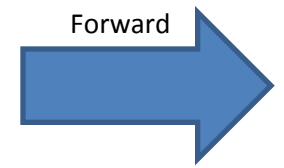
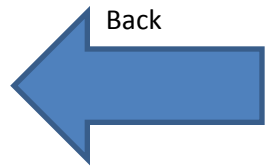
## Ameletidae



Key Characters	Labrum with a median notch on distal margin, terminal filament subequal to cerci. Antennae usually shorter than width of head, maxillae with crown of pectinate spines. Abdominal gills with single oval lamella with a sclerotized band along lateral margin and usually with a similar band on or near mesal margin.
Tolerance	0
Distribution	CA, OR, WA, NV, AZ



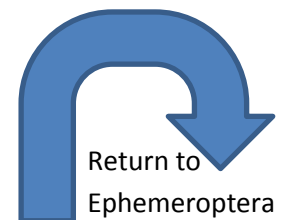


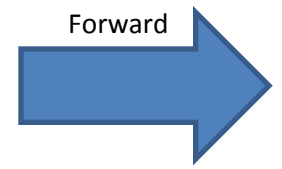
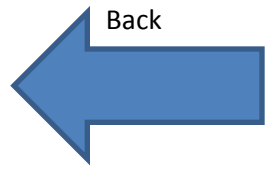


## Ametropodidae



Key Characters	Genus <i>Ametropus</i> ; claws on forelegs simple with long slender denticles, spinous pad present on fore coxae, claws on forelegs different from those on middle and hind legs, claws on middle and hind legs long and slender about as long as tibiae.
Tolerance	unknown
Distribution	CA, OR, WA

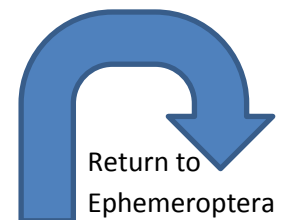


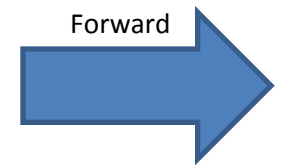
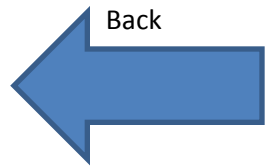


## Baetidae



Key Characters	Labrum with a median notch on distal margin (in Nearctic, only absent in <i>Apobaetis</i> ), terminal filament variable, may be shorter than tergum 10 or subequal to cerci. Antennae variable, can be 2-3 times or more than the width of the head, or shorter than width of head. Maxillae without pectinate spines, abdominal gills variable.
Tolerance	Variable, from 2-9
Distribution	CA, OR, WA, NV, AZ, Baja

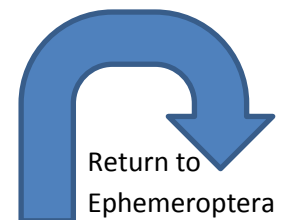




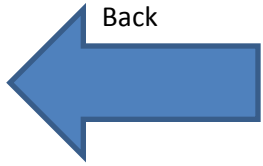
## Baetiscidae



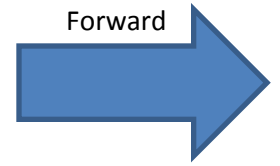
Key Characters	Highly distinctive 'shield' formed by enlarged thoracic notum covering abdominal segments 1-5. Gills are beneath the shield.
Tolerance	4
Distribution	WA, NV



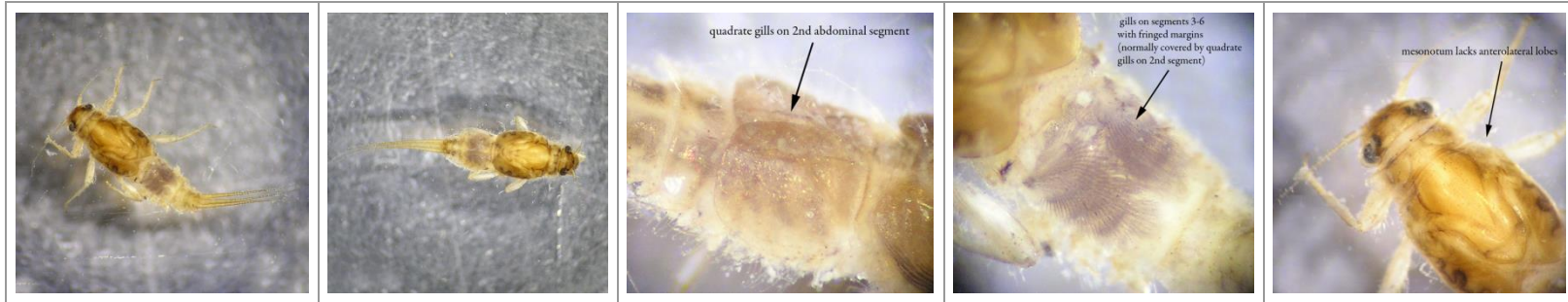
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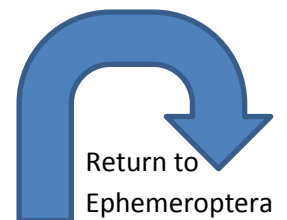
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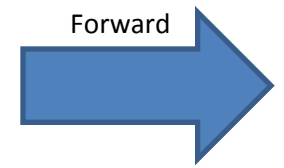
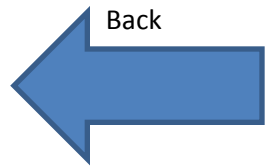


## Caenidae



Key Characters	Quadrate operculate gills on segments 2 not fused medially, gills on segments 3-6 with fringed margins. Mesonotum unlike <i>Neophemeridae</i> . Hind wing pads absent.
Tolerance	7
Distribution	CA, OR, WA, AZ, Baja

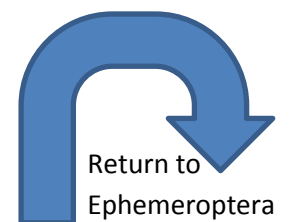


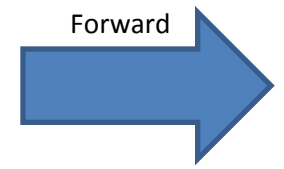
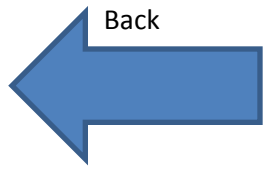


## Ephemerellidae



Key Characters	Abdominal gills absent on segment 2, rudimentary or absent on segment 1, present on segments 3-7 or 4-7. Gills have dorsal and ventral lamella (with numerous lobes). Paired abdominal tubercles often present.
Tolerance	Variable, from 0-7
Distribution	CA, OR, WA, NV, AZ, Baja

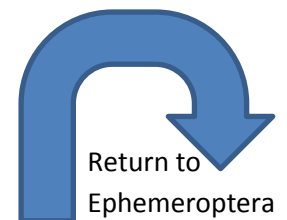


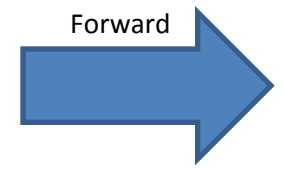
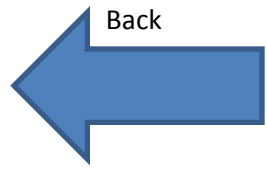


## Ephemeridae



Key Characters	Mandibular tusks curved upward when viewed laterally, body cylindrical. Abdominal gills dorsal.
Tolerance	6
Distribution	CA, OR, WA, NV

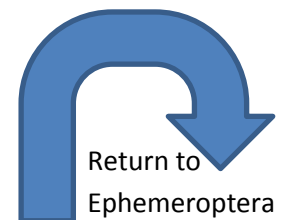


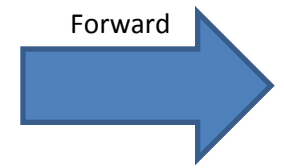
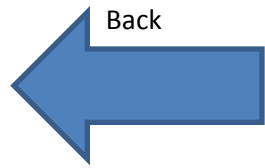


## Heptageniidae



Key Characters	Tarsi longer than claws; tibiae and tarsi straight, mandibles not visible in dorsal view. Head and body noticeably flattened.
Tolerance	Variable, from 0-4
Distribution	CA, OR, WA, NV, AZ, Baja

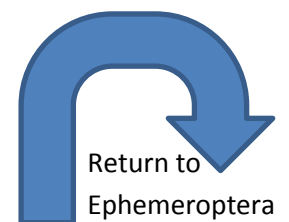




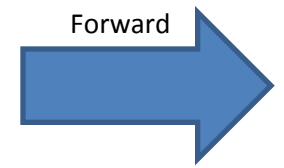
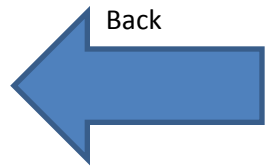
## Isonychiidae



Key Characters	All abdominal gills similar in position and structure; Gill fibrils shorter than gill plates. Fore coxa possess gills, fore tibiae possess filtering hairs. Larvae minnow-like.
Tolerance	2
Distribution	CA, NV, AZ



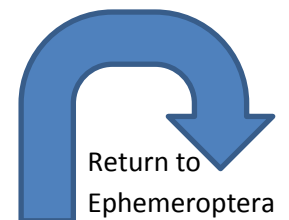


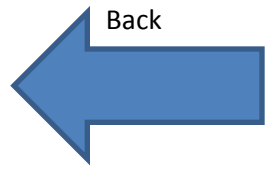


## Leptohyphidae

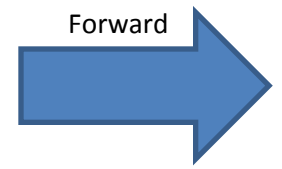


Key Characters	Abdominal gills on abdominal segment 2 operculate, triangular, subtriangular, or oval; gills do not meet medially. Abdominal gills on 3-6 lack fringed margins.
Tolerance	4-5
Distribution	CA, OR, WA, NV, AZ, Baja





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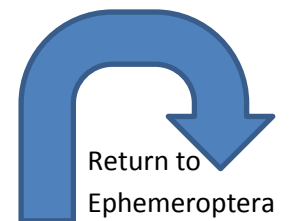


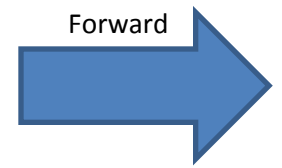
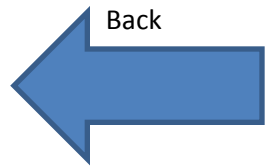
Forward

## Leptophlebiidae



Key Characters	Abdominal gills on segments 2-7 either forked, in tufts with fringed margins, or with double lamellae ending in fringes or points; apicolateral margin of maxillae with a dense brush of hairs.
Tolerance	2-4
Distribution	CA, OR, WA, NV, AZ, Baja

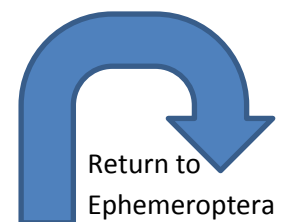


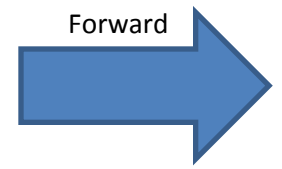
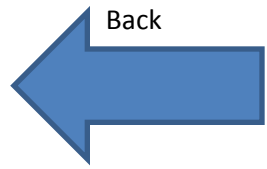


## Oligoneuriidae



Key Characters	Abdominal gills on segment 1 held ventrally, gill fibrils longer than gill plates, or gill plate absent. Row of filtering hairs on front legs similar to those on Isonychiidae.
Tolerance	2
Distribution	AZ

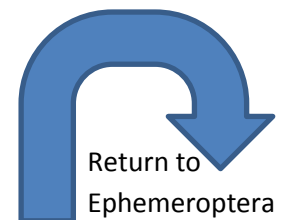


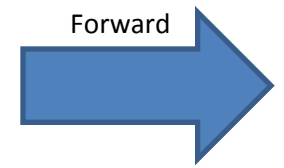
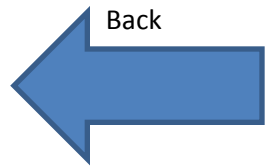


## Polymitarcyidae



Key Characters	Mandibular tusks curved downward when viewed laterally, ventral apex of hind tibiae rounded. Body cylindrical.
Tolerance	2
Distribution	OR, WA, NV

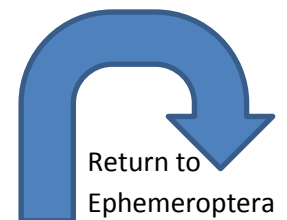




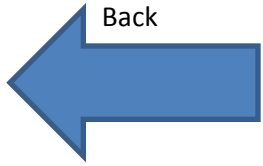
## Siphonuridae



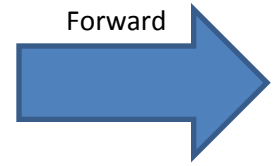
Key Characters	Labrum lacking a median notch on distal margin, terminal filament subequal to cerci, antennae usually shorter than width of the head. Tibiae and tarsi not bowed, claws usually not long and slender. Gills large and well-developed.
Tolerance	7
Distribution	CA, WA



Back



Forward




# Odonata

## Suborder Zygoptera (Damselflies)

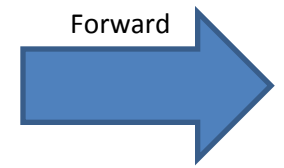
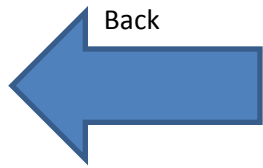
			
<a href="#"><u>Calopterygidae</u></a>	<a href="#"><u>Coenagrionidae</u></a>	<a href="#"><u>Lestidae</u></a>	<a href="#"><u>Platystictidae</u></a>

## Suborder Anisoptera (Dragonflies)

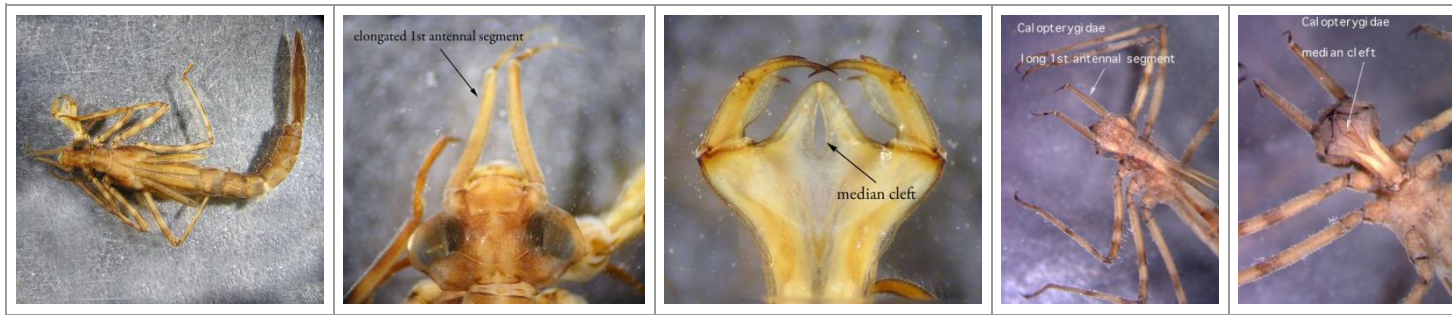
						
<a href="#"><u>Aeshnidae</u></a>	<a href="#"><u>Cordulegastridae</u></a>	<a href="#"><u>Corduliidae</u></a>	<a href="#"><u>Gomphidae</u></a>	<a href="#"><u>Libellulidae</u></a>	<a href="#"><u>Macromiidae</u></a>	<a href="#"><u>Petaluridae</u></a>



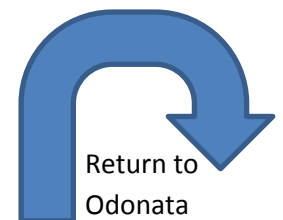
Return to Order

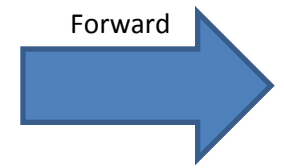
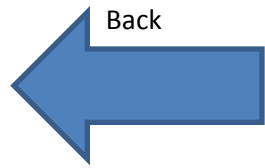


## Calopterygidae



Key Characters	First antennal segment greatly elongated, as long as the length of the remaining segments. Prementum with deep median cleft.
Tolerance	5-6
Distribution	CA, OR, WA, NV, AZ, Baja

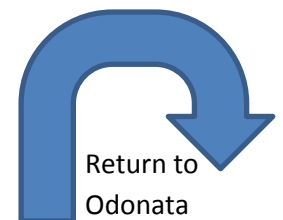




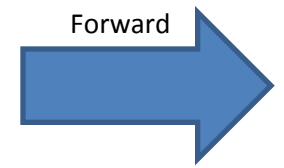
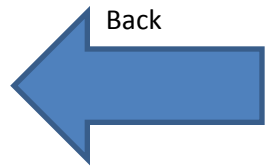
## Coenagrionidae



Key Characters	Generally, most commonly found family of Zygoptera in North America. First antennal segment distinctly shorter than the combined length of the following segments. Proximal portion of gills not differing from distal portion
Tolerance	Variable, from 5-9
Distribution	CA, OR, WA, NV, AZ, Baja



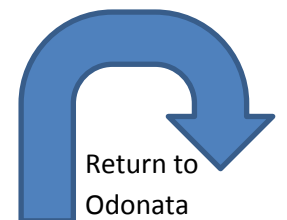


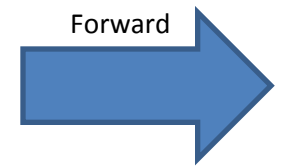
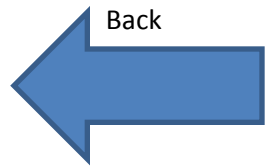


## Lestidae



Key Characters	Prementum distinctly petiolate (stalked) and spoon-shaped. Movable hook on on each palpal lobe with 2 or 3 setae.
Tolerance	9
Distribution	CA, OR, WA, NV, AZ, Baja

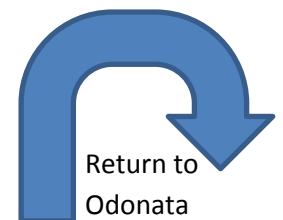


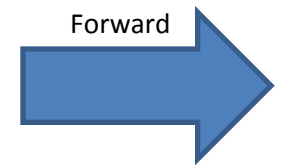
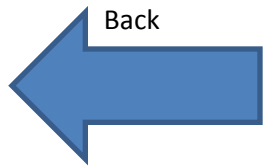


## Platystictidae



Key Characters	Base of prementum wider than distal portion; ligula has a median cleft. Eyes not as large as those of Protoneurids or Coenagrionids. Uncommon in the U.S.
Tolerance	Unknown
Distribution	AZ

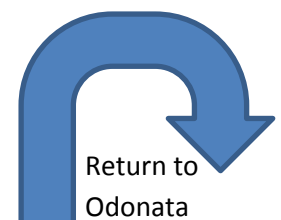


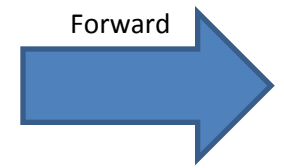
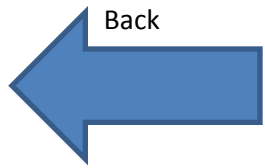


## Aeshnidae

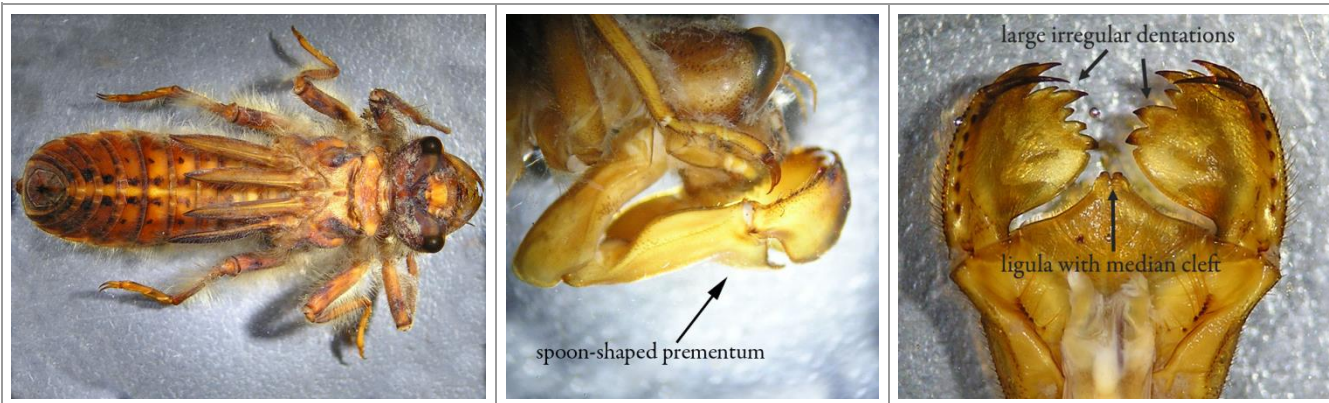


Key Characters	Prementum and palpal lobes of labium flat, prementum widest in distal half, much narrower in basal half, without dorsal premental setae. Antennae slender, bristlelike, with 6 or more segments. Note the difference in coloration between preserved specimens (far left image) and live specimens (2nd image from left).
Tolerance	typically 5, up to 8 in some genera ( <i>Anax</i> )
Distribution	CA, OR, WA, NV, AZ, Baja

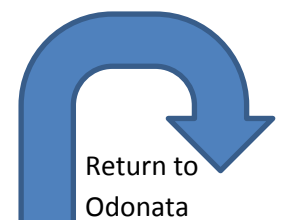


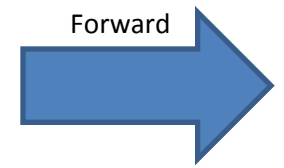
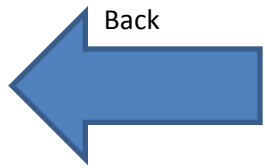


## Cordulegastridae

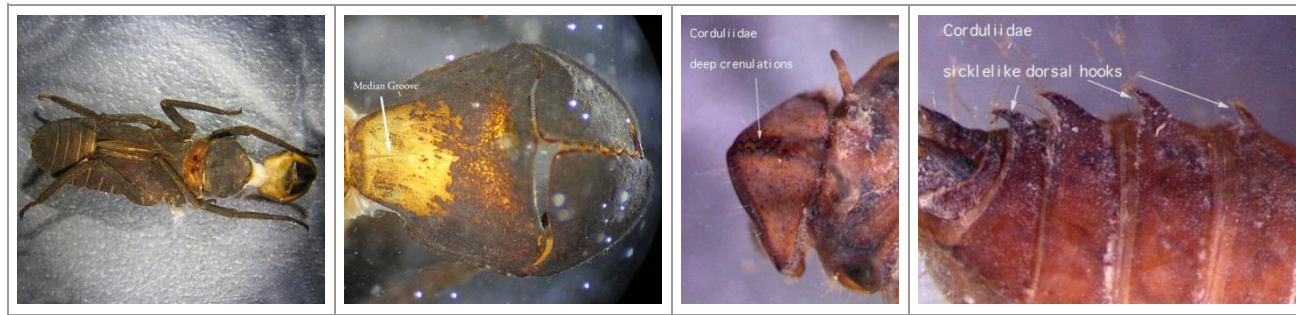


Key Characters	Spoon-shaped prementum and palpal lobes of labium, sometimes with dorsal premental setae; palpal lobe with large, irregular dentations. Tooth-like cleft (ligula) on prementum.
Tolerance	3
Distribution	CA, OR, WA, NV, AZ

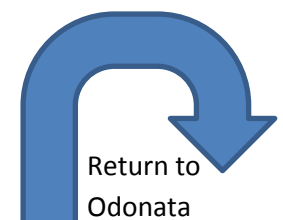


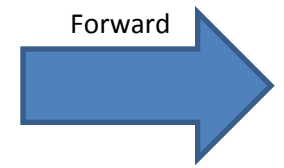
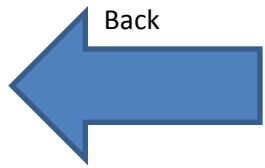


## Corduliidae



Key Characters	Median Groove on ventral side of prementum. Crenulations on palpal lobes with deep notches. Cerci half as long as paraprocts. Lateral spines of abdominal segment 9 usually longer than middorsal length, middorsal hook generally sicklelike.
Tolerance	generally 2-4, can be as high as 9 in some genera ( <i>Somatochlora</i> )
Distribution	CA, OR, WA, NV

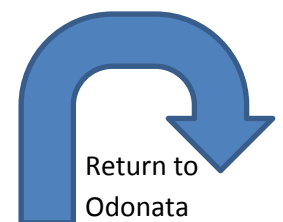


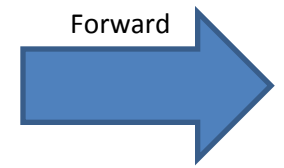
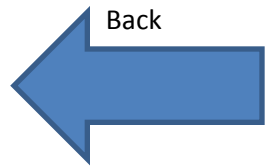


## Gomphidae



Key Characters	Prementum and palpal lobes of labium flat, without premental setae. Antennae with four segments, 3rd antennal segment thicker and larger. Ligula without a median cleft.
Tolerance	4
Distribution	CA, OR, WA, NV, AZ, Baja

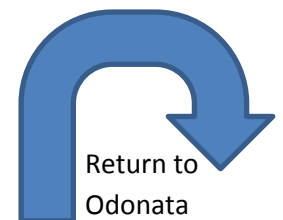


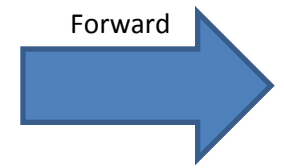
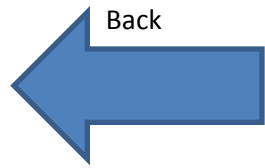


## Libellulidae

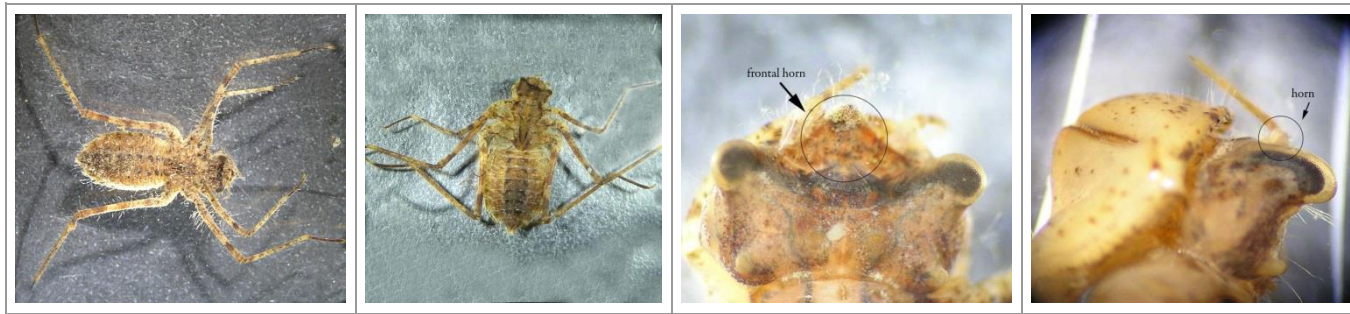


Key Characters	Cerci usually no more than half as long as paraprocts. No median groove on ventral side of prementum. Crenulations on palpal lobes with shallow (not deep) notches.
Tolerance	9
Distribution	CA, OR, WA, NV, AZ, Baja

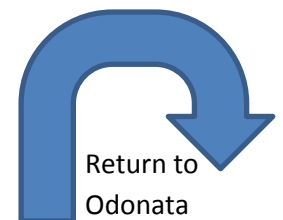




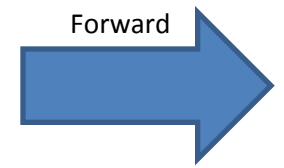
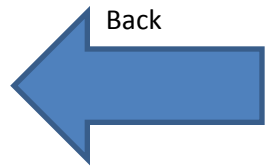
## Macromiidae



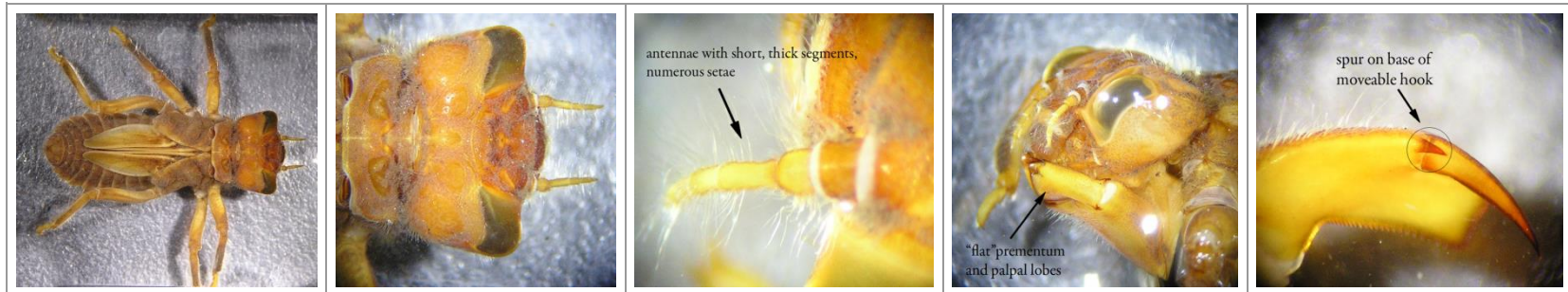
Key Characters	Head with upwardly curved frontal horn between bases of antennae. Long legs, with hind femur extending past abdominal segment 8. <i>Macromia</i> only genus in CA region.
Tolerance	2
Distribution	CA, OR, WA, NV, AZ







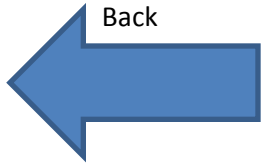
## Petaluridae



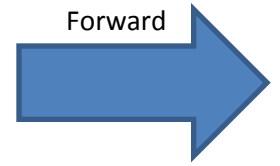
Key Characters	Prementum and palpal lobes of labium flat, prementum with sides subparallel in distal portion, without dorsal premental setae. Antennae short, thick, and hairy with six or seven segments.
Tolerance	Unknown
Distribution	CA, OR, WA, NV



Back



Forward



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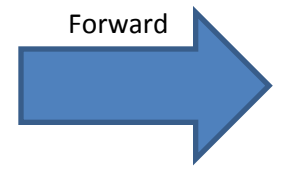
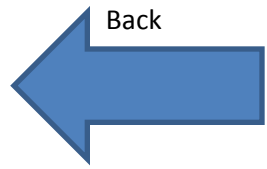
# Plecoptera

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<a href="#"><u>Capniidae</u></a>	<a href="#"><u>Chloroperlidae</u></a>	<a href="#"><u>Leuctridae</u></a>	<a href="#"><u>Nemouridae</u></a>	<a href="#"><u>Peltoperlidae</u></a>	<a href="#"><u>Perlidae</u></a>
					
	<a href="#"><u>Perlodidae</u></a>	<a href="#"><u>Pteronarcyidae</u></a>	<a href="#"><u>Taeniopterygidae</u></a>		



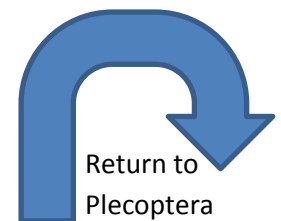
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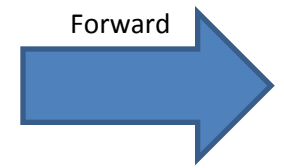
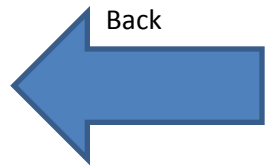


## Capniidae

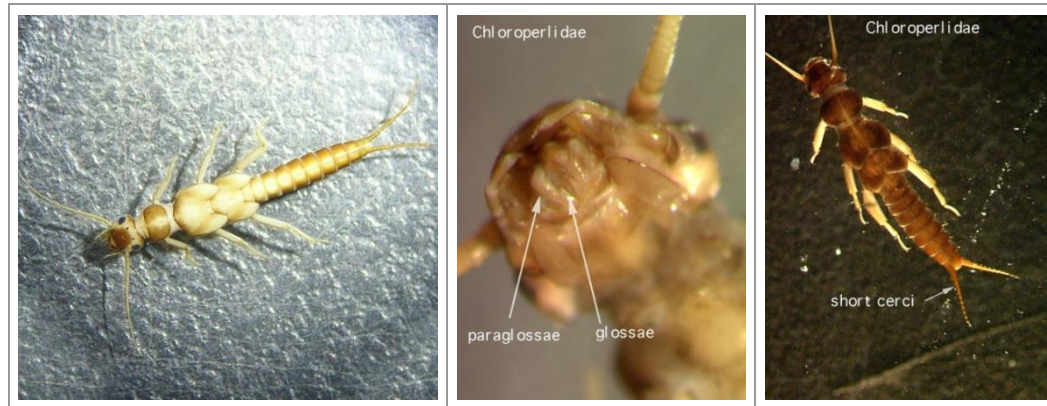


Key Characters	Glossae and paraglossae subequal. Abdominal segments 1-9 divided by a membranous fold, lateral margins of abdomen as viewed from above appear zigzagged. Hind wing pads parallel to the body. Cylindrical body form but more swollen (like a bowling pin).
Tolerance	1
Distribution	CA, OR, WA, NV, AZ, Baja

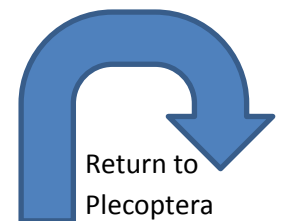


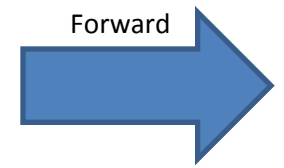
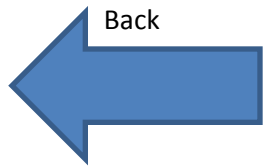


## Chloroperlidae



Key Characters	Paraglossae much longer than glossae; tips of paraglossae are pointed. Cylindrical body form most like Leuctridae. Gills usually absent. Hind wingpads usually parallel to the body. Cerci shorter than length of abdomen
Tolerance	0-1
Distribution	CA, OR, WA, NV, AZ, Baja

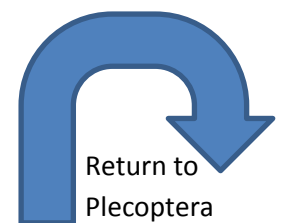




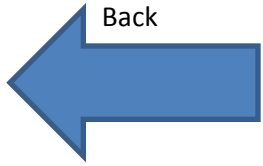
## Leuctridae



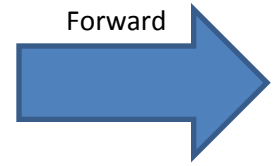
Key Characters	Glossae and paraglossae subequal. Abdominal segments 1-7 divided by a membranous fold; lateral margins of abdomen as viewed from above do not appear zigzagged but are smooth. Hind wing pads parallel to the body. Cylindrical body form.
Tolerance	0
Distribution	CA, OR, WA, NV



Back



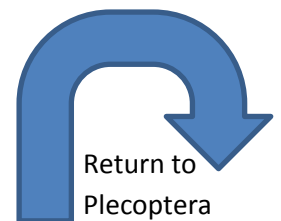
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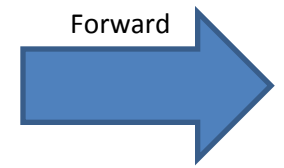
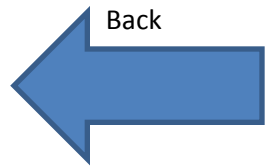


## Nemouridae



Key Characters	Glossae and paraglossae subequal. Short and robust body form. Gills absent or restricted to cervical region. Hind wing pads strongly divergent. Hind legs usually can be extended beyond the tip of the abdomen. 2nd tarsal segment shorter than 1st.
Tolerance	0-2
Distribution	CA, OR, WA, NV, AZ, Baja

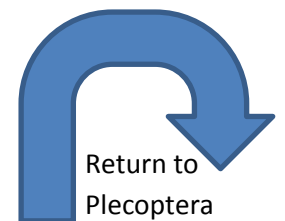


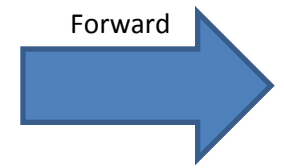
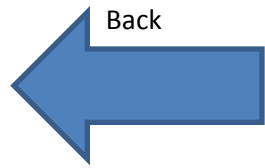


## Peltoperlidae



Key Characters	Body roachlike in appearance. Glossae and paraglossae subequal. May have conical gills at base of legs. Thorax is large with ventral overlapping plates. Adults have 2 ocelli.
Tolerance	1-2
Distribution	CA, OR, WA, NV

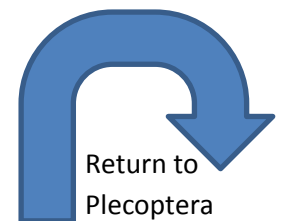




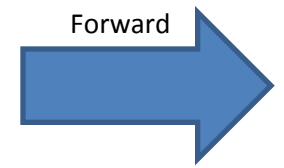
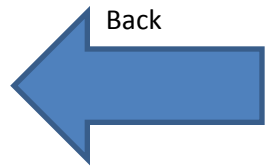
## Perlidae



Key Characters	Paraglossae much longer than glossae; tips of paraglossae distinctively rounded. Filamentous and highly branched gills extending laterally from ventral side of thorax. Usually predacious.
Tolerance	1
Distribution	CA, OR, WA, NV, AZ



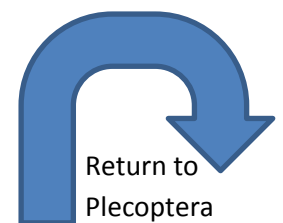


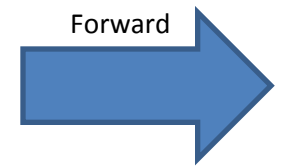
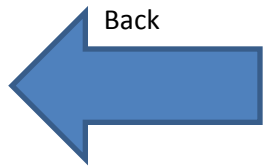


## Perlodidae



Key Characters	Paraglossae much longer than glossae, tips of paraglossae are pointed. Branched thoracic gills almost always absent. May have simple fingerlike gills beneath head or on the thorax. Cerci longer than length of abdomen.
Tolerance	0-2
Distribution	CA, OR, WA, NV, AZ, Baja

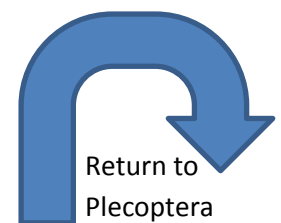


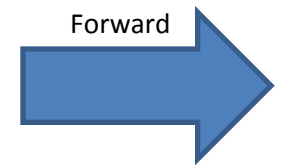
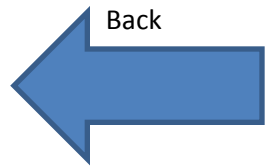


## Pteronarcyidae



Key Characters	Thoracic segments and abdominal segments 1 & 2 ( & possibly 3) have gills.Glossae and paraglossae subequal.
Tolerance	0-1
Distribution	CA, OR, WA, NV, AZ

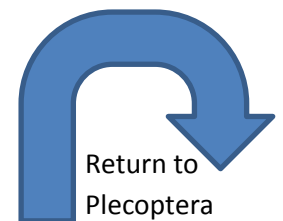


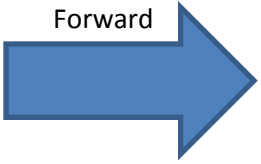
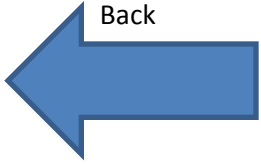


## Taeniopterygidae



Key Characters	Glossae and paraglossae subequal. Cervical gills absent, but may have telescopic, fingerlike gills at base of legs. Abdomen may have large ventroapical plate. Tarsal segments 1 and 2 are subequal in length.
Tolerance	2
Distribution	CA, OR, WA, NV, AZ





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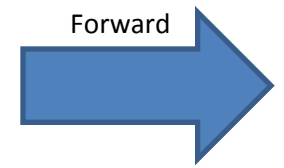
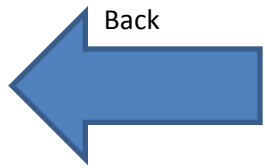
# Hemiptera

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<a href="#">Belostomatidae</a>	<a href="#">Corixidae</a>	<a href="#">Gerridae</a>	<a href="#">Naucoridae</a>	<a href="#">Nepidae</a>	<a href="#">Notonectidae</a>
					
<a href="#">Gelastocoridae</a>	<a href="#">Pleidae</a>	<a href="#">Vellidae</a>			



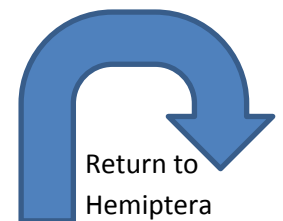
Return to Order

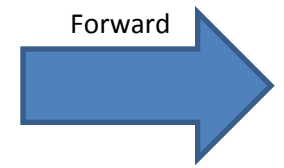
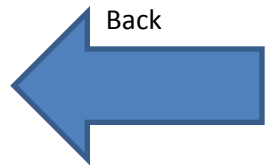


## Belostomatidae



Key Characters	Giant water bugs, electric light bugs. Large, dorsoventrally flattened. Raptorial forelegs. Breathe through flat abdominal air straps. In some genera, eggs are deposited on the back of the male. Predators of insects, tadpoles, fish and even birds!
Tolerance	8
Distribution	CA, OR, WA, NV, AZ

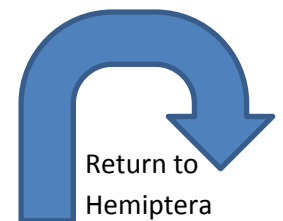


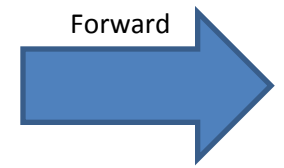
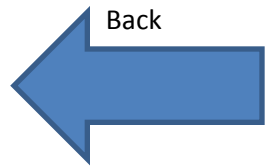


## Corixidae



Key Characters	Water boatmen; scavengers and predators, largest family of aquatic/semi-aquatic Heteroptera. Ventrally keeled, dorsally flattened, beak triangular, short, and unsegmented. Oar-like hind legs, front legs with single tarsal segment scooplike or fringed with stiff setae.
Tolerance	8-10
Distribution	CA, OR, WA, NV, AZ, Baja

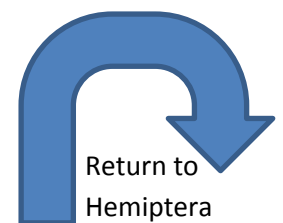


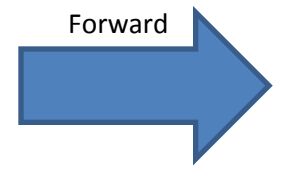
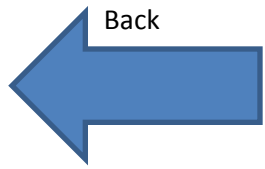


## Gerridae



Key Characters	Elongated hind femur extending beyond abdomen, middle legs closer to hind legs than forelegs, tarsal claws pre-apical. Not considered a benthic organism.
Tolerance	5
Distribution	CA, OR, AZ

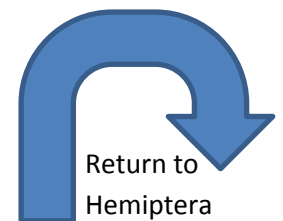




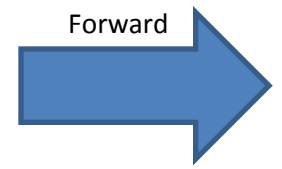
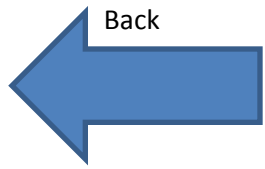
## Naucoridae



Key Characters	"Creeping water bugs," ovate, strongly dorsoventrally flattened. Raptorial forelegs, middle and hind legs with swimming hairs. Found in subsurface aquatic habitats. Predaceous.
Tolerance	5-7
Distribution	CA, OR, NV, AZ



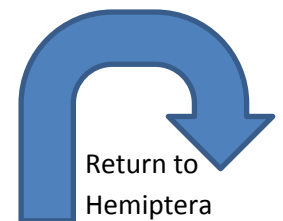


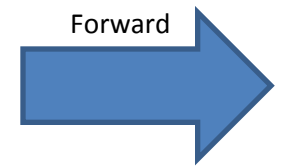
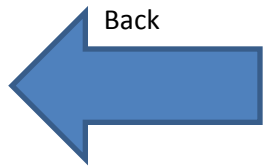


## Nepidae



Key Characters	"Water scorpions," elongate, sticklike and slowmoving -- thus very cryptic. Raptorial fore legs. Breathe through cylindrical respiratory siphon. Predators of mosquito larvae, tadpoles, etc.
Tolerance	5
Distribution	CA, OR, AZ

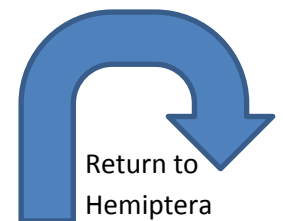


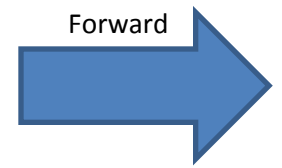
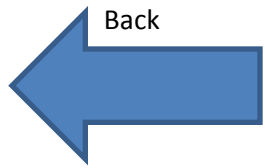


## Notonectidae

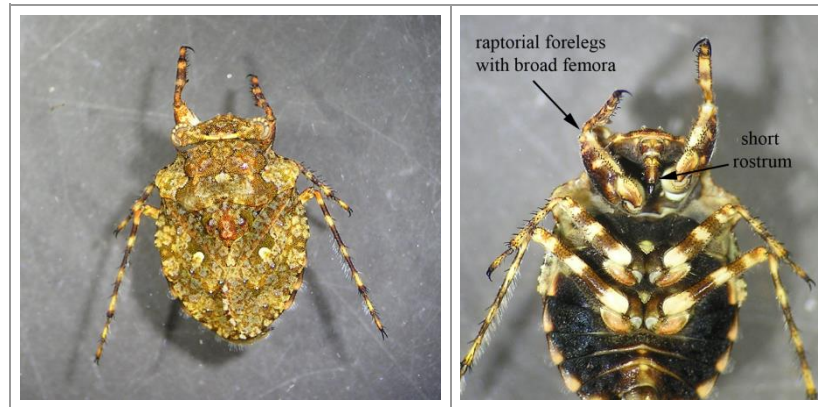


Key Characters	Slender front legs, long, oar-like hind legs, swimming hairs on hind and middle legs. Tarsal claws not well-developed. 5mm or more in length.
Tolerance	5
Distribution	CA, OR, AZ





## Gelastocoridae



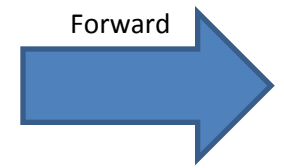
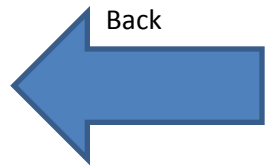
Key Characters	Semi-aquatic bugs, no swimming hairs on middle or hind legs. Raptorial ( grasping) forelegs with broad femora, short rostrum does not reach hind coxae.
Tolerance	unknown
Distribution	CA, OR, WA, UT, AZ, NV



Return to Order



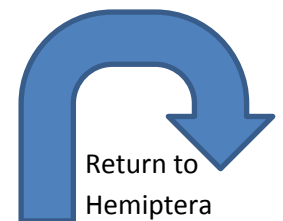
Return to  
Hemiptera

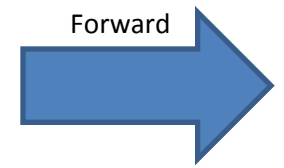
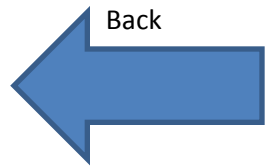


## Pleidae

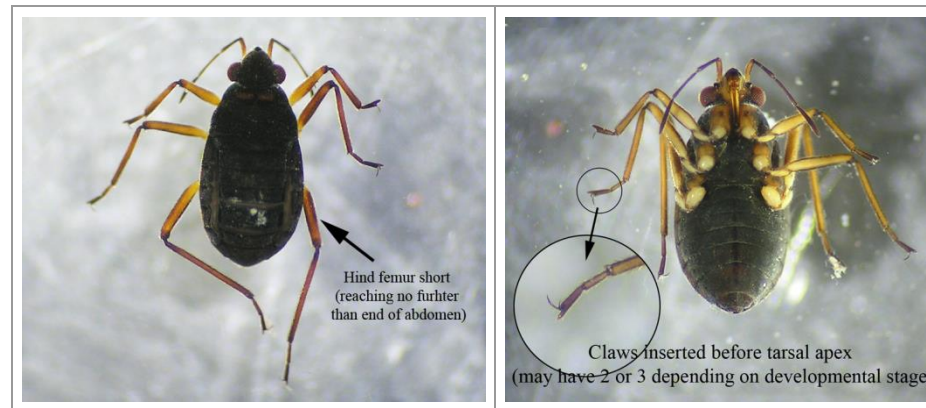


Key Characters	Similar to notonectids, but they are much smaller. Their body form is ovoid. Their legs have swimming hairs, with the hind legs having 2 claws on the tarsi.
Tolerance	5
Distribution	Unknown

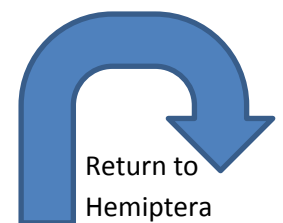


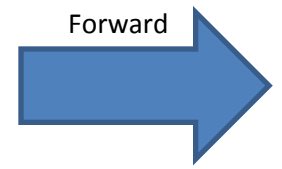
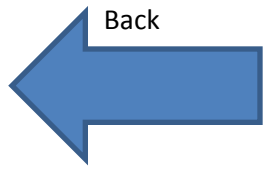


## Vellidae



Key Characters	Semi-aquatic bugs. Antennae longer than head, wing membrane without distinct cells, claws inserted before tarsal apex (at least on front tarsus), hind femur short, either not surpassing or barely surpassing apex of abdomen. Some species with feather-like structures on middle tarsi.
Tolerance	5
Distribution	CA, OR, WA, UT, AZ, NV





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# Megaloptera

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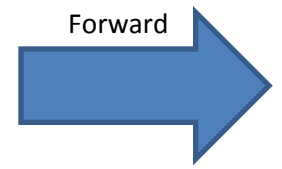
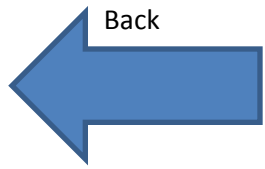
[Corydalidae](#)



[Sialidae](#)



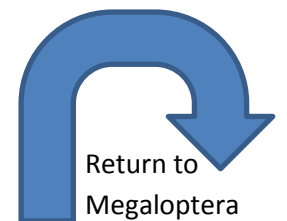
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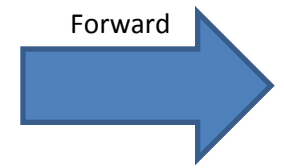
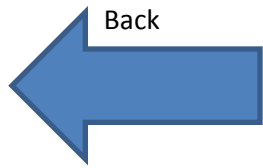


## Corydalidae



Key Characters	8 pairs of 2-segmented lateral filaments on abdominal segments 1-8, one pair of single-segment filaments on abdominal segment 10. 2 anal prolegs with claws on apex of abdomen.
Tolerance	0
Distribution	CA, OR, WA, NV, AZ, Baja

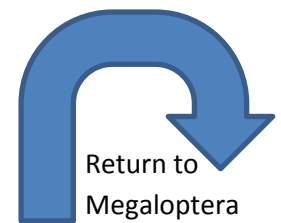




## Sialidae

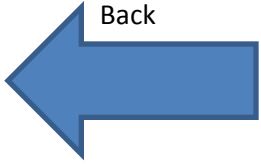


Key Characters	7 pairs of 4-to-5 segmented lateral filaments on abdominal segments 1-7. Single long caudal filament. 25mm or smaller. <i>Sialis</i> only genera in CA
Tolerance	4
Distribution	CA, OR, WA, NV

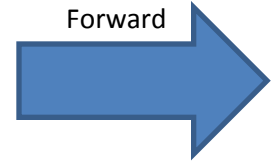




Back



Forward



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# Neuroptera

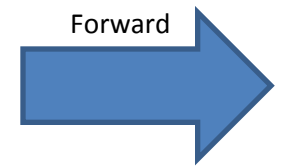
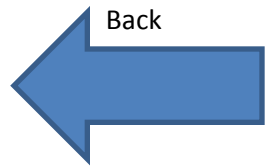
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[Sisyridae](#)



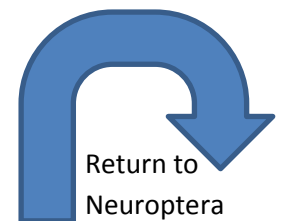
Return to Order



## Sisyridae



Key Characters	Small, stout terminal instars with conspicuous setae, body color yellow-brown or dark green. Elongate, unsegmented mouthparts, relatively long antennae. 2nd and 3rd instars have transparent 2-3 segmented ventral gills on abdominal segments 1-7.
Tolerance	5
Distribution	CA, OR



Back

# Trichoptera

Forward



[Apataniidae](#)



[Brachycentridae](#)



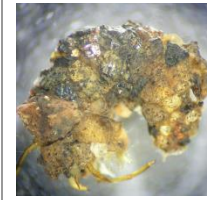
[Calamoceratidae](#)



[Glossosomatidae](#)



[Goeridae](#)



[Helicopsychidae](#)



[Hydrobiosidae](#)



[Hydropsychidae](#)



[Hydroptilidae](#)



[Lepidostomatidae](#)



[Leptoceridae](#)



[Limnephilidae](#)



[Odontoceridae](#)



[Philopotamidae](#)



[Phryganeidae](#)



[Polycentropodidae](#)



[Psychomyiidae](#)



[Rhyacophilidae](#)



[Rossianidae](#)



[Sericostomatidae](#)



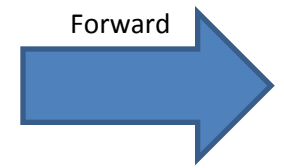
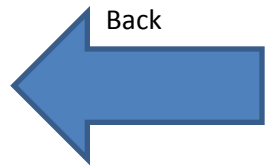
[Uenoidae](#)



[Xiphocentronidae](#)



Return to Order



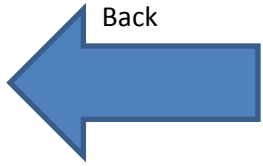
## Apataniidae



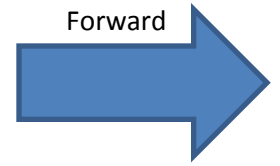
Key Characters	Antennae located between eye and anterior margin of head capsule. Abdominal gills single or lacking. Mandibles with 'scraper blades' in some genera.
Tolerance	0-1
Distribution	CA, OR, WA, NV, AZ



Back



Forward



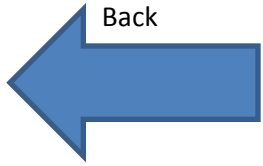
## Brachycentridae



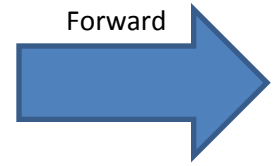
Key Characters	Mesonotum largely sclerotized. Abdominal segment I without dorsal and lateral humps. Portable, tubular cases (many can be four-sided) Generally suspended-particle and substrate-surface feeders.
Tolerance	1-3
Distribution	CA, OR, WA, NV, AZ



Back



Forward



## Calamoceratidae



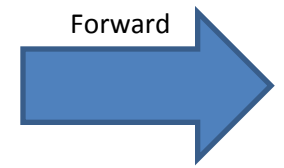
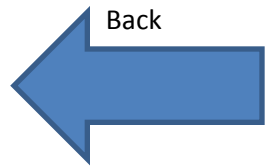
Key Characters	Row of 16 long setae across central part of labrum. Tarsal claws similarly structured on all legs. Larval case a hollowed twig or leaves and bark
Tolerance	1
Distribution	CA, OR, WA



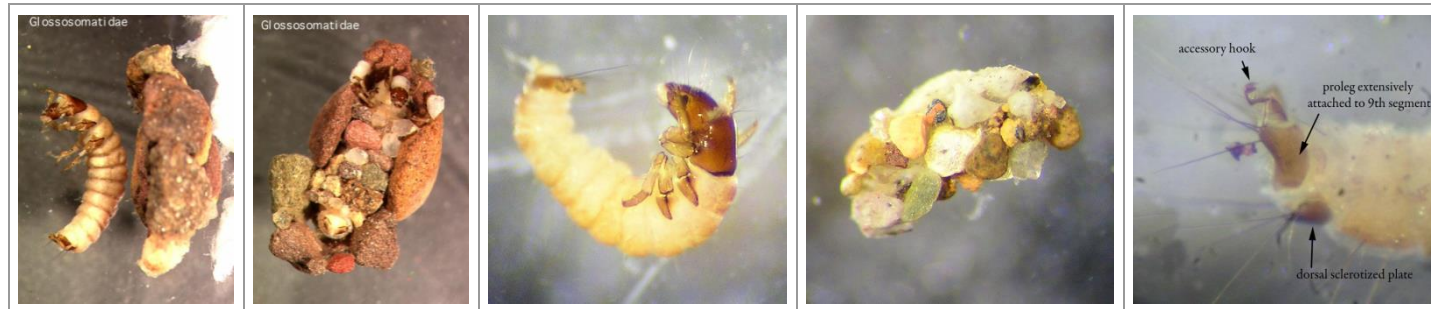
Return to Order



Return to  
Trichoptera

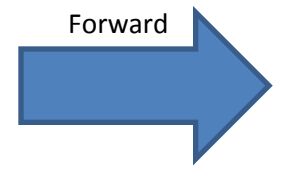
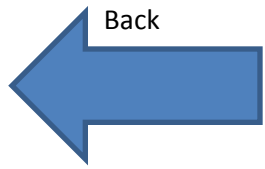


## Glossosomatidae

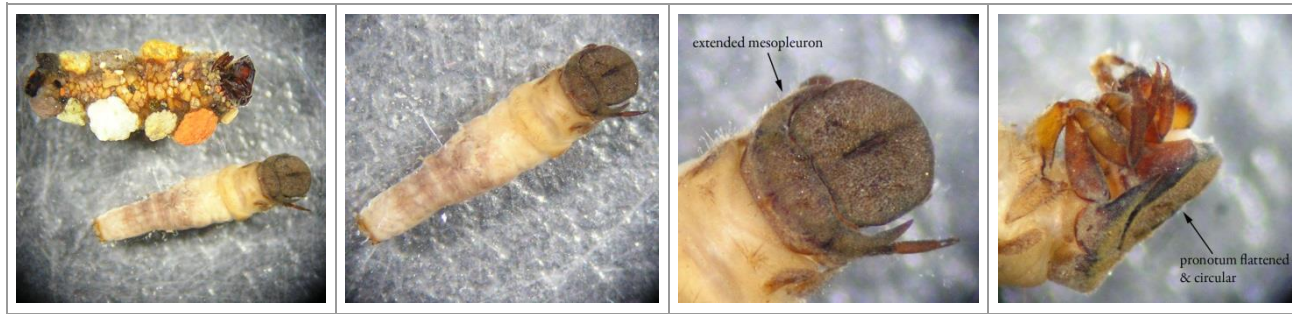


Key Characters	Mesonotum no more than half-sclerotized. Abdominal segment IX with dorsal, sclerotized plate. Anal proleg broadly joined with abdomen, usually with an accessory hook. Portable, tortoise-like, rock cases ("saddle-case makers"). Scrape diatoms and other fine organic matter off substrates.
Tolerance	0-2
Distribution	CA, OR, WA, NV, AZ, Baja





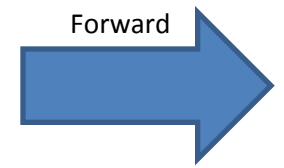
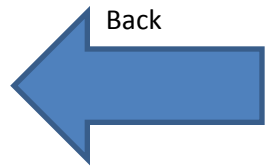
## Goeridae



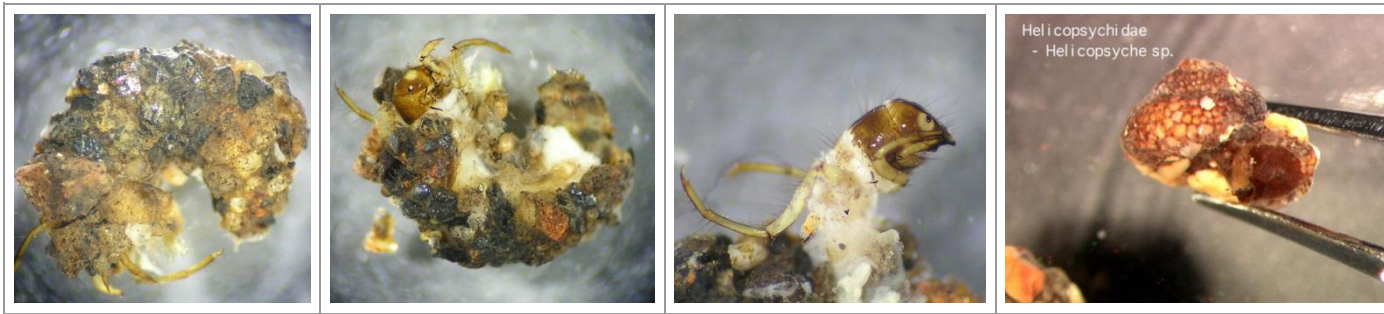
Key Characters	Enlarged and laterally thickened pronotum; close-fitting sclerites form an operculum over opening of larval case. Most have forked lamellae on abdominal segments.
Tolerance	0-1
Distribution	CA, OR, WA





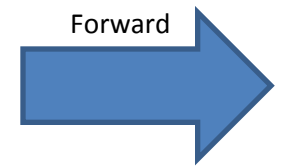
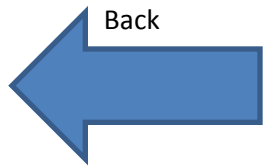


## Helicopsychidae



Key Characters	"Snail shell" larval cases. Anal claw comb-shaped. Scrape algae and other organic material off of substrates. <i>Helicopsyche</i> only genus in U.S. and Canada.
Tolerance	3
Distribution	CA, OR, WA, AZ



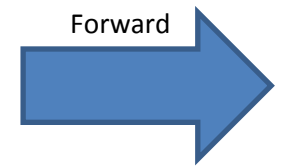
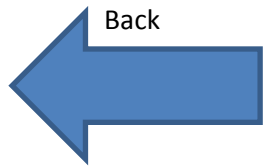


## Hydrobiosidae



Key Characters	Larvae free-living until pupation. Sclerite on dorsum of abdominal segment IX. Tibia, tarsus and claw of foreleg articulate against ventral lobe of femur to form a chelate leg.
Tolerance	unknown
Distribution	AZ



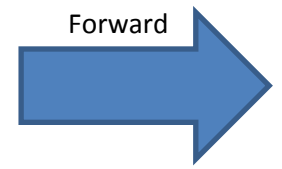
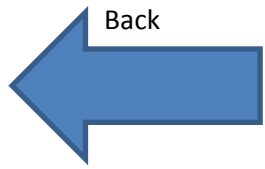


## Hydropsychidae



Key Characters	Thoracic segments with dorsal, sclerotized plates, abdomen with branched ventral gills, anal prolegs with tufts of setae at bases. Larvae construct fixed, case-like retreats, spin silk nets for food collection ("net-spinning caddisflies").
Tolerance	variable, from 0-6
Distribution	CA, OR, WA, NV, AZ



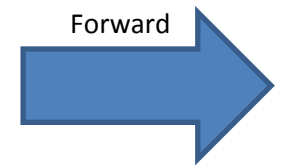
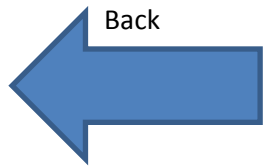


## Hydroptilidae



Key Characters	Small size, usually < 6mm ("microcaddisflies"). Thoracic segments with dorsal, sclerotized plates. Most larvae construct portable, purse-like cases (final instar). Many feed on filamentous algae (piercers). Undergo hypermetamorphosis: free-living during first four instars.
Tolerance	generally 3-6, may be as high as 8 in some genera ( <i>Agraylea</i> )
Distribution	CA, OR, WA, NV, AZ



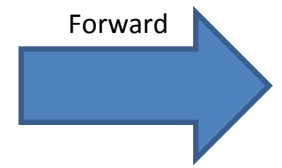
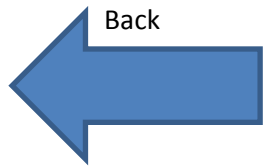


## Lepidostomatidae



Key Characters	Mesonotum largely sclerotized. Antennae situated close to anterior margin of eye. Without dorsal hump on abdominal segment I. Portable, tubular cases (late-instar cases often four-sided). Shredders of coarse organic materials. <i>Lepidostoma</i> only genus in CA.
Tolerance	1
Distribution	CA, OR, WA, NV, AZ



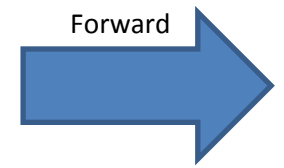
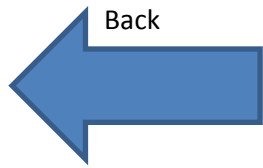


## Leptoceridae



Key Characters	Long antennae, at least 6X longer than wide ("long-horned caddisflies"), portable, tubular cases, diverse feeding strategies and habitats.
Tolerance	variable, from 3-8
Distribution	CA, OR, WA, NV, AZ



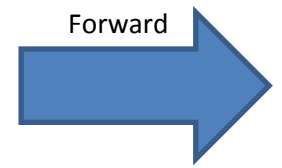
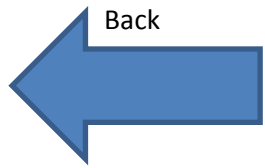


## Limnephilidae



Key Characters	Mesonotum largely sclerotized, antennae about halfway between eye and anterior margin of head. Usually with prosternal horn and chloride epithelia on abdominal segments. Portable, tubular cases. Generally shredders of coarse organic matter primarily adapted to cool waters ("northern caddisflies").
Tolerance	0-4
Distribution	CA, OR, WA, NV, AZ





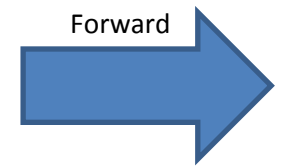
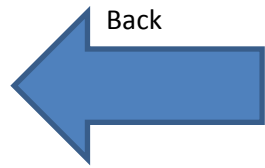
## Odontoceridae



Key Characters	Larval case mainly of small rock fragments. Small fore trochantin, antennae situated at or very close to anterior margin of head capsule. Dorsum of anal proleg with no more than 3-5 setae.
Tolerance	0
Distribution	CA, OR, AZ





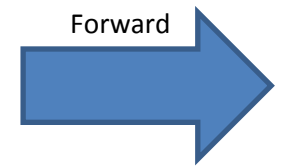
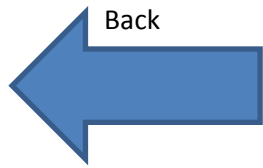


## Philopotamidae



Key Characters	Meso- metanotum, abdominal segment IX membranous. Labrum membranous and T-shaped. Fixed, sac-like silk retreats ("finger-net caddis or silken-tube spinners"). Filter food particles with their retreats
Tolerance	2-4
Distribution	CA, OR, WA, NV, AZ



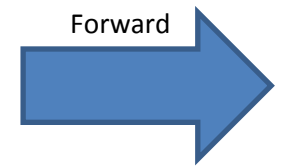
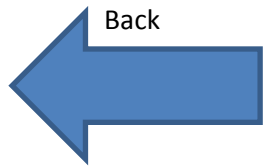


## Phryganeidae



Key Characters	Mesonotum largely unsclerotized. Abdominal segment IX with dorsal, sclerotized plate. Prosternal horn present. Slender, cylindrical cases. Larvae attain large sizes (up to 4 cm). Principally lentic habitats, a few occurring in streams. Shredders of coarse organic material, a few are predators.
Tolerance	generally 4-5, as low as 1 in <i>Yphria</i> sp.
Distribution	CA, OR, WA



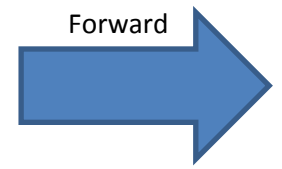
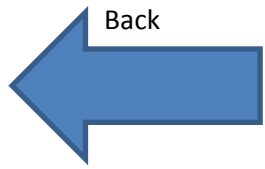


## Polycentropodidae



Key Characters	Meso- metanotum, abdominal segment IX membranous. Trochantin of prothoracic leg acute. Fixed, silk retreats ("trumpet-net and tube-making caddisflies"). Generally filter feeders, some predators.
Tolerance	5-6
Distribution	CA, OR, WA, AZ



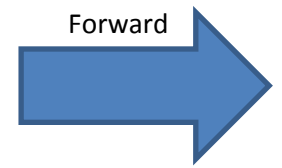
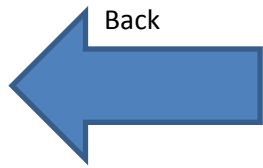


## Psychomyiidae



Key Characters	Meso- and metanotum membranous. Abdominal segment IX membranous. Trochantin of prothoracic leg broad and hatchet-shaped. Fixed, tubular, silk retreats. Generally filter feeders, some scrapers/grazers.
Tolerance	2
Distribution	CA, OR, WA, NV, AZ



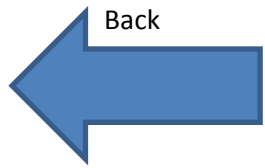


## Rhyacophilidae

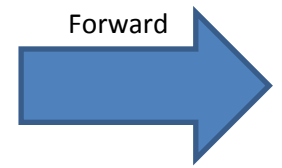


Key Characters	Meso- and metanotum membranous. Abdominal segment IX with dorsal, sclerotized plate, most of anal proleg free from segment IX. Larvae free-living ("primitive caddisflies"), predominantly predaceous. Prefer cool, flowing waters.
Tolerance	0-2
Distribution	CA, OR, WA, NV, AZ





Back



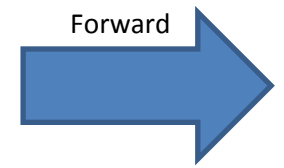
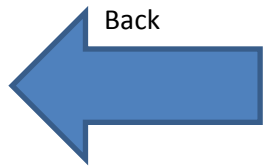
Forward

## Rossianidae



Key Characters	Coarse surfacing of head and pronotum. Abdomen with single gills; chloride epithelia absent. 2 or 3 mesonotal sclerites on either side of midline. Toothed mandibles with mesal tuft of setae. Cases almost always made of rock fragments. <i>Rossiana montana</i> only species in CA.
Tolerance	unknown
Distribution	WA



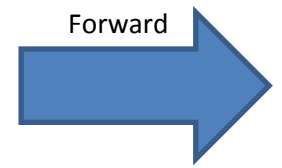
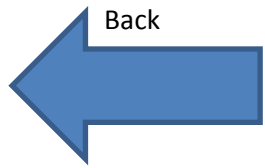


## Sericostomatidae

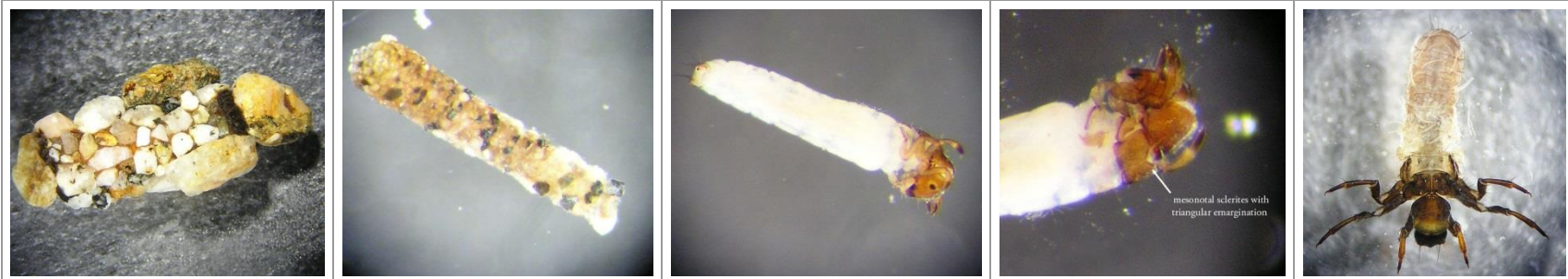


Key Characters	30 + setae near lateral sclerite (and anal proleg) on last abdominal segment. Large fore trochantin with hook-shaped apex. Larval case made mainly of sand. Antennae situated at or very close to anterior margin of head capsule.
Tolerance	3
Distribution	CA, OR, AZ





## Uenoidae



Key Characters	Larval case of rock fragments or plant materials. Mesonotum with emarginate anteromesal border; median dorsal hump usually present on segment 1.
Tolerance	0-3
Distribution	CA, OR, WA, NV, AZ

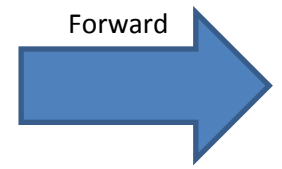
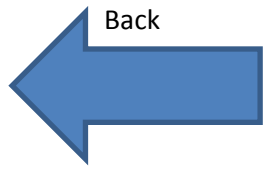


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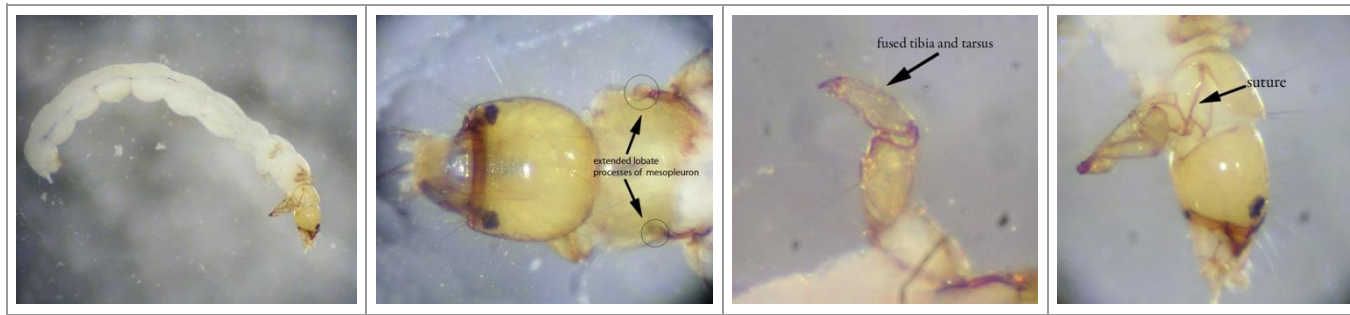


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Trichoptera



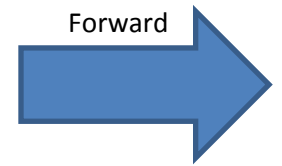
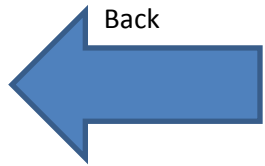


## Xiphocentronidae



Key Characters	Mesopleuron extended anteriorly, tibiae and tarsi fused together on all legs. Construct fixed tubes of sand in small streams.
Tolerance	unknown
Distribution	AZ





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# Lepidoptera

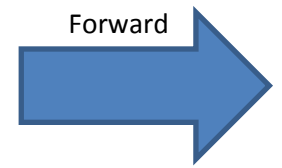
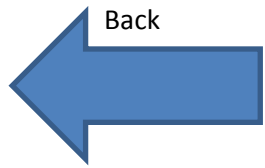
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[Pyralidae](#)



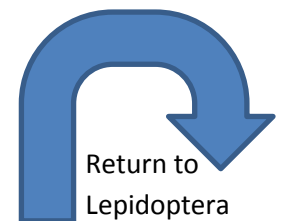
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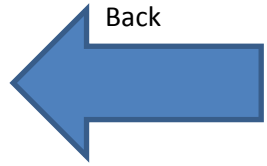
## Pyralidae



Key Characters	Thorax and abdomen with filamentous gills. Segmented thoracic legs. Larvae of various genera can have different distinguishing characters.
Tolerance	5
Distribution	CA, OR, WA, NV, AZ, Baja

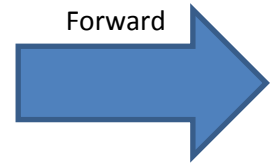


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# Coleoptera

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## Page 1: Adults



Amphizoidae



Carabidae



Chrysomelidae



Curculionidae



Dryopidae



Dytiscidae



Elmidae



Epimetopidae



Eulichadidae



Georissidae



Gyrinidae



Haliplidae



Helophoridae



Heteroceridae



Hydraenidae



Hydrochidae



Hydrophilidae



Hydroscaphidae



Lampyridae



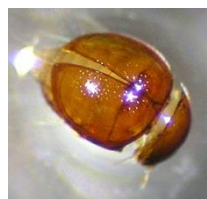
Limnichidae



Lutrochidae



Melyridae



Microsporidae



Noteridae



Psephenidae



Ptilodactylidae



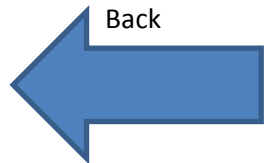
Scirtidae



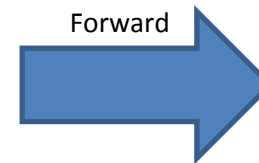
Scarabaeidae



Staphylinidae



# Coleoptera

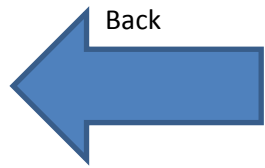


## Page 2: Larvae

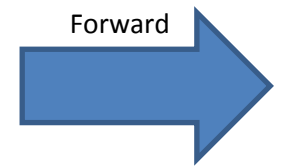
						
<a href="#"><u>Amphizoidae</u></a>	<a href="#"><u>Carabidae</u></a>	<a href="#"><u>Chrysomelidae</u></a>	<a href="#"><u>Curculionidae</u></a>	<a href="#"><u>Dytiscidae</u></a>	<a href="#"><u>Elmidae</u></a>	<a href="#"><u>Eulichadidae</u></a>
						
<a href="#"><u>Gyrinidae</u></a>	<a href="#"><u>Haliplidae</u></a>	<a href="#"><u>Heteroceridae</u></a>	<a href="#"><u>Hydrophilidae</u></a>	<a href="#"><u>Hydroscaphidae</u></a>	<a href="#"><u>Lampyridae</u></a>	<a href="#"><u>Lutrochidae</u></a>
						
<a href="#"><u>Microsporidae</u></a>	<a href="#"><u>Noteridae</u></a>	<a href="#"><u>Psephenidae</u></a>	<a href="#"><u>Ptilodactylidae</u></a>	<a href="#"><u>Scirtidae</u></a>		



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# Amphizoidae



Adults:



Larvae:



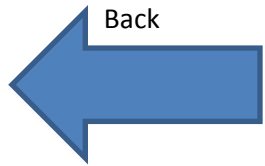
Key Characters (adult)	Trout stream beetles. Adults and larvae found along margins of cool to cold streams, usually in fast-moving portions and often associated with undercut banks or woody debris. Adults resemble carabids; notopleural suture present; first ventrite divided by hind coxae; antennae 11-segmented, filiform; pronotum narrower than elytra, weakly crenulate;
Key Characters (larva)	Larvae strongly flattened and well sclerotized; tergites projecting laterally; 8 abdominal segments; urogomphi short, 1-segmented.
Tolerance	1
Distribution	CA, OR, WA



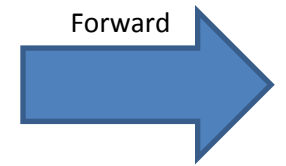
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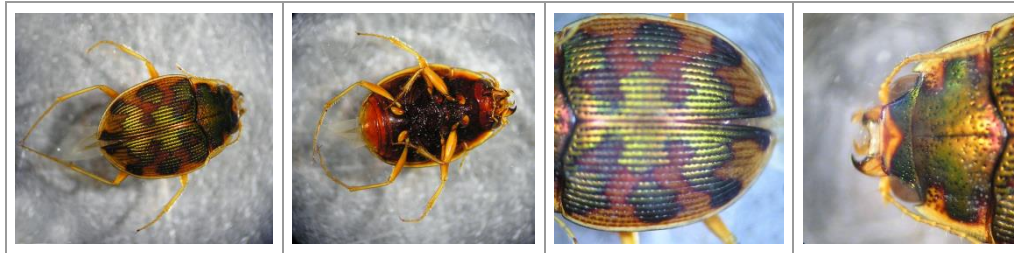
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Coleoptera



# Carabidae



## Adults:

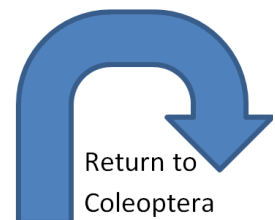


## Larvae:

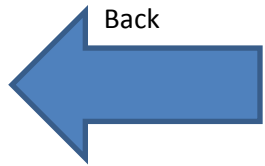


Key Characters (adult)	Ground beetles. Very diverse group, mainly terrestrial. <i>Omophron</i> (pictured) is semiaquatic, living in sandy stream margins; a few intertidal forms plus many riparian taxa. Adults vary greatly in size; notopleural suture present; first ventrite divided by hind coxae; large hind trochanters; legs not modified for swimming.
Key Characters (larva)	Larvae with 6-segmented legs and 1-2 apical claws; generally 10 abdominal segments; urogomphi variously developed; 10th abdominal segment may serve as a proleg in some forms.
Tolerance	unknown
Distribution	CA, OR, WA, NV, AZ, Baja

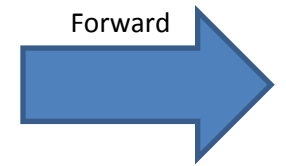
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# Chrysomelidae



## Adults:

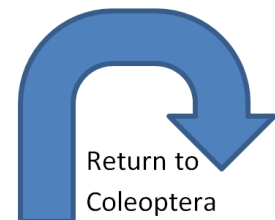


## Larvae:



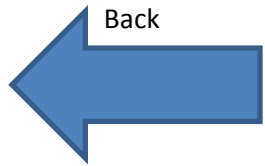
Key Characters (adult)	Leaf beetles. Very diverse group, mainly terrestrial. The few taxa associated with aquatic habitats generally found on emergent vegetation. Adults highly variable in size, shape and coloration; generally 5 tarsal segments on each leg, sometimes 4; tarsal segments 1-3 generally lobed with ventral adhesive pads; 5 abdominal sternites; 10-segmented antennae, usually filiform.
Key Characters (larva)	Larvae found associated with host plants; may be leaf miners or even case-bearers; legs often reduced, but present.
Tolerance	5
Distribution	CA

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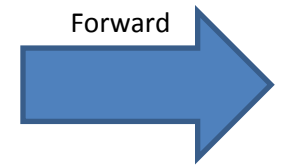


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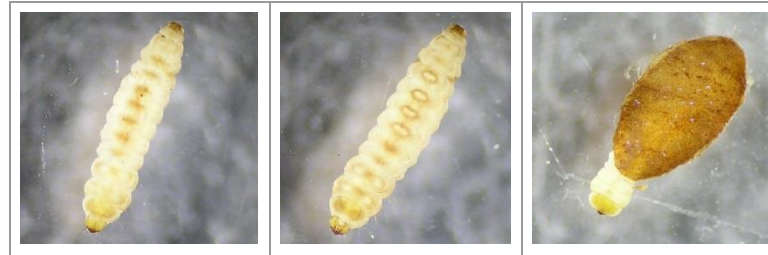
# Curculionidae



## Adults:

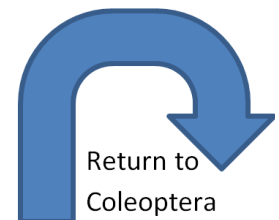


## Larvae:

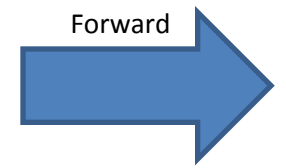
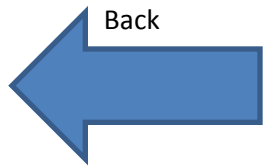


Key Characters (adult)	Weevils. Very diverse group, mainly terrestrial, feed on plants. Most adults have an extended rostrum or snout; antennae geniculate (bent), with a 3-segmented, compact club.
Key Characters (larva)	Larvae found associated with host plants; lightly sclerotized; white, grub-like; legs absent.
Tolerance	5
Distribution	CA

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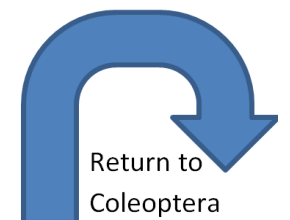
## Dryopidae

### Adults:

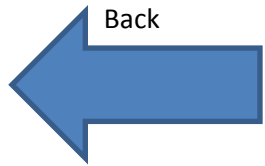


Key Characters (adult)	Long-toed water beetles. Adults found in streams, mainly in leaf packs or log jams. Elongate, oval; ranging in size from 4-8 mm; head usually retracted into pronotum; antennae short and usually retracted, 11-segmented but with 2nd segment ear-like and covering remaining segments, which are usually broader than long; 5 visible abdominal sternites.
Key Characters (larva)	<i>Larvae are terrestrial</i> ; elongate, subcylindrical; 9 abdominal segments; pleural sclerites absent or not well developed; retractile gills absent; operculum present; legs 4- or 5-segmented.
Tolerance	5
Distribution	CA, OR, WA, NV, AZ

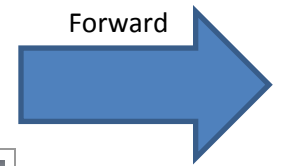
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# Dytiscidae



## Adults:

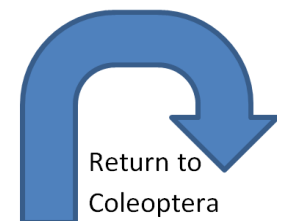


## Larvae:

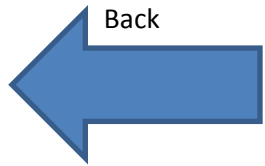


Key Characters (adult)	Predaceous diving beetles. Very diverse group, ranging in size from 2.5-40 mm. Found in nearly all freshwater aquatic habitats. Adults are oval to elongate oval; notopleural suture present; first ventrite divided by hind coxae; large hind trochanters; legs flattened and paddle-like, often with various swimming hairs; antennae filiform.
Key Characters (larva)	Larvae with 6-segmented legs, with two apical claws; body shape various, shape ovoid to elongate; variously sclerotized, usually with several membranous segments ventrally; urogomphi sometimes short, but usually elongate; lateral gills present only in <i>Coptotomus</i> .
Tolerance	typically 5, up to 8 in some genera ( <i>Agabus</i> )
Distribution	CA, OR, WA, NV, AZ, Baja

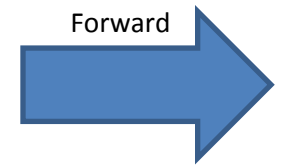
Return to Order



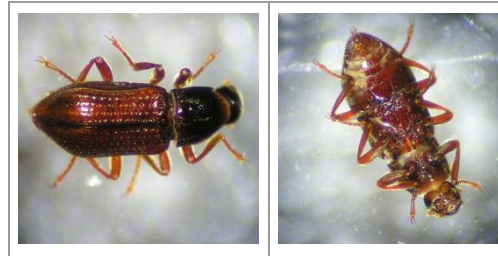
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# Elmidae



## Adults:

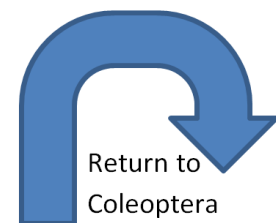


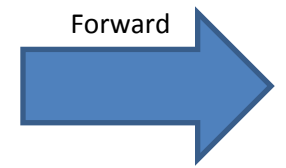
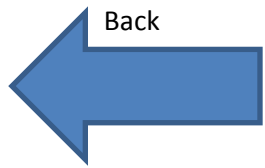
## Larvae:



Key Characters (adult)	Riffle beetles. Found primarily in streams, although sometimes found in lake margins, some species associated with submerged wood. Adults ovate to elongate; small size, 1-8 mm; coloration black or brown, sometimes with bright red or yellow spots; head may be retracted into pronotum; antennae either short with 8 segments, or filiform with 10-11 segments; 5 visible abdominal sternites; sides of 4th or 5th sternites may be modified to grasp the underside of the elytra.
Key Characters (larva)	Larvae found in same habitats as adults; body shape generally cylindrical or hemicylindrical; body size ranges from 3-16 mm; 5-segmented legs, single claws; abdomen 9-segmented; sternites with pleural sclerites or sutures; urogomphi absent; last abdominal segment at least slightly emarginate; retractile anal gills covered by an operculum with internal hooks.
Tolerance	variable, fom 1-6
Distribution	CA, OR, WA, NV, AZ, Baja

Return to Order





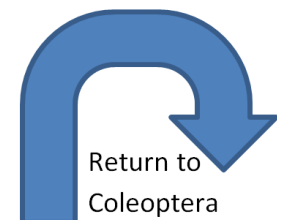
# Epimetopidae

## Adults:

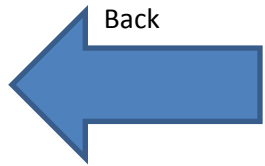


Key Characters (adult)	Some experts consider this to be a subfamily of Hydrophilidae. Rarely encountered; habitat not well known. Adults are small, 1.2-3.5 mm; the head is deflexed under a projecting pronotum; the eyes are divided; the pronotum and elytra are highly sculptured.
Key Characters (larva)	<i>Larvae are terrestrial</i> ; with well developed, 5-segmented legs, single claw; nine distinct abdominal segments; no spiracular atrium; labroclypeal margin symmetrical; pronotum with large, poorly-sclerotized plate; plates of meso- and metanotum small, poorly sclerotized; abdomen with little sclerotization.
Tolerance	unknown
Distribution	CA, OR, WA, NV, AZ, Baja

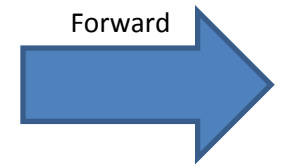
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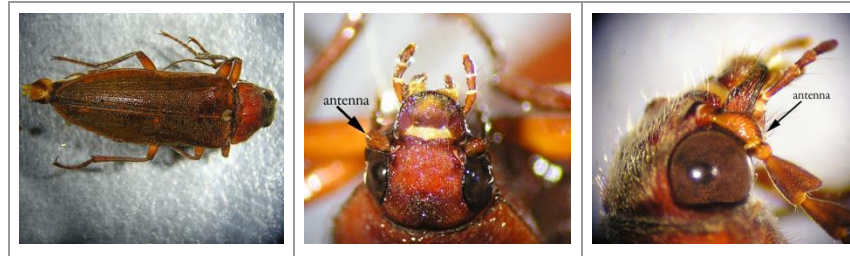
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# Eulichadidae



## Adults:

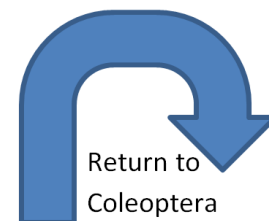


## Larvae:

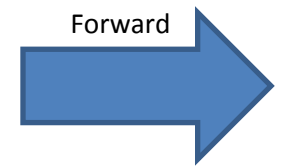
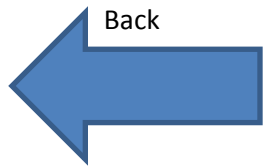


Key Characters (adult)	Forest stream beetles. Formerly placed in the Ptilodactylidae. One North American species, <i>Stenocolus scutellaris</i> LeConte (pictured). Adults emerge in summer and are found primarily on the branches of riparian trees. Females black, generally larger than males, which tend to be brown or grey; body covered with short, thick setae which may rub off easily; antennae 11-segmented and serrate in males, subserrate in females; scutellum round and covered with prominent white setae.
Key Characters (larva)	Larvae found in riffles, particularly under larger rocks and embedded wood. Elongate and large, female larvae up to 50 mm, male larvae smaller; nine distinct abdominal segments; urogomphi present, rigid and slightly upturned; abdominal segments 1-7 with paired, multi-branched filamentous gills.
Tolerance	unknown
Distribution	CA

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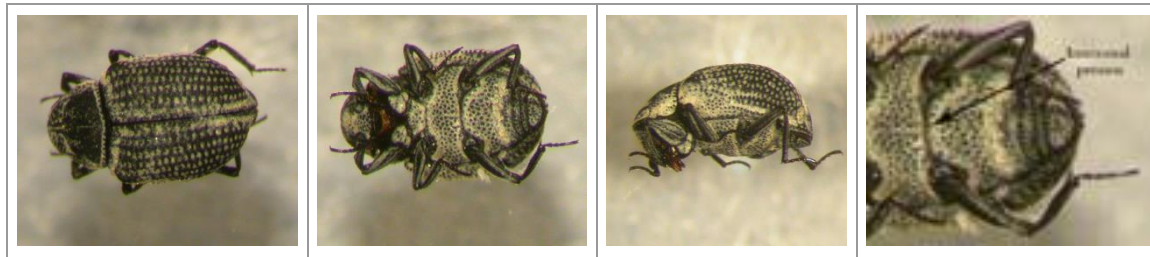


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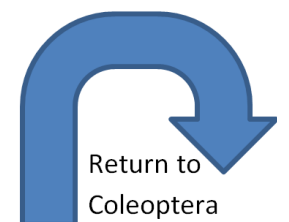
## Georissidae

### Adults:

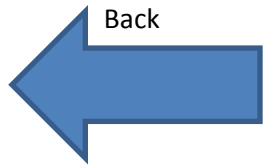


Key Characters (adult)	Minute mud-loving beetles Adults live at stream and lake margins. The adults camouflage themselves with sand and mud. This cover is usually shed when the beetles are captured. Head strongly deflexed, not visible from above; scutellum indistinct; metacoxae widely separated.
Key Characters (larva)	<i>Larvae are terrestrial</i> ; live in the soil above and at water line in the same habitats as the adults. Abdomen with 10 distinct abdominal segments; no spiracular atrium, symmetrical labroclypeal margin; legs short, stout and 3-segmented.
Tolerance	unknown
Distribution	CA

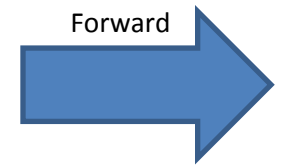
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# Gyrinidae



## Adults:

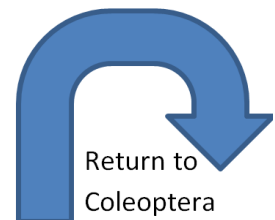


## Larvae:



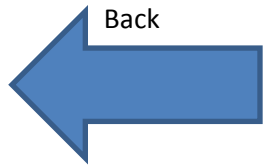
Key Characters (adult)	Whirligig beetles. Found in both lentic and lotic habitats. Adults ovate, flattened dorsoventrally; notopleural suture present; first ventrite divided by hind coxae; large hind trochanters; mid and hind legs flattened, oar-like; eyes divided into ventral and dorsal components; antennal segments 3-11 form short, cylindrical club and are about as long as combined segments 1+2.
Key Characters (larvae)	Larvae white; legs 6-segmented with two apical claws; 10 abdominal segments; elongate lateral gills on segments 1-9; four decurved hooks on 10th segment.
Tolerance	4-5
Distribution	CA, OR, WA, NV, AZ, Baja

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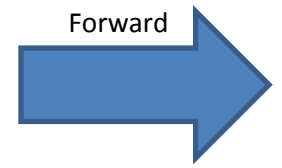


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# Haliplidae



## Adults:

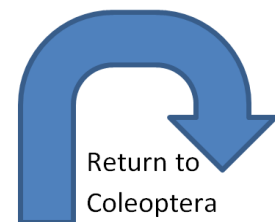


## Larvae:

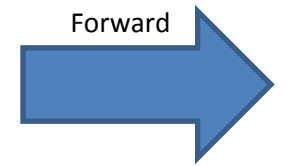
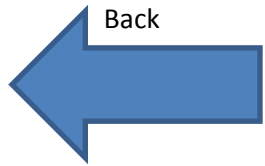


Key Characters (adult)	Creeping water beetles. Most commonly associated with lentic habitats or slow-moving, vegetated sections of streams. Adults have large coxal plates which cover most of the ventral abdominal segments and expose only the tips of the hind femora; notopleural suture present; first ventrite divided by hind coxae, large hind trochanters hidden by coxal plates; body yellowish and most with black spots; legs with swimming hairs; antennae filiform; head narrower than pronotum.
Key Characters (larva)	Larvae have 6-segmented legs, with a single claw; elongate, tapering, with 9-10 segments and ending in a long spiny process; well sclerotized; EXCEPT for <i>Peltodytes</i> which has multiple, long hair-like gills arising from all the thoracic and abdominal segments.
Tolerance	5
Distribution	CA, WA, Baja

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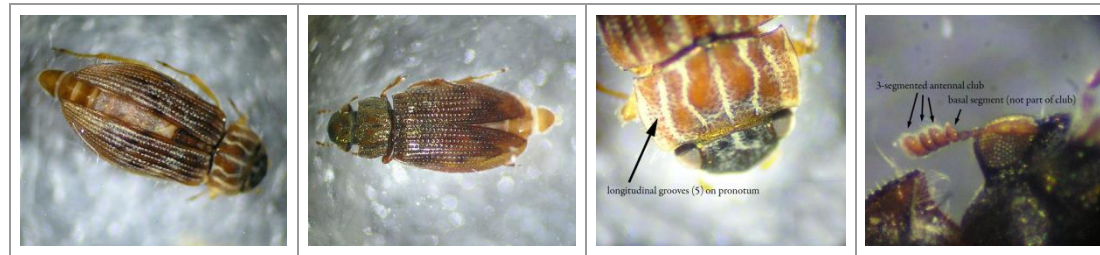


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Coleoptera



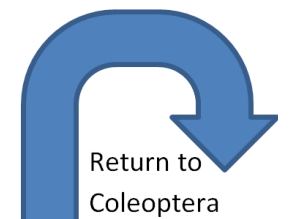
# Helophoridae

## Adults:

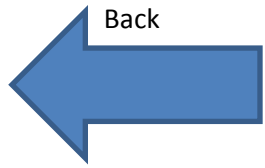


Key Characters (adult)	Some experts consider this to be a subfamily of Hydrophilidae. Found in both lotic and lentic habitats. Adults distinguished by pronotum with seven prominent, longitudinal grooves; eyes large, body elongate; size ranging from 2.6-3.8 mm; antennae with 8 or 9 segments, the last three segments forming a loose club.
Key Characters (larva)	Larvae live in soil at water's edge. Larvae with well developed, 5-segmented legs, single claw; 9 distinct abdominal segments; urogomphi 3-segmented, elongate; no spiracular atrium.
Tolerance	unknown
Distribution	Information for this family is incomplete.

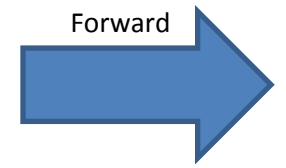
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# Heteroceridae



## Adults:

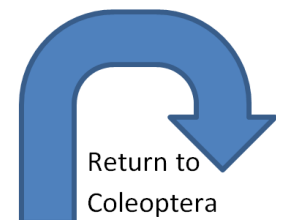


## Larvae:

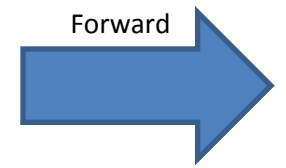
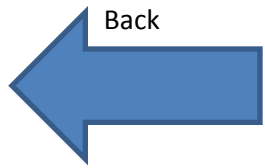


Key Characters (adult)	Variegated mud-loving beetles. Found in riparian mud or sand. Adults can be caught at lights in huge numbers. Generic and species identifications difficult without examining genitalia. Adults with prominent mandibles; legs modified for digging; antennae 9- or 11-segmented, very short, with a 6- or 7-segmented compact club; coloration varies from entirely light brown to spotted and/or striped.
Key Characters (larva)	Larvae found with the adults. Head projecting forward, with prominent mandibles; body widest in the thoracic segments, tapering posteriorly; legs well developed, 5-segmented.
Tolerance	unknown
Distribution	CA, OR, WA, NV, AZ

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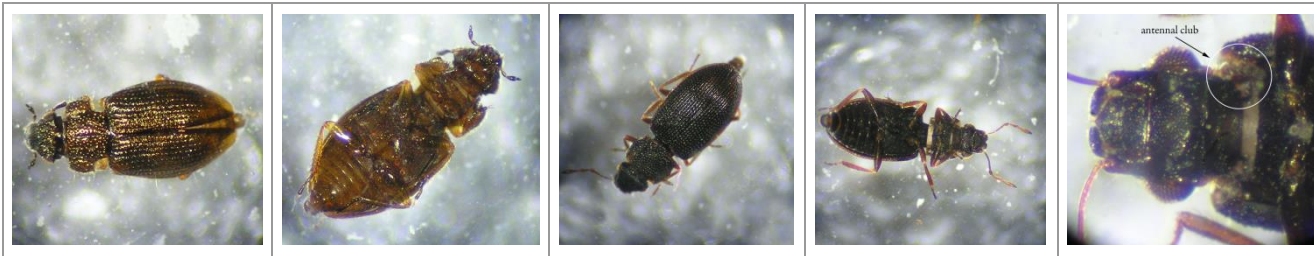


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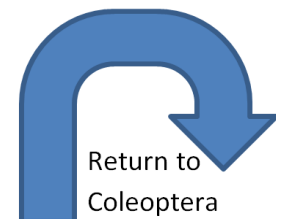
## Hydraenidae

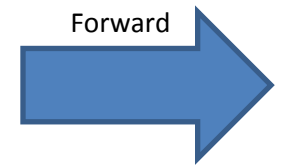
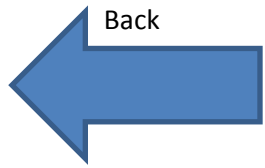
### Adults:



Key Characters (adult)	Minute moss beetles. Found at the water's edge in both lentic and lotic habitats as well as intertidal. Adults are generally small, 0.5-3 mm; antennae with a 5-segmented club; maxillary palps may be as long as the antennae, or longer in <i>Hydraena</i> ; pronotum may have clear border in other genera.
Key Characters (larva)	Larvae found in the soil at water's edge. Abdomen 10-segmented; pair of recurved hooks may be present on 10th abdominal segment; urogomphi 2-segmented.
Tolerance	5
Distribution	CA, OR, WA, NV, AZ, Baja

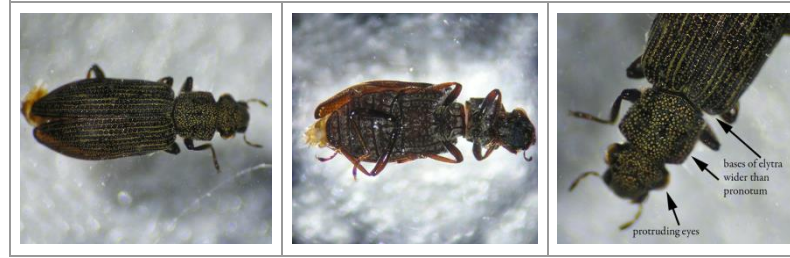
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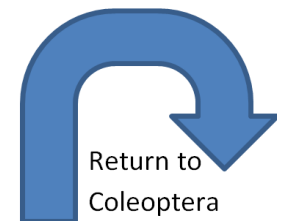
# Hydrochidae

## Adults:

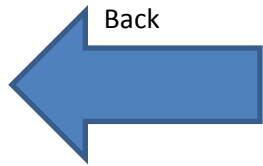


Key Characters (adult)	Some experts consider this to be a subfamily of Hydrophilidae. Found in both lentic and lotic habitats. Adults have bulging eyes; narrow body ranging in size from 1.5-5.5 mm; pronotum narrower at the base, with shallow depressions.
Key Characters (larva)	Larvae presumably live in soil at water's edge. Larvae with well developed, 5-segmented legs, single claw; labroclypeal margin symmetrical; 8 distinct abdominal segments; abdominal segments 8 and reduced 9th modified into spiracular atrium; urogomphi 2-segmented.
Tolerance	unknown
Distribution	Information for this family is incomplete.

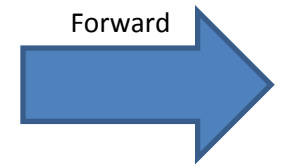
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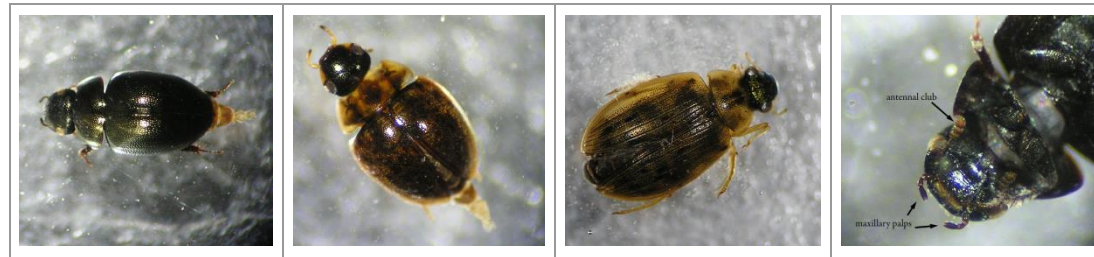
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# Hydrophilidae



## Adults:

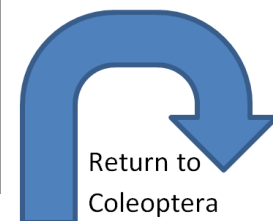


## Larvae:

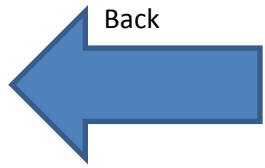


Key Characters (adult)	Water scavenger beetles. Many experts include Epimetopidae, Georissidae, Helophoridae and Hydrochidae as subfamilies of Hydrophilidae. Another subfamily, the Sphaeridiinae, is generally considered not aquatic. Found in nearly all freshwater habitats as well as brackish water and intertidal. Adults oval, ranging in size from 1-40 mm; antennae with the apical 3 segments forming a loose to compact club; maxillary palps may be longer than the antennae; scutellum usually distinct; tibiae may be slightly flattened, with spines ( <i>Berosus</i> has fringe of swimming hairs).
Key Characters (larva)	Larvae with 5-segmented legs and a single claw; usually only 8 distinct abdominal segments (except for <i>Berosus</i> , which has 10 distinct segments and long, lateral gills); abdominal segments 8 and reduced 9th modified into spiracular atrium (except for <i>Berosus</i> ); head well sclerotized; shape and arrangement of teeth on labroclypeal margin diagnostic for generic identifications; except for sclerotized pronotum and smaller sclerotized plates of other nota and abdomen, body mainly membranous with transverse folds and tuberculate processes.
Tolerance	5
Distribution	CA, OR, WA, NV, AZ, Baja

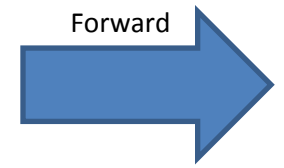
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# Hydroscaphidae



## Adults:

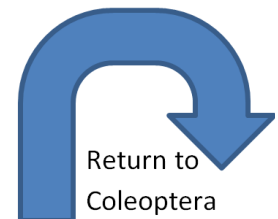


## Larvae:

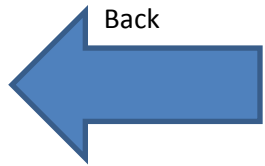


Key Characters (adult)	Skiff beetles. Adults are most often found in algae with a thin film of water. Adults are small, 1.5 mm or less; body oval with an elongated abdomen; elytra truncate, exposing several abdominal segments; antennae 8-segmented with the apical segment about as long as combined length of segments 4-7; hind coxal plates widely separated.
Key Characters (larva)	Larvae occur with the adults. Body length up to 1.5 mm; body slightly flattened and narrowed posteriorly; have 5 stemmata on each side; antennae are very short and 2-segmented; paired fingerlike gills on abdominal segments 1 and 8 only.
Tolerance	7
Distribution	CA, NV, AZ

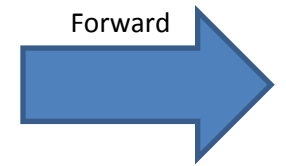
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# Lampyridae



## Adults:

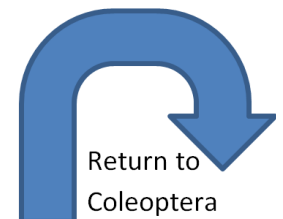


## Larvae:



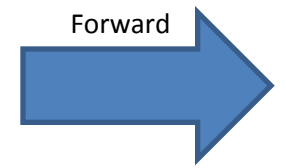
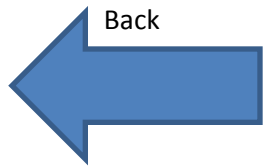
Key Characters (adult)	Fireflies, lightningbugs, glowworms. Adults soft-bodied, elongate; color generally black, with red markings on the pronotum; antennae with 8-13 (usually 11) segments, filiform, serrate or branched in some taxa; tarsi 5-segmented, next-to-last segment with pads; abdominal segments may be modified as luminescent organs (mainly Eastern species). Some adults may have reduced wings or even be larva-like.
Key Characters (larva)	Larvae live in moist soils, sometimes along shorelines; all larvae luminescent to some degree; body elongate with prominent sclerotized plates; head covered by pronotum; legs 5-segmented.
Tolerance	unknown
Distribution	Information for this family is incomplete.

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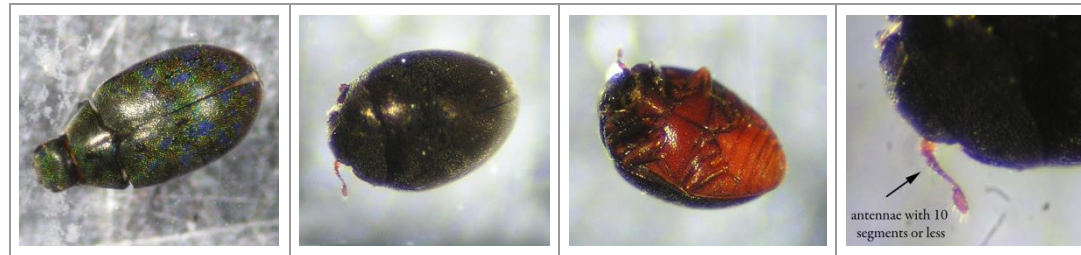
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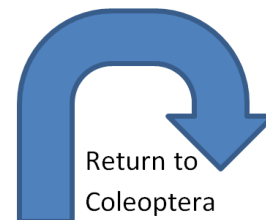
## Limnichidae

### Adults:

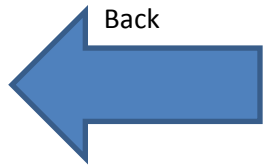


Key Characters (adult)	Minute marsh-loving beetles. Generally riparian, living on plants or wood debris, some taxa marine intertidal. Adults oval and small, 1-2 mm in total length; very pubescent, sometimes distinctly colorful; antennae 11-segmented, short, with a 2- to 7-segmented club; 5 visible abdominal sternites.
Key Characters (larva)	Larvae live in moist, riparian soil. Larvae elongate; 9 abdominal segments; operculum present; gills absent.
Tolerance	unknown
Distribution	CA, OR, WA, AZ

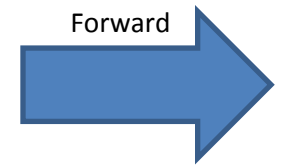
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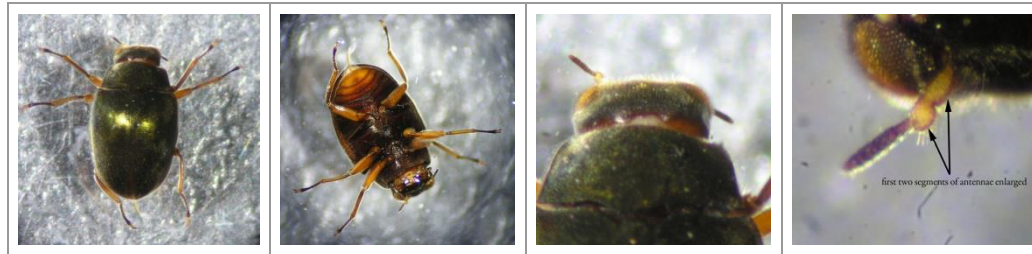
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# Lutrochidae



## Adults:

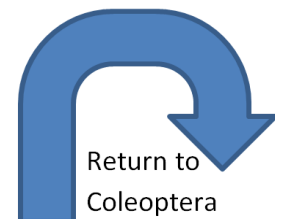


## Larvae:

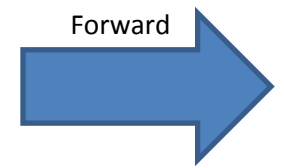
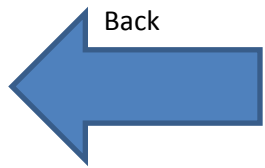


Key Characters (adult)	Travertine beetles. Found in streams on submerged or emergent rocks or wood. Body ovate and very convex; body size 2-6 mm; antennae 11-segmented, but very short, segments 3-11 about as long as segments 1+2;
Key Characters (larva)	Larvae elongate, tapering; head large; 9 abdominal segments; operculum present, covering retractile gills, 2 hooks present; legs 5-segmented, but short.
Tolerance	unknown
Distribution	AZ

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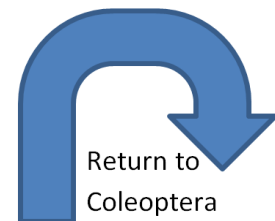
# Melyridae

## Adults:

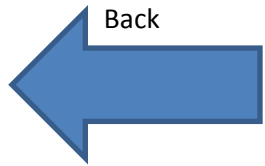


Key Characters (adult)	Soft-winged flower beetles. Mostly terrestrial; a few forms marine intertidal such as <i>Endeodes</i> (pictured). Adults with truncate elytra, exposing much of the abdomen; antennae with 10 or 11 segments; yellow or orange protrusible vesicles present.
Key Characters (larva)	with spinelike urogomphi, each with a single point; epicranial suture Y-shaped.
Tolerance	unknown
Distribution	Information for this family is incomplete.

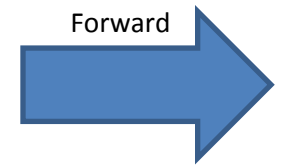
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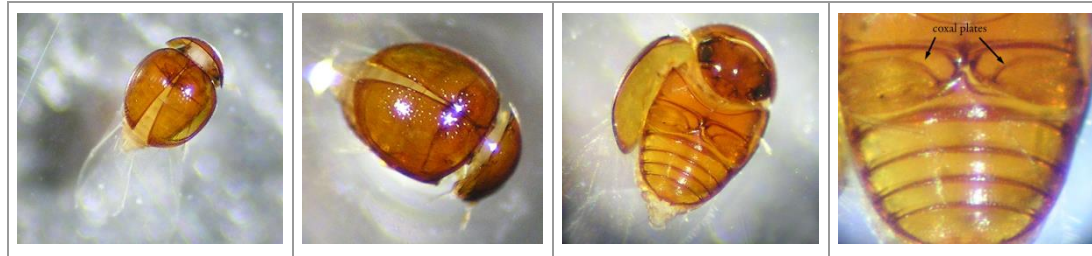
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Coleoptera



# Microsporidae (Sphaeriusidae)



## Adults:

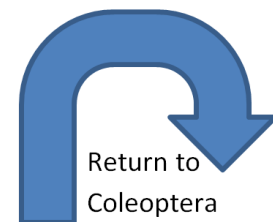


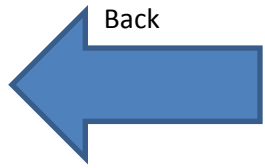
## Larvae:



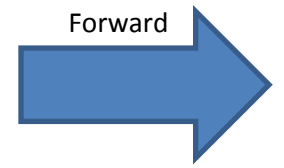
Key Characters (adult)	Minute bog beetles. Adults occur in wet sand, gravel or in leaf litter at the stream margin. Body size small, 1.5 mm or less, broadly oval and convex; hind coxal plates large, covering first two abdominal sternites, but exposing abdominal segments laterally; bases of hind femora also exposed.
Key Characters (larva)	Larvae occur with adults. Larvae are 0.8 to 1.2 mm long; the body is slightly flattened and narrowed posteriorly; have 4 stemmata on each side; the antennae are short and 3-segmented, but may appear to be only 2-segmented; unique in having paired, fingerlike lobes on abdominal segments 1-8.
Tolerance	unknown
Distribution	CA, OR, WA, NV, AZ, Baja

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# Noteridae



## Adults:

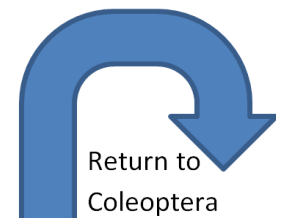


## Larvae:

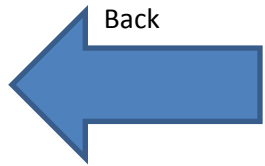


Key Characters (adult)	Burrowing water beetles. Formerly considered to be in the Dytiscidae. Adults have a tapered oval shape; notopleural suture present; first ventrite divided by hind coxae; large hind trochanters; antennal segments 3-11 filiform and much longer than segments 1+2; visible scutellum lacking; sternum raised, platform-like; moderately to well-developed protibial spur; protibia fits into groove of profemur.
Key Characters (larva)	Larvae with 6-segmented legs, two apical claws; 8 abdominal segments; urogomphi short; body cylindrical or spindle-shaped, well sclerotized.
Tolerance	unknown
Distribution	CA

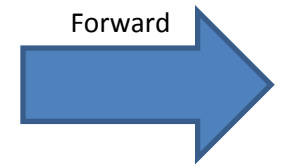
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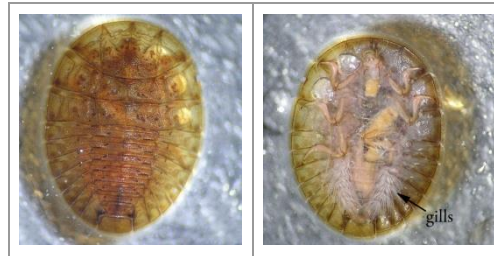
# Psephenidae



## Adults:

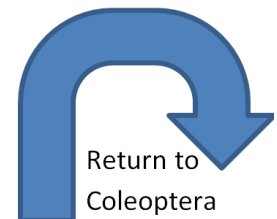


## Larvae:

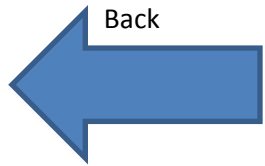


Key Characters (adult)	Water penny beetles. Adults are terrestrial and found on riparian vegetation and rocks; occasionally are found underwater where the females lay their eggs. Adults are soft-bodied, oval to ovate; body size ranges from 3-7 mm; coloration black or brown, but some taxa have red or yellow spots; antennae 11-segmented; antennae may be moniliform (bead-like) or serrate or flabellate (segments much wider than long).
Key Characters (larva)	Larvae found in riffles or at stream margins; body flattened, disk-like, hence the name water penny; legs 4-segmented, but not visible from above; abdomen may have an operculum and retractile gills ( <i>Acneus</i> ) or no operculum, with 4-5 pairs of multi-branched tracheal gills ( <i>Eubrianax</i> and <i>Psephenus</i> ).
Tolerance	4
Distribution	CA, OR, WA, NV, AZ, Baja

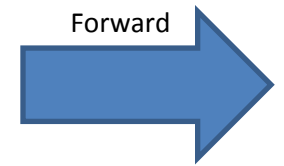
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# Ptilodactylidae



## Adults:

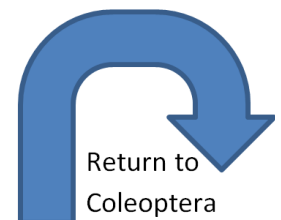


## Larvae:

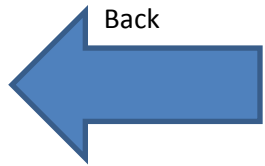


Key Characters (adult)	Ptilodactylid beetles. Only two aquatic/semiaquatic genera in the Western US ( <i>Anchyteis</i> and <i>Araeopidius</i> ); also many strictly terrestrial taxa. Adults are terrestrial and found in riparian vegetation. Body elongate, up to 16 mm; antennae 11-segmented and filiform, serrate or pectinate (segments with long, lateral extensions); pronotum rounded anteriorly, crenulate posteriorly; 5 visible abdominal sternites, the 5th emarginate.
Key Characters (larva)	Larvae of <i>Anchyteis</i> and <i>Araeopidius</i> are aquatic to semiaquatic, usually found in wetted mosses or moist leaf packs in spring seeps or small, headwater streams. Larvae elongate, subcylindrical; no abdominal gills; abdomen with 9 distinct segments; with or without small urogomphi; operculum absent; hooks present along with anal lobes.
Tolerance	3
Distribution	CA

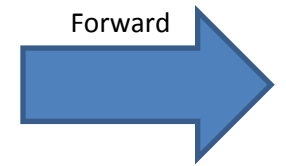
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# Scirtidae



## Adults:

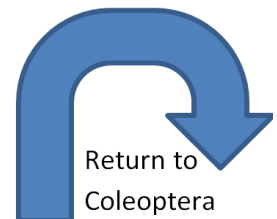


## Larvae:



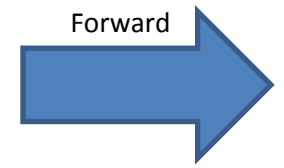
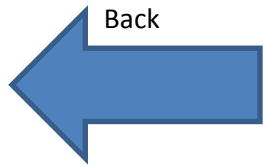
Key Characters (adult)	The marsh beetles. Adults are terrestrial and may be found on emergent vegetation in wetlands or along stream margins. Body oval, soft-bodied; head deflexed; antennae 11-segmented, filiform to subserrate; tarsi all 5-segmented; 4th segment bilobed, larger than 3rd.
Key Characters (larva)	Larvae are aquatic and may be found in wetlands, along stream margins or undercut banks, particularly where there is leaf litter and decomposing wood. Larvae roachlike; head prognathous and smaller than pronotum; body segments sclerotized and brown. The larvae are unique among all larvae of Coleoptera and the rest of the holometabolous insects in having long, multi-segmented antennae.
Tolerance	7
Distribution	CA, AZ

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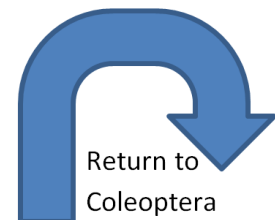
## Scarabaeidae

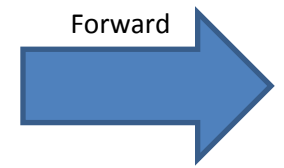
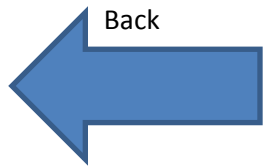
### Adults:



Key Characters (adult)	Scarab beetles. Very diverse group, but only one species group of <i>Aphodius</i> associated with moist habitats. <i>Aphodius alternatus</i> Horn (pictured), has been found on emergent vegetation in vernal pools in California. Adults feed on drowned insects or dead amphibians as the pools dry out. Adult antennae with 3- to 5-segmented club, antennal segments tomentose (furry); protibiae modified for digging; 6 abdominal sternites.
Key Characters (larva)	Larvae presumably occur in the soil along the pool margin or in the basin after the pools dry out. Larvae lightly colored; c-shaped, cylindrical and grub-like; legs 4-segmented.
Tolerance	unknown
Distribution	CA

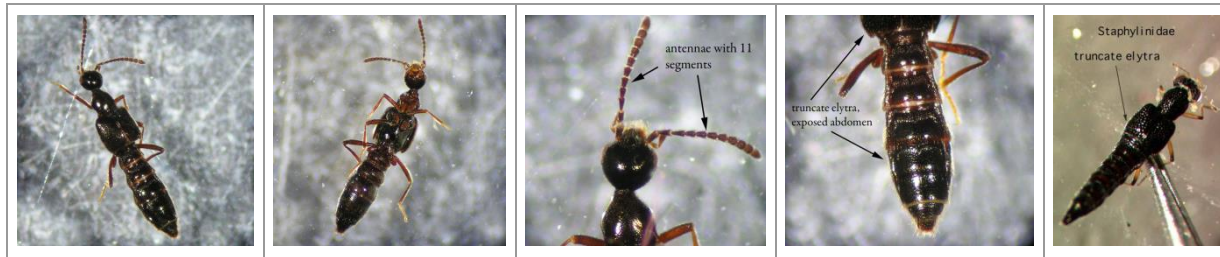
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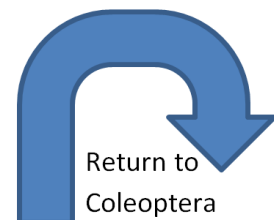
# Staphylinidae

## Adults:

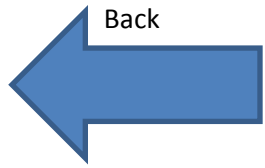


Key Characters (adult)	Rove beetles. Large, diverse group with many terrestrial forms. Semiaquatic taxa are usually shore dwellers, many taxa are marine intertidal. Adults generally have truncate elytra exposing half of the flexible abdomen; antennae usually 11-segmented; no protrusible vesicles; most with contiguous procoxae and 6-7 visible abdominal sternites; tarsi simple.
Key Characters (larva)	Larvae found in moist areas of adult's habitats. Larval forms very diverse morphologically. Abdomen with 10 segments; first 6 or 8 segments similar in length and width, remaining segments progressively narrower and longer; urogomphi 1- to 3-segmented; 10th abdominal segmented may have cylinder-like anal pseudopod.
Tolerance	unknown
Distribution	CA, OR, WA, NV, AZ, Baja

Return to Order

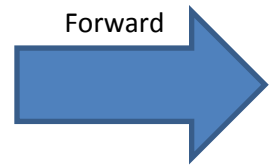


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Back

# Diptera



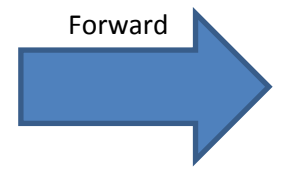
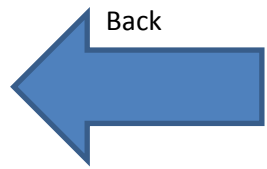
Forward

						
<a href="#">Athericidae</a>	<a href="#">Blephariceridae</a>	<a href="#">Canacidae</a>	<a href="#">Ceratopogonidae</a>	<a href="#">Chaoboridae</a>	<a href="#">Chironomidae</a>	<a href="#">Culicidae</a>
						
<a href="#">Dixidae</a>	<a href="#">Deuterophlebiidae</a>	<a href="#">Dolichopodidae</a>	<a href="#">Empididae</a>	<a href="#">Ephydriidae</a>	<a href="#">Muscidae</a>	<a href="#">Oreoleptidae</a>
						
<a href="#">Pelecorhynchidae</a>	<a href="#">Psychodidae</a>	<a href="#">Ptychopteridae</a>	<a href="#">Sciomyzidae</a>	<a href="#">Simuliidae</a>	<a href="#">Stratiomyidae</a>	<a href="#">Syrphidae</a>

			
<a href="#">Tabanidae</a>	<a href="#">Tanyderidae</a>	<a href="#">Thaumaleidae</a>	<a href="#">Tipulidae</a>



Return to Order

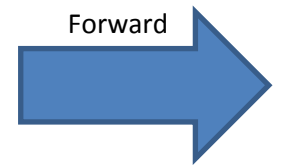
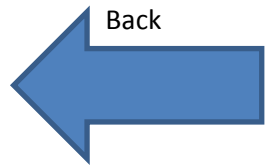


## Athericidae



Key Characters	"Snipe flies." Head usually deeply withdrawn into thorax. All abdominal segments w/ paired spiny prolegs & dorsal and lateral pseudopods. Posterior end w/ pair of fringed filaments (look like antennae).
Tolerance	2
Distribution	CA



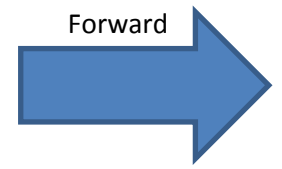
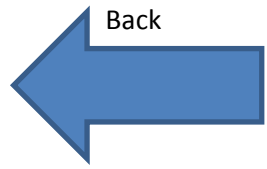


## Blephariceridae



Key Characters	"Net-winged midges", highly adapted to fast currents. Body flattened, 7 "segments": head, thorax, 1st abdominal fused to form 1 segment. 1st 6 segments with a ventral sucker, tracheal gills present on ventral side.
Tolerance	0
Distribution	CA, OR, WA, NV



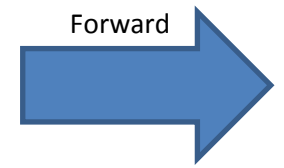
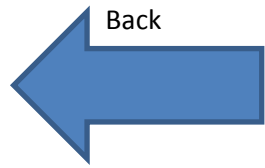


## Canacidae

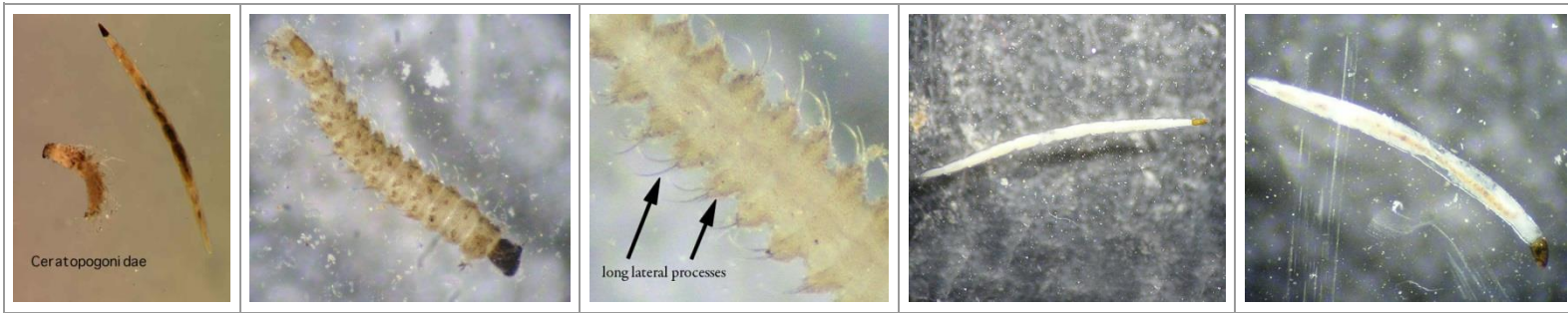


Key Characters	Prothoracic spiracles with stigmatal openings on branching papillae or arranged along spiracular stalk. Well-developed mouth hooks.
Tolerance	unknown
Distribution	CA



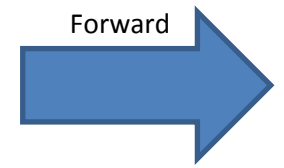
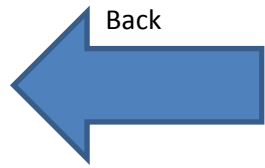


## Ceratopogonidae

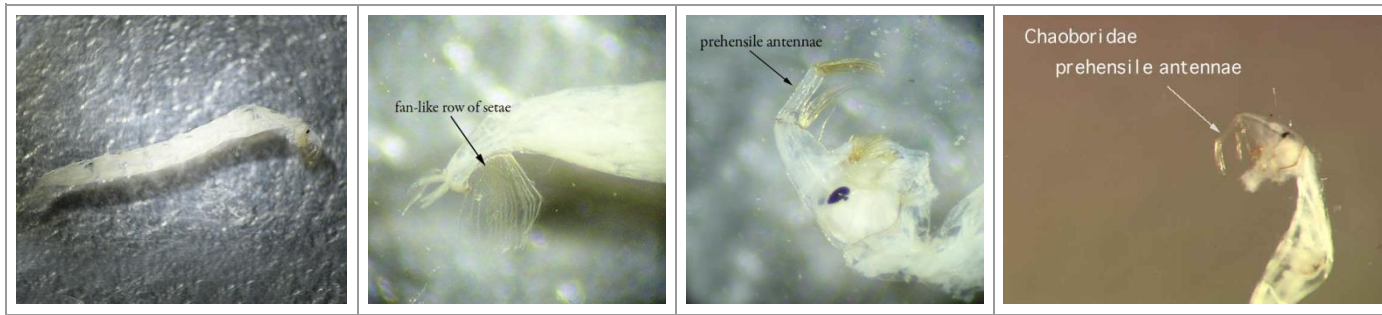


Key Characters	"Biting midges", a.k.a. "no-see-ums." Shiny, needle-shaped body w/ retractile posterior gills. Snake-like swimming motion. 2 genera have proles, but separated from midges by dorsal and/or lateral projections, hairs.
Tolerance	6
Distribution	CA, OR, WA





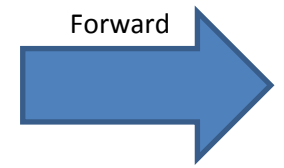
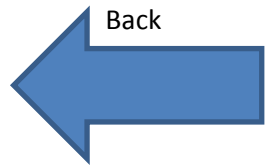
## Chaoboridae



Key Characters	"Phantom midges," similar to Culicidae but predaceous. Prehensile antennae to catch zooplankton. Ventral fan of setae on apex of abdomen.
Tolerance	7
Distribution	CA, OR, WA





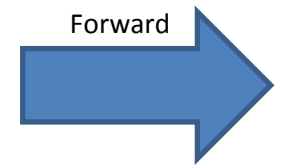
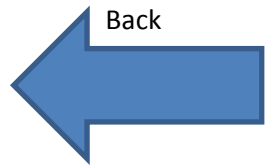


## Chironomidae

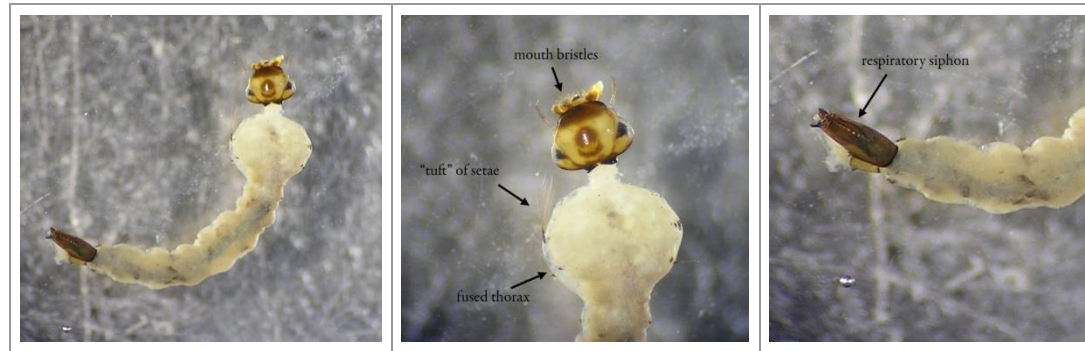


Key Characters	"Midges" or "bloodworms" (ones w/ hemoglobin). Found everywhere, usually add 50% to the species diversity of any aquatic system. Elongate, C-shaped, and cylindrical. Prolegs w/ hooks on prothoracic & last abdominal segments.
Tolerance	highly variable, from 0-10
Distribution	CA, OR, WA, NV, AZ



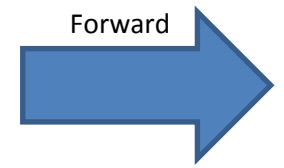
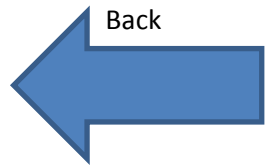


## Culicidae



Key Characters	Invade most stillwater habitats, a.k.a. "skeeters" or "wigglers." Respiratory siphon present, posterior w/ hair surrounding the end. Mouth brushes. Ventral fan of setae on apex of abdomen.
Tolerance	8
Distribution	CA, OR, WA, NV, AZ, Baja



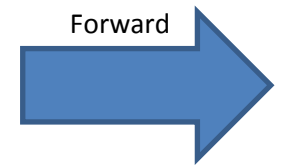
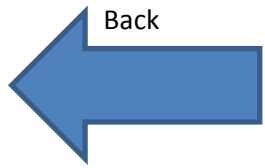


## Dixidae

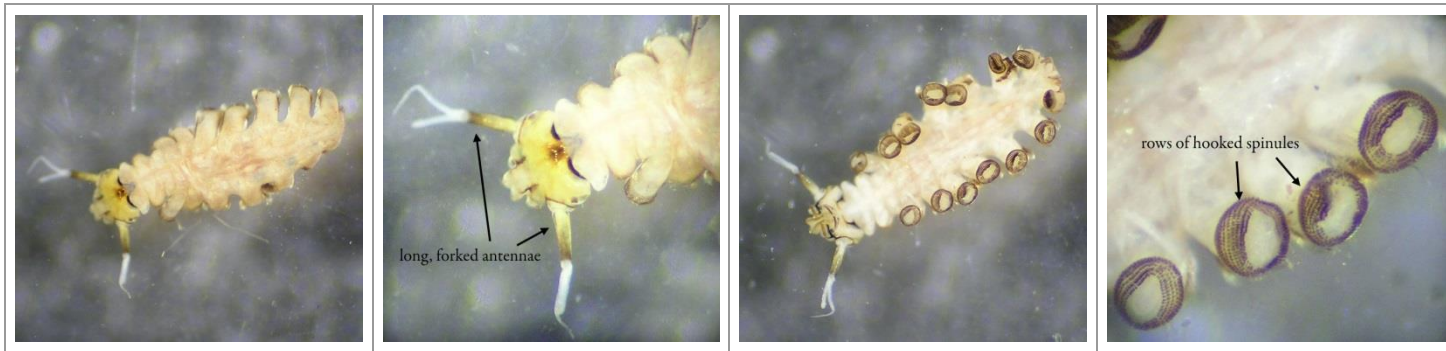


Key Characters	"Dixid midges." Postspiracular lobe instead of a posterior respiratory siphon. Prolegs on 1st or 1st & 2nd abdominal segments, head upturned.
Tolerance	2
Distribution	CA, OR, WA, AZ



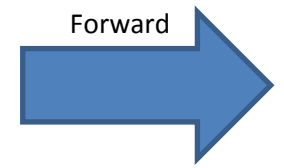
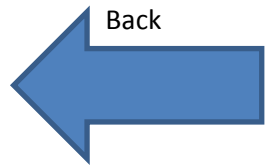


## Deuterophlebiidae

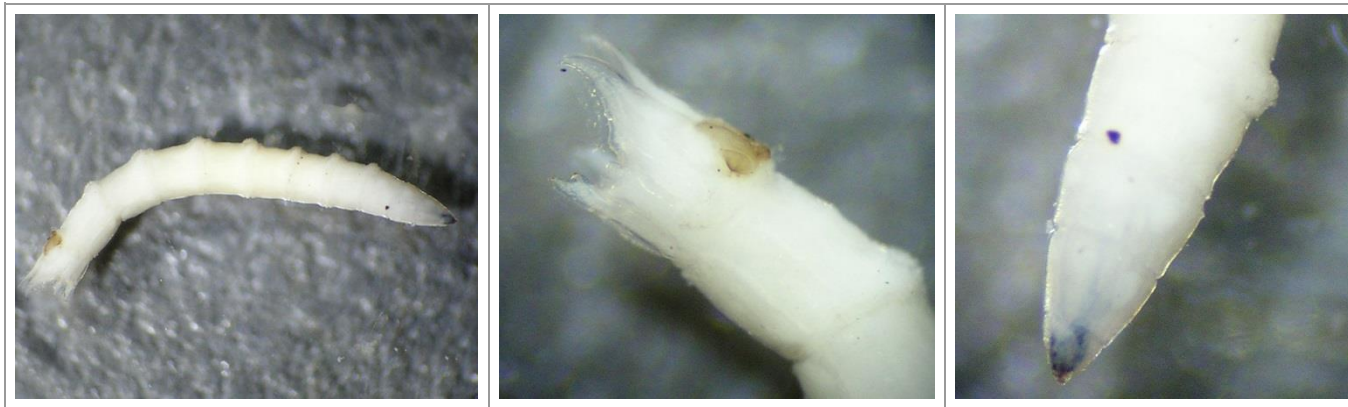


Key Characters	"Mountain midges", found in western mountains, fast-flowing streams. 7 pairs of broad abdominal prolegs w/ rows of hooked spinules. Head with forked antennae.
Tolerance	0
Distribution	CA, OR, WA



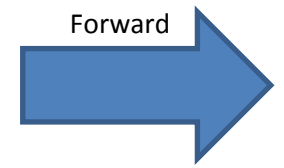
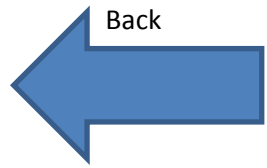


## Dolichopodidae

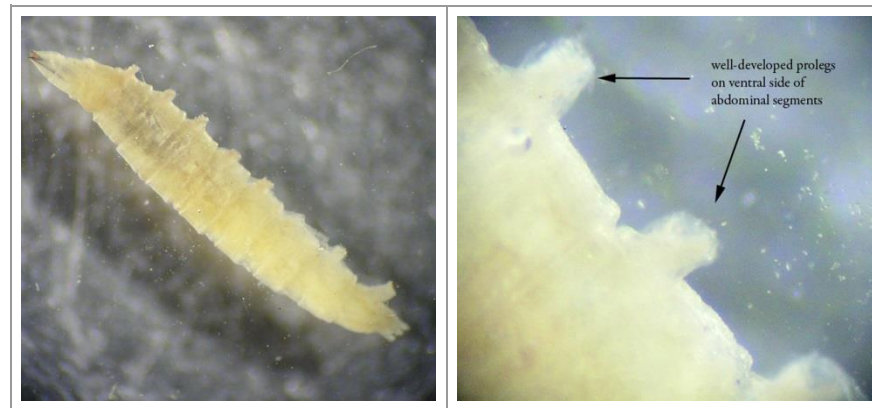


Key Characters	Head capsule reduced to a pair of metacephalic rods. Ventral creeping welts present on abdominal segments; 4 smooth lobes on last abdominal segment, base of upper 2 with posterior spiracles.
Tolerance	4
Distribution	CA, OR, WA, NV, AZ



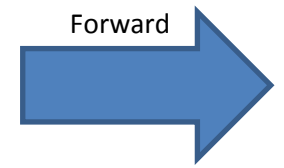
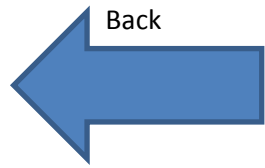


## Empididae

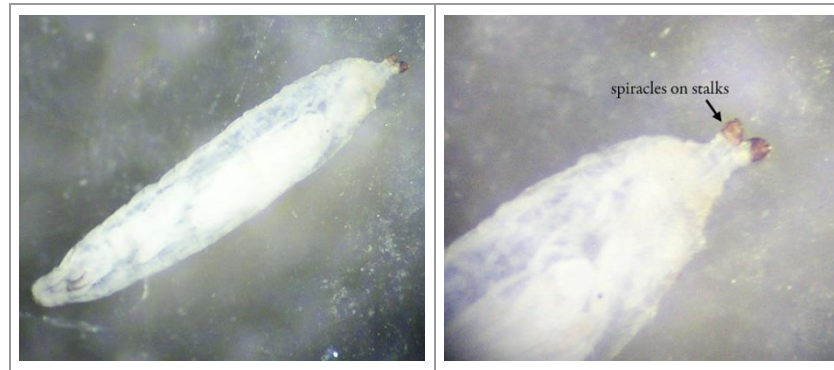


Key Characters	"Dancing flies." Head very reduced. 7 or 8 pairs of abdominal prolegs w/ hooked spines, caudal lobes w/ hairs. Separated from Athericidae by lack of pseudopods, and forked post filaments.
Tolerance	6
Distribution	CA, OR, WA



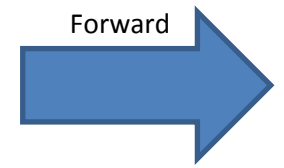
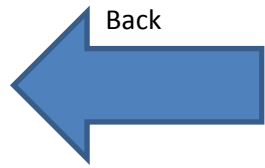


## Ephydriidae



Key Characters	"Shore flies" or "brine flies." Head reduced to internal skeleton, rarely protruding. Highly variable, usually w/ ventral prolegs or creeping welts, wrinkled appearance Pair of posterior spiracles always on separate stalks.
Tolerance	6
Distribution	CA, OR, WA, NV, AZ, Baja





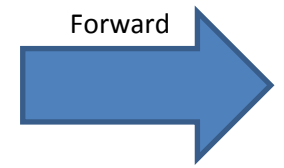
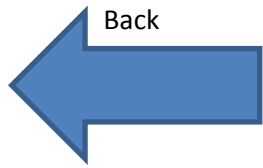
## Muscidae



Key Characters	"House or bristle flies." Head reduced to mouth hooks and internal skeleton. Abdominal segments w/ creeping welts, last one w/ prolegs; smooth appearance. Posterior end with spiracles on short stubs; never on stalks.
Tolerance	6
Distribution	CA, OR, WA, NV, AZ, Baja





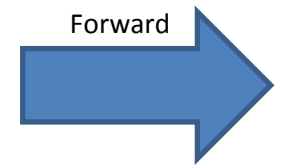
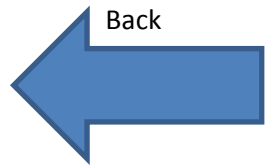


## Oreoleptidae

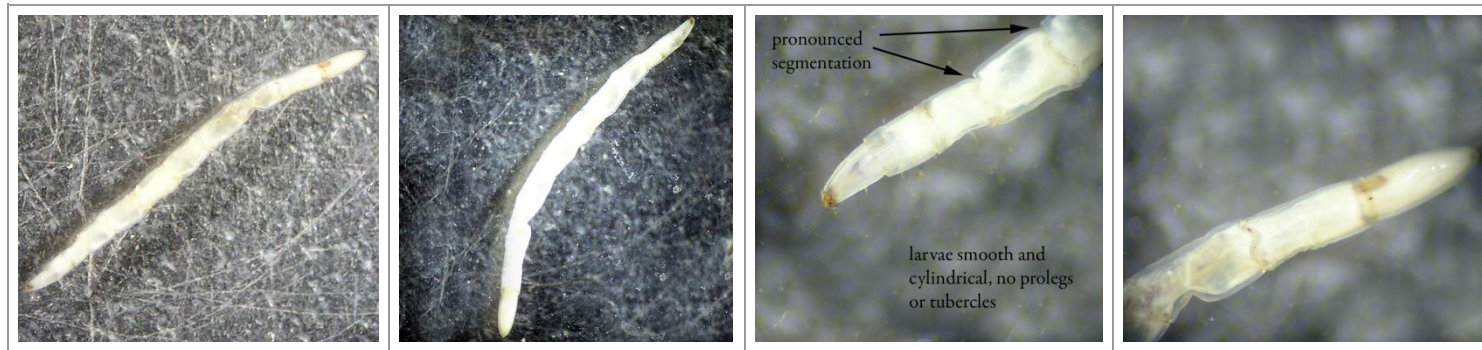


Key Characters	The larvae, which bear two pairs of long, slender prolegs on abdominal segments 2 to 7, are predators of immature aquatic insects. Their flexible bodies allow them to crawl through the abrasive substrates of torrential streams; they pupate in sand and gravel at the high water line after spring run-off.
Tolerance	unknown
Distribution	CA, possibly OR



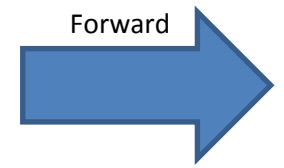
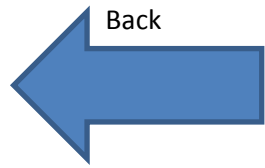


## Pelecorhynchidae



Key Characters	Cylindrical larva with pronounced segmentation and flat, glossy integument. No tubercles or prolegs.
Tolerance	3
Distribution	CA, OR, WA



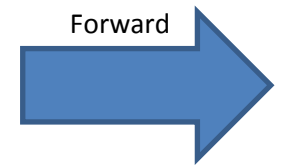
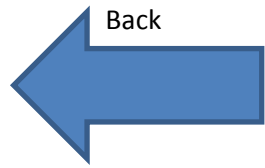


## Psychodidae



Key Characters	"Moth flies", a.k.a. "drain flies." Body segments subdivided into 2 or 3 sections, each w/ sclerotized dorsal plate. Posterior spiracles at the end of a short conical respiratory tube.
Tolerance	generally 2-4, as high as 10 in some genera ( <i>Psychoda</i> )
Distribution	CA, OR, WA, AZ, Baja



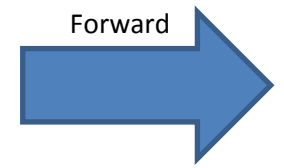
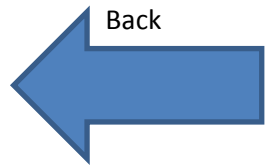


## Ptychopteridae



Key Characters	"Phantom crane-flies." Abdomen ending in a long telescopic respiratory siphon. Very small prolegs on 1st 3 abdominal segments w/ single, slender, curved claw.
Tolerance	7
Distribution	CA, OR, WA, NV, AZ





## Sciomyzidae



Key Characters	Sclerotized ventral arch below base of mouth hooks, usually toothed. Body often covered in short, fine hairs. Posterior segment tapered, tubercles surrounding spiracles on apex.
Tolerance	6
Distribution	CA, OR, WA, NV, AZ, Baja

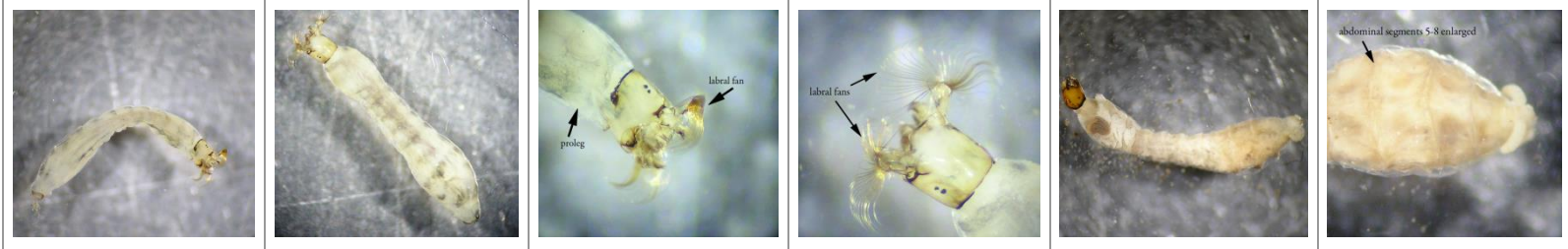


Back

# Simuliidae

Forward

## Larvae:

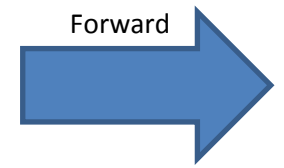
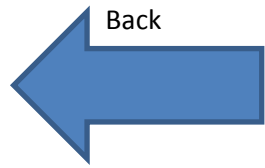


## Pupae:

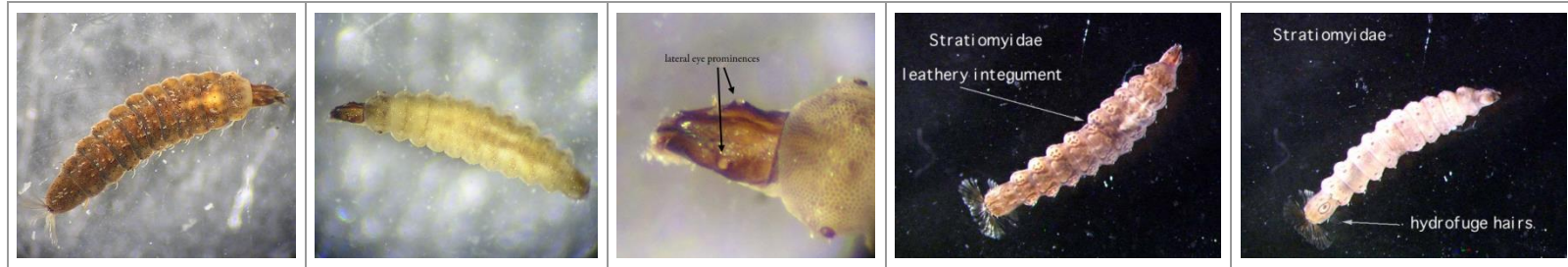


Key Characters	"Black flies" or "buffalo gnats," shaped like little bowling pins. Caudal 1/3 distinctly swollen, retractable anal gills, attachment disk on posterior end. Labral fan used in filter feeding. Single prothoracic proleg (may help in feeding). Large chromosomes in salivary glands, used by researchers to define "cytospecies."
Tolerance	generally 6-7, can be as low as 3 ( <i>Simulium</i> sp.)
Distribution	CA, OR, WA, AZ, NV, Baja



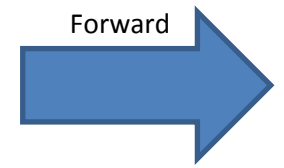
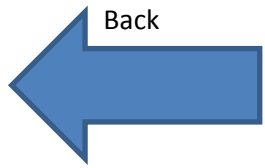


## Stratiomyidae



Key Characters	"Soldier flies." Body slightly flattened, most complete head of the Brachycera. Integument toughened and leathery from calcium deposits. Circle of hydrofuge hairs surrounding the posterior segment, anus prominent.
Tolerance	7-8
Distribution	CA, OR, WA, NV, AZ, Baja





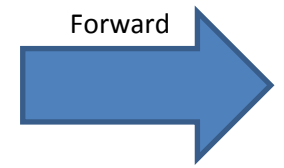
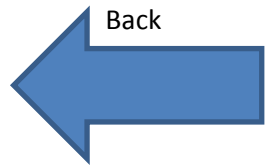
## Syrphidae



Key Characters	Prothoracic spiracles absent or with stigmatal openings near apex of simple stalk. Ribbed filter chamber in area normally occupied by mouth hooks.
Tolerance	10
Distribution	CA, OR, WA, NV, AZ, Baja





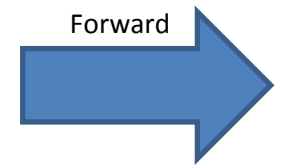
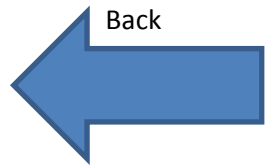


## Tabanidae

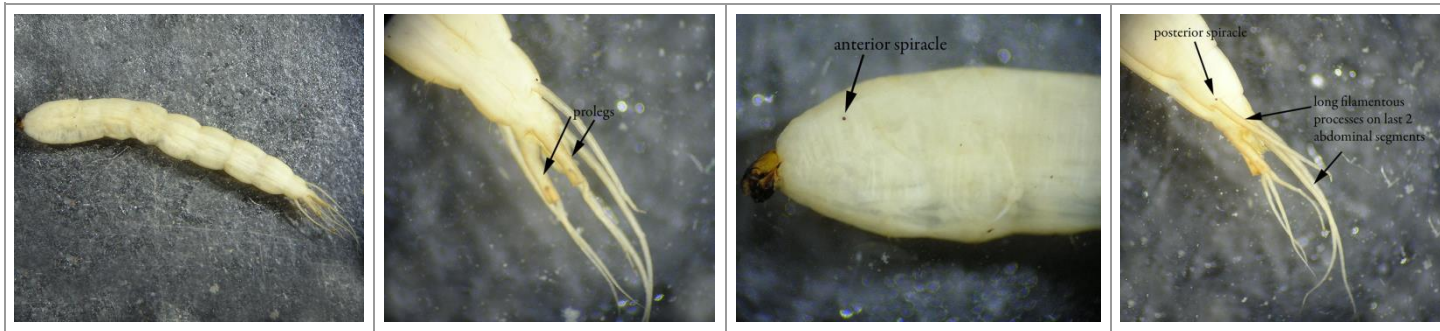


Key Characters	"Horse flies" and "Deer flies." Head minute, body elongate & cylindrical w/ both ends tapered, short siphon on posterior end. Abdominal segments w/ pairs of dorsal, ventral, and lateral prolegs or "creeping welts".
Tolerance	usually 8, 5 in <i>Tabanus</i> sp.
Distribution	CA, OR, WA, NV, AZ, Baja



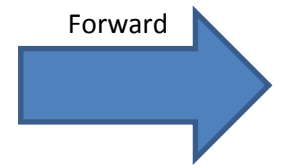
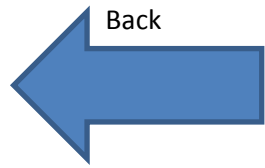


## Tanyderidae

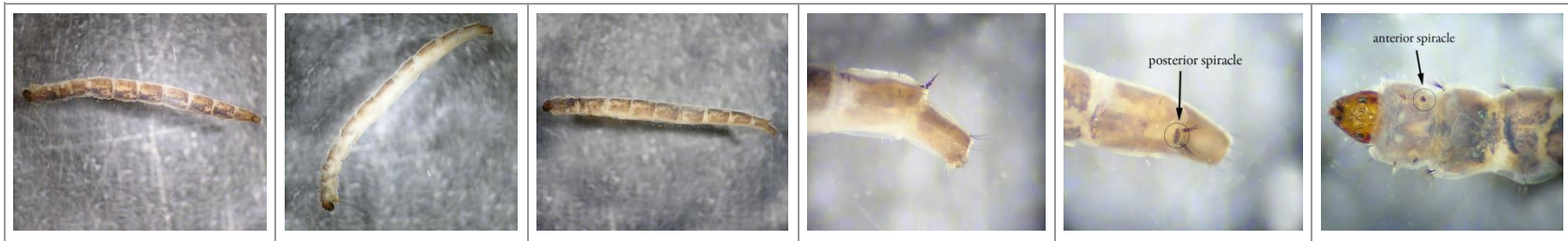


Key Characters	Long filamentous processes on last 2 abdominal segments. Pairs of filamentous processes arising laterally on 2nd to last segment, dorsolaterally on terminal segment. Prolegs may be present on last abdominal segment, but never on prothorax.
Tolerance	1
Distribution	CA, OR



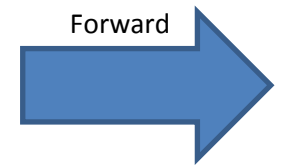
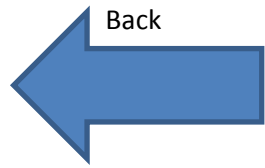


## Thaumaleidae



Key Characters	Prothorax with 1 proleg or a pair of ventral prolegs. Anterior spiracles on short stalks, posterior spiracles open into transverse cleft between processes on abdominal segment 8. Prothoracic or anal prolegs unpaired
Tolerance	unknown
Distribution	CA



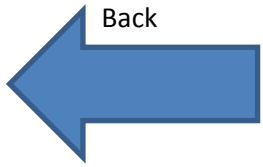


## Tipulidae

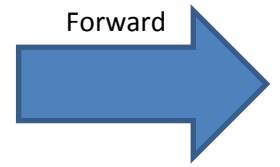


Key Characters	Most diverse and primitive family, a.k.a. "crane flies." Generally sub-cylindrical, tapered toward the head, posterior end with anal lobes and a spiracular disk, usually surrounded by lobes and hairs. Can be fairly large, resemble small cigars ( <i>Tipula</i> spp.)
Tolerance	varies between genera, from 1-7
Distribution	CA, OR, WA, NV, AZ, Baja





Back




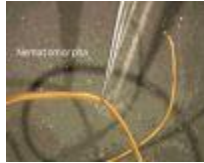


Forward

# Non-Insects

[Page 1]

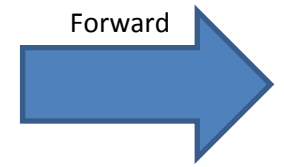
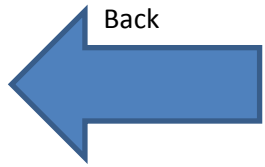
	
<a href="#"><u>Acari</u></a>	<a href="#"><u>Amphipoda</u></a>

				
<a href="#"><u>Bryozoa</u></a>	<a href="#"><u>Cnidaria</u></a>	<a href="#"><u>Decapoda</u></a>	<a href="#"><u>Hirudinea</u></a>	<a href="#"><u>Isopoda</u></a>

					
<a href="#"><u>Nematoda</u></a>	<a href="#"><u>Nematomorpha</u></a>	<a href="#"><u>Nemertea</u></a>	<a href="#"><u>Oligochaeta</u></a>	<a href="#"><u>Porifera</u></a>	<a href="#"><u>Turbellaria</u></a>



Return to Order



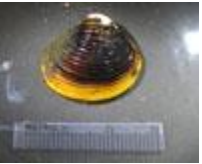



# Non-Insects



[Page 2]

## Phylum Mollusca

### Class Bivalvia

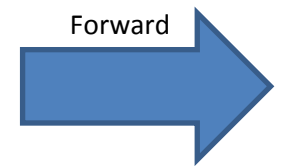
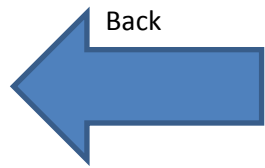
			
Unionidae	Margaritiferidae	Corbiculidae	Sphaeriidae

### Class Gastropoda

					
Viviparidae	Thiaridae	Pleuroceridae	Valvatidae	Lymnaeidae	Hydrobiidae
					
		Physidae	Planorbidae		



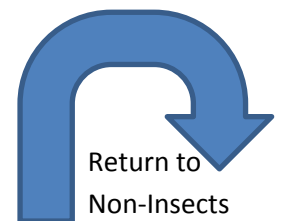
Return to Order

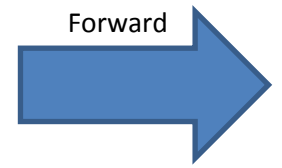
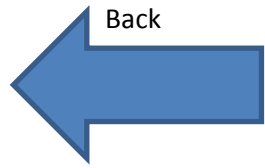


## Acari

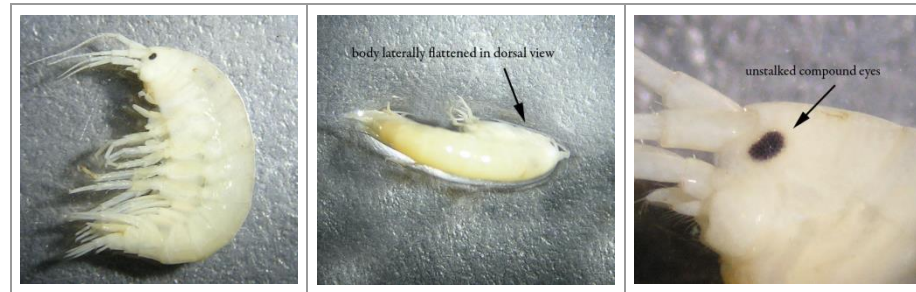


Key Characters	0.3 - 0.4 mm in length, 4 pairs of legs, Cephalothorax and abdomen fused (unlike true spiders). Very colorful (blues, greens, and reds). More than 600 species in U.S.
Tolerance	5-8
Distribution	CA, OR, WA, NV, AZ, Baja

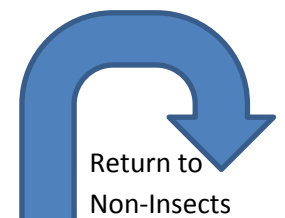




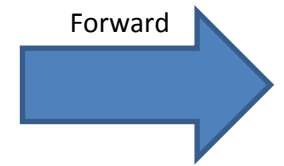
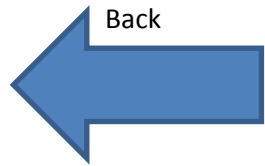
## Amphipoda



Key Characters	150 species in U.S. 5 - 20 mm in length, strongly laterally compressed. Eyes unstalked and compound.
Tolerance	variable, from 4-8
Distribution	CA, OR, WA, NV, AZ, Baja



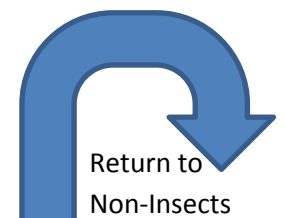


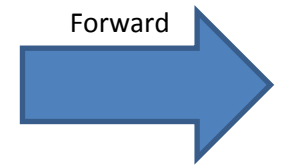
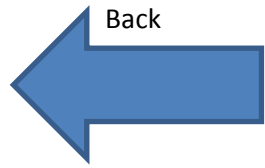


## Ectoprocta



Key Characters	21 species in U.S. Often mistaken for mats of moss. Found on logs, stones, or twigs, individual zooids connect in a branched, twig-like manner to form colonies.
Tolerance	unknown
Distribution	CA, OR, WA, NV, AZ, Baja

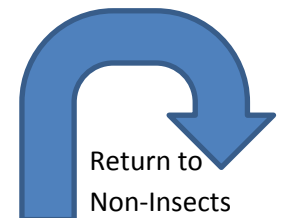


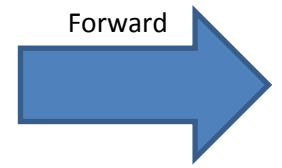
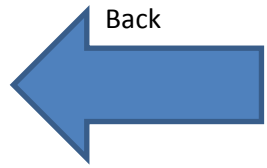


## Cnidaria



Key Characters	20 freshwater species in U.S. 1 - 25 mm in length. Body is radially symmetrical, tentacles have nematocysts (stinging cells).
Tolerance	5
Distribution	CA, OR, WA, NV, AZ, Baja

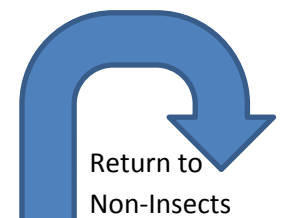


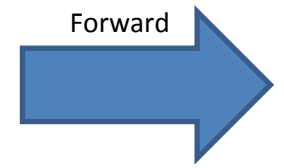
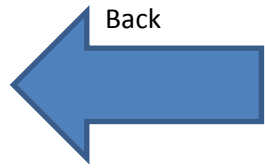


## Decapoda



Key Characters	350 species in U.S. 10 - 150 mm in length. Eyes stalked, compound, large, and moveable. Head and thoracic segments fused to form cephalothorax
Tolerance	typically 6-8
Distribution	CA, OR, WA, NV, AZ, Baja

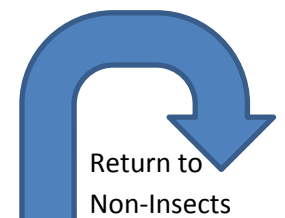


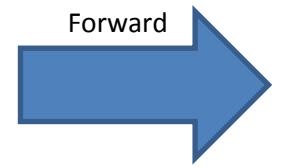
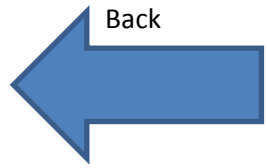


## Hirudinea



Key Characters	60 species in U.S. 5mm - 45 cm in length. Segmented, dorsoventrally flattened, with oral and caudal sucker.
Tolerance	Usually 8-10, as low as 6 in Glossiphoniidae family
Distribution	CA, OR, WA, NV, AZ, Baja

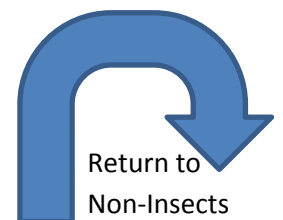


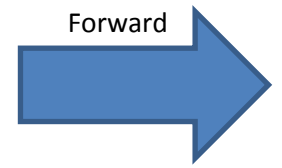
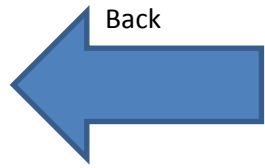


## Isopoda



Key Characters	130 species in U.S. 5 - 20 mm in length. Strongly dorsoventrally flattened. Eyes dorsal, unstalked, and compound.
Tolerance	8
Distribution	CA, OR, WA, NV, AZ, Baja





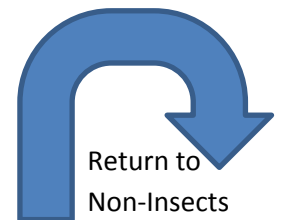
## Nematoda



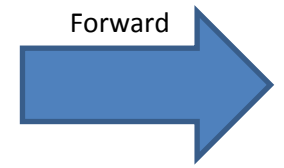
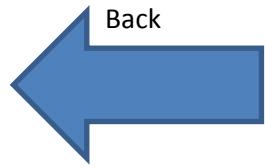
Key Characters	Thousands of species; most are < 1 cm in length. Body circular in cross-section. Look like needles pointed on both ends. Preserved specimens sometimes curled up like a curly-Q.
Tolerance	5
Distribution	CA, OR, WA, NV, AZ, Baja



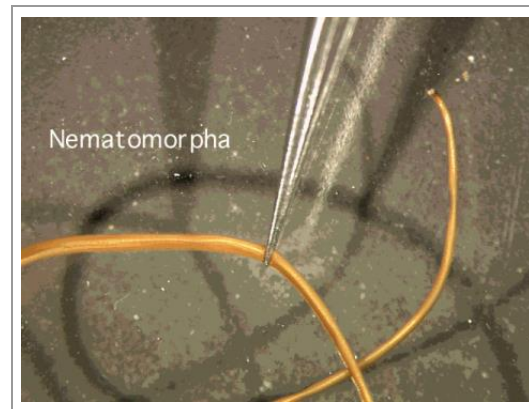
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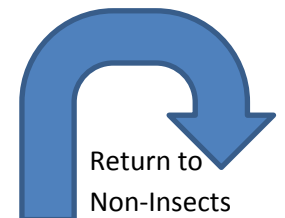
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Non-Insects

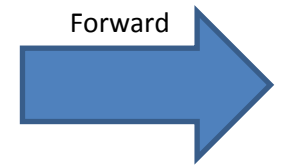
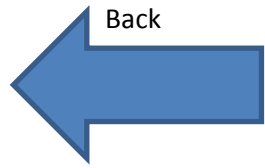


## Nematomorpha



Key Characters	Thousands of species, 12 freshwater species in U.S. 10 -7- cm in length. Body same diameter throughout its length. Threadlike, only slightly tapered on both ends.
Tolerance	10
Distribution	CA, OR, WA, NV, AZ, Baja

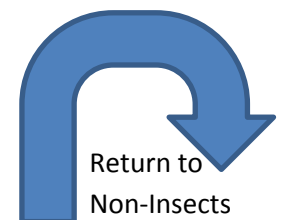




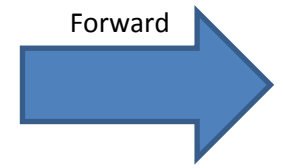
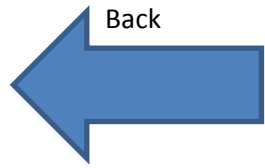
## Nemertea



Key Characters	2 freshwater species in U.S. Largely marine group, Up to 30 mm. 3 pairs of ocelli, arranged in 2 longitudinal rows at anterior end. Body smooth, unsegmented. Long, protrudable proboscis.
Tolerance	8
Distribution	CA, OR, WA, NV, AZ, Baja



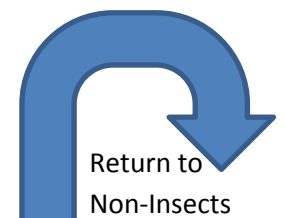


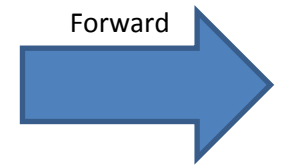
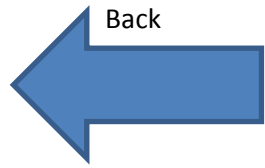


## Oligochaeta



Key Characters	10 families in U.S. 1 - 3 mm in length. Found in all types of water, including highly polluted areas. Tubular, segmented body.
Tolerance	8-10
Distribution	CA, OR, WA, NV, AZ, Baja

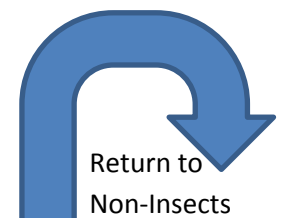


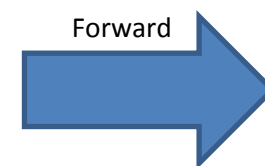
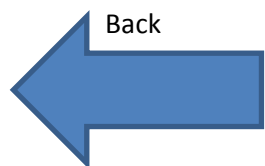


## Porifera



Key Characters	Largely marine group, 1 freshwater Family in U.S. - Spongillidae, 170 species. Highly variable in size and growth form. "Skeleton" contains both spicules and spongin. Taxonomy difficult, considerable disagreement among specialists.
Tolerance	unknown
Distribution	CA, OR, WA, NV, AZ, Baja

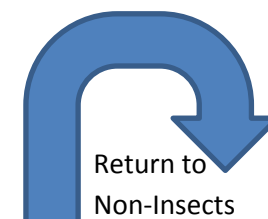


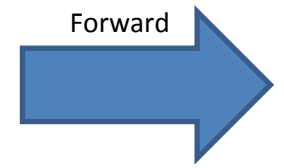
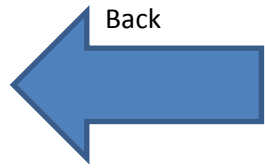


## Turbellaria

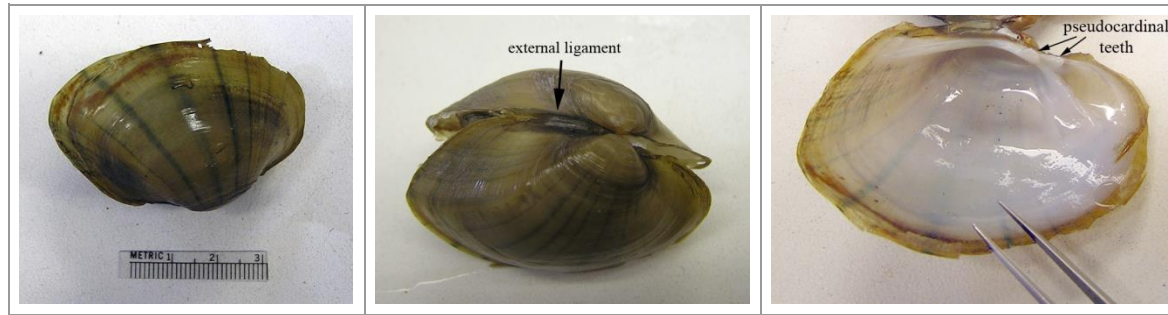


Key Characters	Elongated, flattened and leaflike, or cylindrical-shaped body with a single opening. Preserved specimens often have pharynx extruded.
Tolerance	1-4
Distribution	CA, OR, WA, NV, AZ, Baja

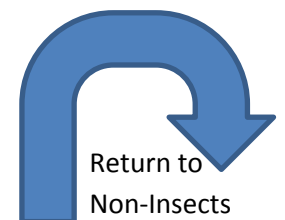


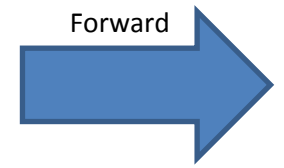
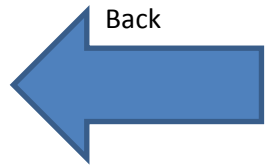


## Unionidae



Key Characters	Pearly mussels, found in lotic (river) or lentic (lake) environments. Shell elongated, oval, subtriangular, or subcircular. Ligament external. Lack true cardinal teeth but pseudocardinal teeth are well-developed in most species.
Tolerance	unknown
Distribution	CA, OR, WA, UT, NV, AZ, Baja

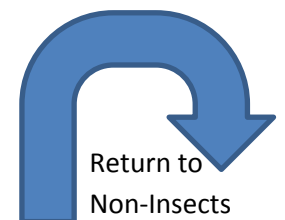


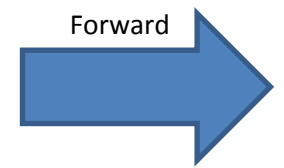
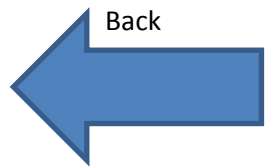


## Margaritiferidae

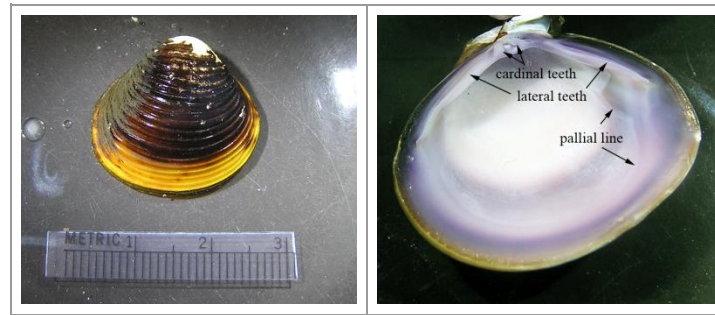


Key Characters	Elongated, laterally compressed shell with external ligament, epidermis dark brown to black, 80 to 175 mm. <i>Margaritifera falcata</i> is the only known species in CA.
Tolerance	unknown
Distribution	CA, OR, WA, UT, NV, AZ, Baja

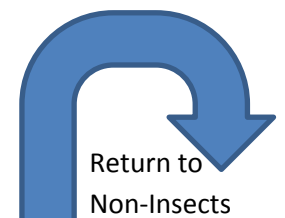


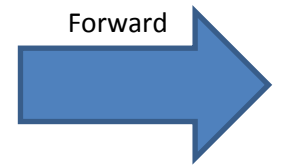
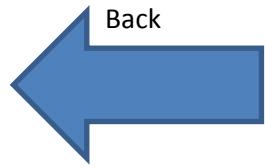


## Corbiculiidae

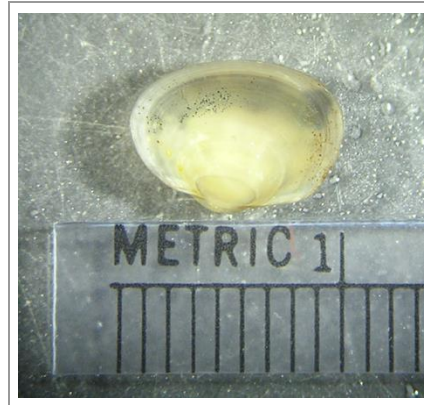


Key Characters	Invasive species from Asia. Thick shell with blackish periostracum, shell interior with true cardinal teeth, anterior and posterior lateral teeth and curved/irregular pallial line. 10-50mm.
Tolerance	unknown
Distribution	CA, OR, WA, UT, NV, AZ, Baja

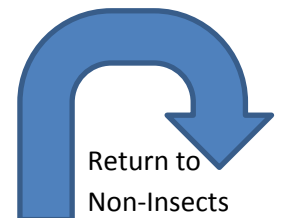


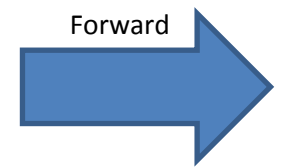
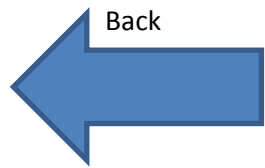


## Sphaeriidae

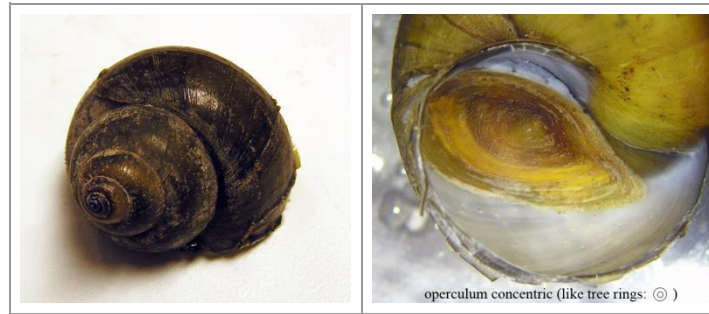


Key Characters	Very common, widespread, also known as "pea," "pill" or "fingernail" clams, or "seed shells." Typically less than 10mm. Thin, fragile shells. Growth rings are present but faint.
Tolerance	unknown
Distribution	CA, OR, WA, UT, NV, AZ, Baja

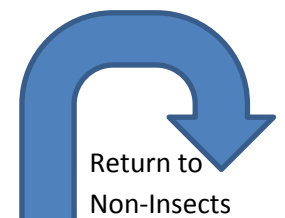




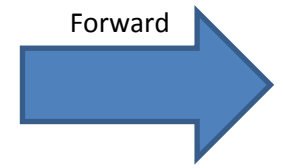
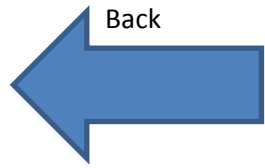
## Viviparidae



Key Characters	Common, medium-sized to large snails (adults 20mm or more in length), shell globulose to turreted, operculum corneous and concentric.
Tolerance	unknown
Distribution	CA, OR, WA



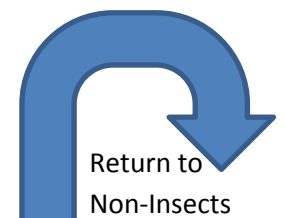


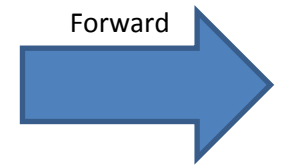
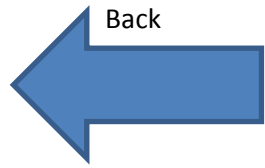


## Thiaridae

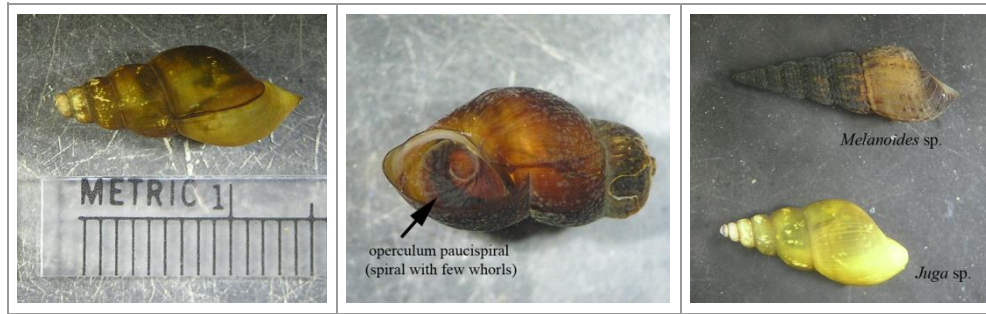


Key Characters	Introduced species found in disturbed habitats with high, sculptured, light-colored shells. Adults usually larger than 12mm, operculum corneous and paucispiral. As a parthenogenic species, males are extremely rare.
Tolerance	unknown
Distribution	CA, UT, NV, AZ

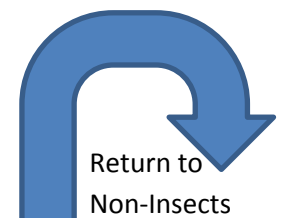


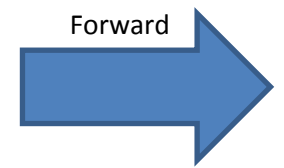
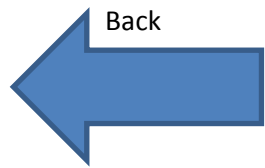


## Pleuroceridae

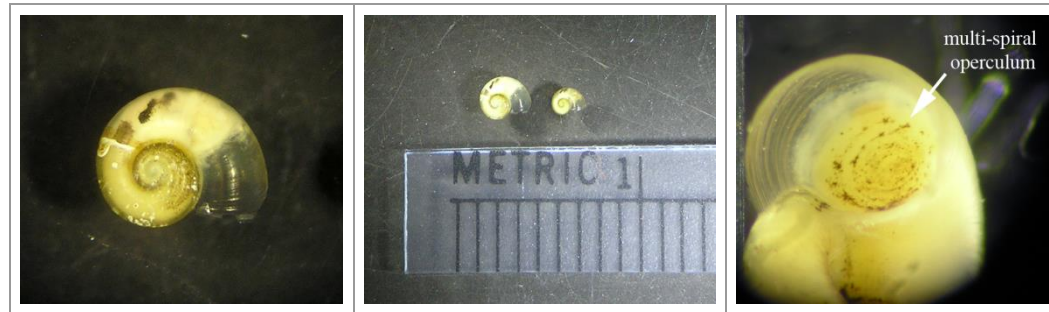


Key Characters	Thick, solid shell, adults larger than 10mm. Operculum corneous, paucispiral. <i>Juga</i> is the only genus in CA
Tolerance	unknown
Distribution	CA, OR, WA

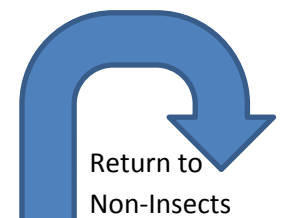


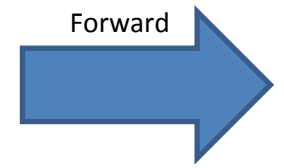
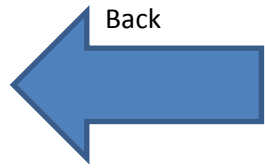


## Valvatidae

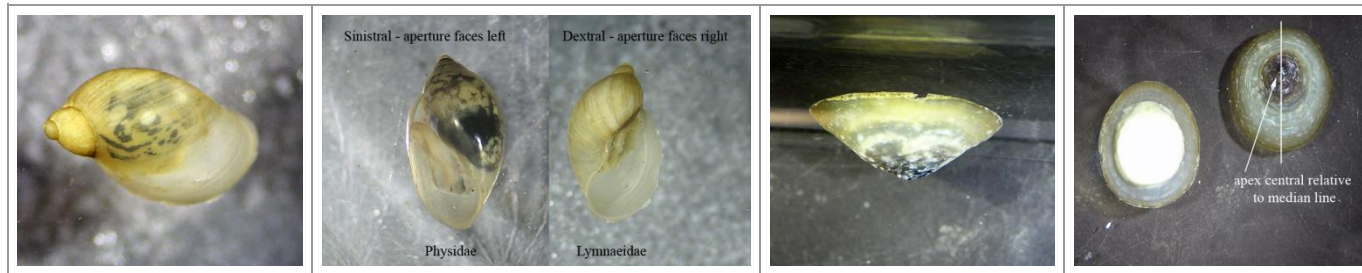


Key Characters	Small (8mm or less) snails found in a number of different habitats. Shell with a depressed spire, operculum multispiral (vs. concentric operculum in Viviparidae). <i>Valvata</i> is the only genus in CA.
Tolerance	unknown
Distribution	CA, OR, WA, UT

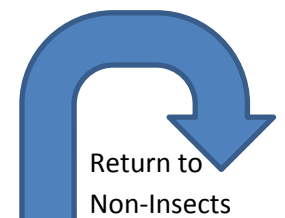


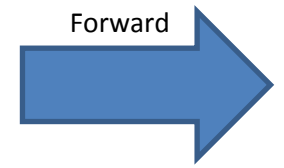
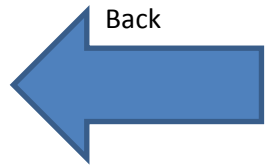


## Lymnaeidae

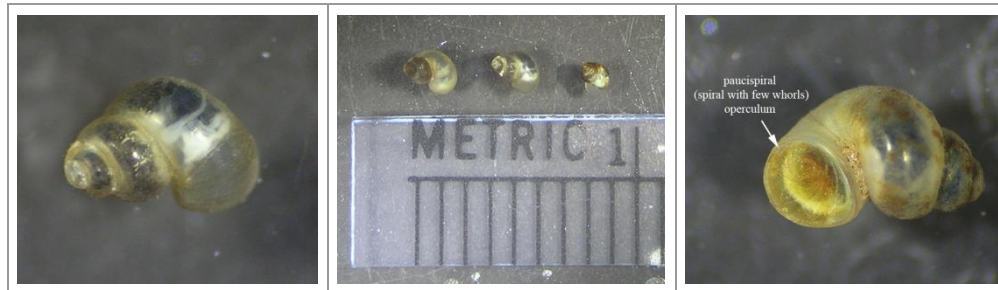


Key Characters	The CA Lymnaeidae include the genus <i>Lymnaea</i> , which has a dextral shell and lacks an operculum, and two families of limpets with distinctive patelliform (flattened cup-shaped) shells, which also do not have an operculum. In the limpets, the shell apex is centered relative to a median line drawn from anterior to posterior.
Tolerance	unknown
Distribution	CA, OR, WA, UT, NV, AZ, Baja

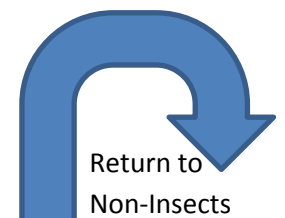


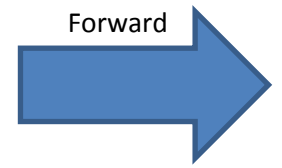
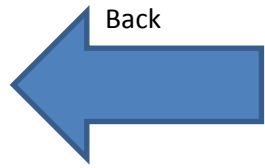


## Hydrobiidae

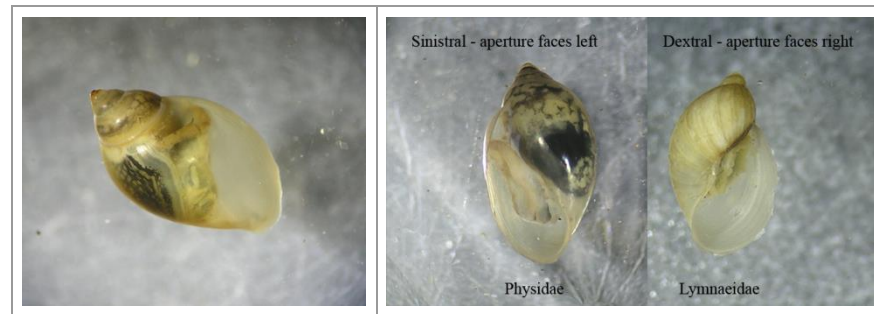


Key Characters	Possess a paucispiral operculum, similar to that found in Pleuroceridae and Hydrobiidae, but are distinguished from these families by their small size (adults are usually no larger than a few mm).
Tolerance	unknown
Distribution	CA, OR, WA, UT, NV, AZ

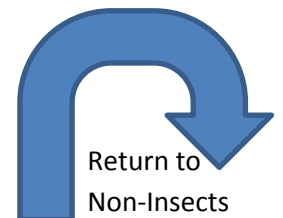


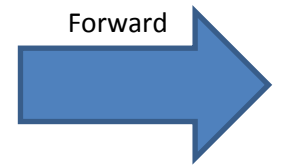
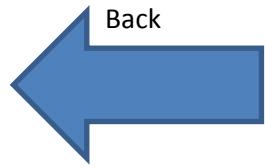


## Physidae



Key Characters	Lacks an operculum like the Lymnaeidae and Planorbidae. It is distinguished from the former by the fact that its shell is sinistral rather than dextral, and from the latter by the fact that its shell is <i>not</i> planispiral.
Tolerance	unknown
Distribution	CA, OR, WA, UT, NV, AZ, Baja





## Planorbidae



Key Characters	Like the families Lymnaeidae and Physidae, the Planorbidae also lack an operculum. They are distinguished from these other families by their planispiral (flattened coil-shaped) shells.
Tolerance	unknown
Distribution	CA, OR, WA, UT, NV, AZ, Baja

