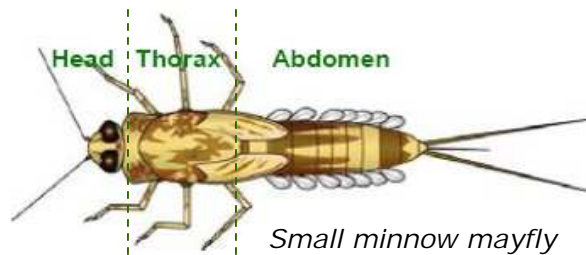


# Kentucky Water Watch Benthic Macroinvertebrate Identification Key



What is an insect?

An insect is an invertebrate (an animal with no spine) that has three pairs of legs and three body divisions.



The mouth, antennae, and eyes are located on the **head**; the **thorax** is the attachment site for legs and wing pads; and the **abdomen** often has a variety of structures attached including gills, tails, and leg-like projections. A benthic macroinvertebrate is a bottom-dwelling animal with no spine that can be seen with the naked eye. Most of the benthic macroinvertebrates you will find during stream surveys are aquatic larvae or nymphs of insects.

## Tolerance Values

All of the macroinvertebrates included in this key have tolerance values that are indicated in a box at the bottom right of their respective cards. These different sensitivities and responses to pollution are specific to Kentucky, and have been determined through historic collections made by KDOW professional biologists. Using a scale of zero to ten, these tolerance values are assigned based on each group's average pollution tolerance, with ten being the most pollution tolerant.

Example:

Tolerance Value = 2



# 1

## CARD

NO LEGS → #2

6 LEGS → #7

MORE THAN 6 LEGS → #13

**2**

CARD

BODY ENCLOSED IN SHELL → #3

BODY WORMLIKE → #6

**3**

CARD

SHELL HAS 2 HALVES → #4

SHELL ALL ONE PIECE → #5

# 4

## CARD

CLAMS & MUSSELS → #14  
(NON-NATIVE)



MUSSELS (NATIVE) → #15



5

CARD

OPERCULATE SNAILS → #16



*Opening  
on right*

NON-OPERCULATE SNAILS → #17



*Opening  
on left*



# 6

## CARD

MIDGES → #18



BLACKFLIES → #19



CRANEFLIES → #20



WATERSNIPE FLIES → #21



OTHER TRUE FLIES → #22



## CARD

LEECHES → #23



FLATWORMS → #24



AQUATIC WORMS → #39



**7**

CARD

TAIL PRESENT → #8

NO TAIL → #11

# 8

## CARD

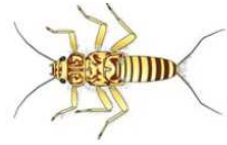
1 TAIL → #25

2 TAILS → #9

3 TAILS → #10

CARD

STONEFLIES → #26



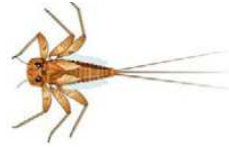
HELLGRAMMITES → #27



# 10

CARD

MAYFLIES → #28



DAMSELFLIES → #29



CARD

CADDISFLIES → #12



DRAGONFLIES → #32



CARD

RIFFLE BEETLES → #33



WATER PENNIES → #34



OTHER BEETLES → #35



# 12

CARD

NETSPINNING CADDISFLIES → #30



CASEBUILDING CADDISFLIES → #31



CARD

CRAYFISHES → #36



SCUDS/SIDESWIMMERS → #37



AQUATIC SOWBUGS → #38





# 14

## CLAMS & MUSSELS (NON-NATIVE)

Body Shape  
Heart-shape side view,  
or roughly triangular

Length  
Asiatic Clams <40mm  
Zebra Mussels <50mm

Appearance  
• Fleshy body enclosed  
in 2 hinged shells

Distinguishing Characteristics  
\* Are generally smaller than native mussels, with distinct ridged bands or  
zig-zag stripes on entire shell

Notes  
Only live clams and mussels may be counted in determining water  
quality



## MUSSELS (NATIVE)

15

Body Shape  
Roughly round or oval, some elongated

Length  
Varies (very small to very large, 25mm to 175mm)

Appearance  
• Fleshy body enclosed in 2 hinged shells

Distinguishing Characteristics

\* Mussel adults usually have larger, darker shells than clams

Notes

Only live mussels may be counted in determining water quality. Remember to replace live native mussels exactly where you found them.



# 16

## OPERCULATE SNAILS

Body Shape  
Spiraled shell

Length  
2 - 70 mm

Appearance

- Hard shell encloses fleshy body
- Plate-like covering (operculum) over shell opening



Distinguishing  
Characteristics

- \* With point held up, opening is on your right as it faces you (right=good) and has operculum (plate-like covering over shell opening)

Notes

Only live snails may be counted in determining water quality



## NON-OPERCULATE SNAILS

17

Body Shape  
Usually spiral, may be flattened

Length  
2 - 70 mm

Appearance

- Hard shell encloses fleshy body
- No plate-like covering over shell opening
- May have shells coiling in one plane

Distinguishing Characteristics  
\* With point held up, opening is *usually* on your left as it faces you

Notes  
Only live snails may be counted in determining water quality



TV  
8

# 18

## TRUE FLIES–MIDGES

Body Shape  
Cylindrical, thin, and  
often curved

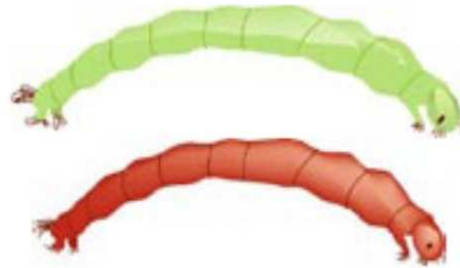
Length  
<5 mm

Appearance

- No true (jointed) legs, but very small front and rear prolegs
- Hardened head capsule with soft body

Distinguishing Characteristics

\* Often confused with aquatic worms, but have small hardened head and prolegs



## TRUE FLIES—BLACKFLIES

19

Body Shape  
Bowling pin shaped  
with sucker on wide  
end

Length  
3.5 - 15 mm

Appearance

- Soft body
- Single proleg directly under head—no true (jointed) legs
- Fan-like mouth bristles may be present
- Coloration can be black, brown, tan, or greenish

Distinguishing Characteristics

- \* Distinguished from other fly larvae by swollen rear end, which it will often stick to the bottom of your collection pan



TV

5

# 20

## TRUE FLIES—CRANEFLIES

Body Shape  
Caterpillar-like and segmented

Length  
10 - 60 mm

- Appearance
- No legs or wing buds
  - Light brown, milky, or greenish in color
  - Soft, "juicy", and may be almost transparent



Distinguishing Characteristics

- \* Distinguished from other fly larvae by finger-like appendages that extend from rear end

## TRUE FLIES—WATERSNIPE FLIES 21

### Body Shape

Plump body, looks very much like a caterpillar

### Length

10 - 20 mm

### Appearance

- On the underside there are several prolegs - no true (jointed) legs
- Tail is forked and fringed with hairs
- No apparent head
- Color brown to greenish

### Distinguishing Characteristics

\* Paired, stumpy prolegs on underside of most body segments





# 22

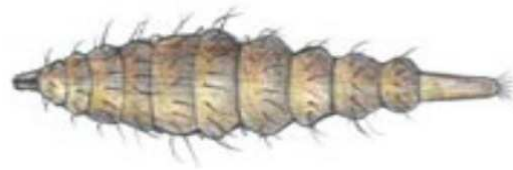
## TRUE FLIES—OTHER

Body Shape  
Usually segmented  
with some visible fea-  
tures along body or at  
ends

Length  
2 - 40 mm

- Appearance
- Many with maggot-  
like appearance
  - No fully developed  
legs in the larval stag-  
es
  - Very diverse group

Distinguishing Characteristics  
\*Maggot-like appearance



## LEECHES

23

Body Shape  
Usually flattened  
sideview, many seg-  
ments

Length  
10 - 100 mm

Appearance

- Front and rear end suckers
- No apparent head
- Usually much wider than an aquatic worm
- Usually brown, greenish, or tan in color, though can be patterned and brightly colored

Distinguishing Characteristics

- \* May be confused with flatworms but are usually larger with segments and suckers



TV

9

# 24

## FLATWORMS

Body Shape  
Flattened sideview,  
arrow-shaped head

Length  
1 - 30 mm

- Appearance
- Soft, flat body
  - Arrow-shaped head with white eyespots
  - Body unsegmented

### Distinguishing Characteristics

\* May be confused with aquatic worms or leeches, but slides along surfaces rather than moving end to end (leeches) or by stretching part of the body and pulling the rest (worms); body is unsegmented, worms and leeches are segmented



## ALDERFLIES

25

Body Shape  
Large, long, and  
slightly flattened

Length  
<25 mm

Appearance

- Large pinchers on front of head near mouth
- 7 pairs of leg-like projections (not jointed) on sides of abdomen
- 3 pairs of legs on thorax

Distinguishing Characteristics

- \* May be confused with hellgrammites (2 tails), but have only one hard-to-see tail



# 26

## STONEFLIES

Body Shape  
Generally elongated,  
but varies

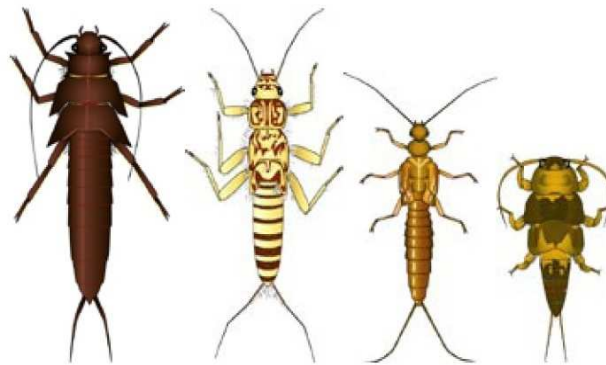
Length  
5 - 35 mm

Appearance

- Abdomen ends in 2 hair-like tails
- No gills visible on abdomen
- 2 claws on the end of each leg
- Antennae longer than head
- Only found crawling on surfaces, not swimming

Distinguishing Characteristics

- \* May be confused with mayflies (3 tails), but have 2 tails and lack of feathery gills on the abdomen



## HELLGRAMMITES

27

Body Shape  
Large, long and slightly  
flattened

Length  
<65 mm

Appearance

- Large pinchers on front of head near mouth
- 7-8 pairs of leg-like projections (not jointed) on sides of abdomen
- 2 claws on the end of each leg
- Abdomen ends in 2 short, spiny tails, each with 2 hooks

Distinguishing Characteristics

- \* May be confused with alderfly (1 tail), but have 2 short spiny tails, each with 2 hooks



# 28

## MAYFLIES

Body Shape  
Generally elongated,  
but appear stubby

Length  
2 - 30 mm

Appearance

- Abdomen usually ends in 3 hair-like tails
- Tail may appear webbed
- Tails are fragile and may break off during collection, examine carefully
- Feathery gills line sides of abdomen
- Often swim in collection bin—rather than crawling

Distinguishing Characteristics

- \* May be confused with stoneflies (2 tails), but have 3 tails and feathery gills on sides of abdomen



TV

3

## DAMSELFLIES

29

Body Shape  
Elongated, narrow,  
tapering rearward

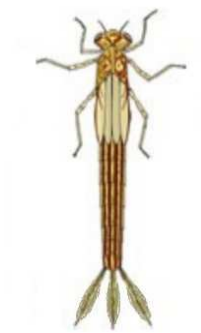
Length  
15 - 30 mm

Appearance

- No gills present on sides of abdomen
- Abdomen ends in 3 wide, oar-shaped tails

Distinguishing Characteristics

- \* May be confused with mayflies (3 hair-like tails), but have no abdominal gills and have 3 paddle-shaped or feather-shaped tails
- \* May be confused with dragonflies (no tail), but have 3 tails





# 30

## NETSPINNING CADDISFLIES

Body Shape  
Cylindrical and "C"-  
shaped

Length  
2 - 40 mm

Appearance

- 6 legs close together on thorax near head
- Abdomen ends in 2 claws
- May have darker, harder plates on top of thorax
- Move with characteristic wiggling—back and forth, then up and down through water

Distinguishing Characteristics

- \* May be confused with riffle beetle larvae (hard abdomen), but have soft abdomens



## CASEBUILDING CADDISFLIES

# 31

Body Shape  
Case roughly  
cylindrical

Length  
2 - 40 mm

Appearance

- Often found in "cases" made of pebbles, wood, sticks, leaves, sand, or shells
- 6 legs close together on thorax near head
- May appear as a moving stick, clump of rocks or leaves on bottom of collection pan
- May withdraw entirely into case

Distinguishing Characteristics

- \* Live in protective "cases"



TV

3

# 32

## DRAGONFLIES

Body Shape  
Wide abdomen, oval,  
flattened

Length  
20 - 50 mm

Appearance

- Large eyes
- No tails
- No external gills
- Body is generally rough and yellow-green, grey, or brown in color

Distinguishing Characteristics

\* May be confused with damselflies (2 tails), but have wide, oval abdomen and no tail



## RIFFLE BEETLES (ADULTS AND LARVAE)

33

Body Shape  
Adult—Oblong, oval  
Larvae—Cylindrical and  
"C" shaped

Length  
<6 mm

Appearance

- Tiny
- Black, brown, or greenish in color
- Hardened, stiff appearance of entire body

Distinguishing Characteristics

- \* Adult may be confused with other beetles (indistinct body segments), but body shape has distinct segments of head, thorax, abdomen
- \* Larvae may be confused with caddisflies (soft abdomen), but body is hardened and stiff



TV  
4

# 34

## WATER PENNIES

Body Shape  
Oval, cupped disc

Length  
2 - 6 mm

Appearance

- Rounded, resembling pennies
- Brown, tan, or black colored
- Resembles a hardened suction cup
- 3 tiny pairs of legs on underside of body

Distinguishing Characteristics

- \* Slightly cupped disc



## OTHER BEETLES

35

Body Shape  
Rounded oval

Length  
2 - 40 mm

Appearance

- 3 body segments  
difficult to  
differentiate,  
rounded look to body
- Hardened, stiff appearance to entire body

Distinguishing Characteristics

- \* May be confused with riffle beetle adults (distinct body segments), but body segments less distinct, giving a more rounded look to body



TV  
9

# 36

## CRAYFISHES

Body Shape  
Lobster-like with fan shaped tail

Length  
30 - 150 cm

- Appearance
- Five pairs of walking legs, first pair enlarged with claws
  - Hard body, looks like a small lobster
  - Brown, yellow, pink greenish, or white in color
  - Eyes on stalks; well developed antennae

Distinguishing Characteristics  
\* First pair of walking legs enlarged with claws



## SCUDS/SIDESWIMMERS

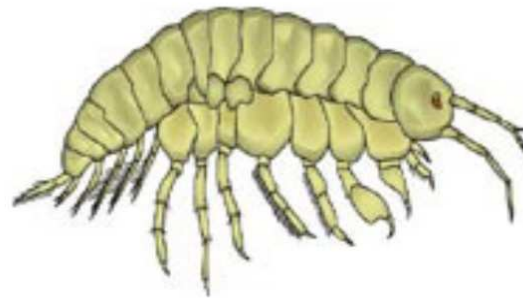
37

Body Shape  
Flattened side to side

Length  
5 - 20 mm

Appearance

- Shrimp-like
- White, pink, or clear in color
- Body is somewhat taller than it is wide
- 7 pairs of legs
- May have darker, harder plates on top of thorax



Distinguishing Characteristics

- \* May be confused with aquatic sowbugs (wider than tall), but are taller than wide and usually swims in a rapid sideways motion

TV  
8



# 38

## AQUATIC SOWBUGS

Body Shape  
Flattened top to  
bottom

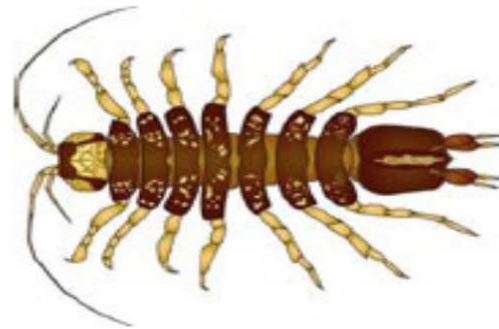
Length  
5 - 20 mm

Appearance

- Looks like a roly-poly or pill bug, but more "skeletal"
- Hard body that is flattened top to bottom
- Very long antennae
- 7 pairs of legs; body wider than high

Distinguishing Characteristics

- \* May be confused with scuds/sideswimmers (taller than wide), but are wider than tall and walk slowly along surfaces



TV

8

## AQUATIC WORMS

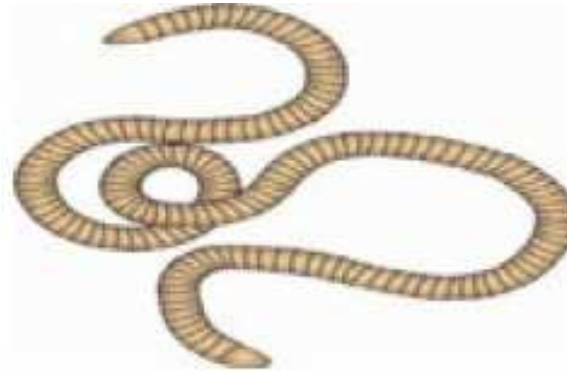
**39**

Body Shape  
Cylindrical and thin

Length  
1 - 7.5 cm

Appearance

- No defined head
- No legs
- Body color reddish, brown or gray
- Body segmented



Distinguishing Characteristics

\* Moves by stretching part of the body and pulling the rest