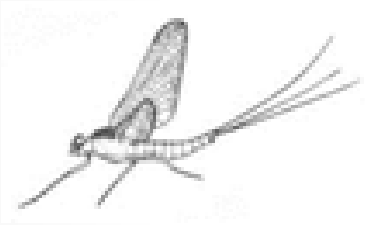
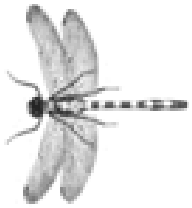
Fly Fishing Entomology

i.e. bugs 101






What is entomology?

Entomology (from Greek *entomos)*, is the scientific study of insects, a branch of arthropodology, which in turn is a branch of biology.

OR

Any form of scientific study in which there is a focus on insect related inquiries.

At ~ 1.3 million described species, insects account for more than two-thirds of all known organisms.

Why is entomology important to the fly fisherman?

Knowing the basics of entomology goes along way from separating a day of casting and frustration from one of action and excitement.

Fly fishers have to figure out once he/she is on the water what flies to use. Those decisions are made based on his/hers the understanding the various food sources in the area that day. This is can important to fishing success.

Some Trout Food Groups

Mayfly (Mayfly cycle) – are born in water, mates out of water, returns to water.

Caddisfly (Caddisfly cycle) – are born in water, mates out of water, returns to water. (Only slightly different than the mayfly cycle.)

Midges (Midge cycle) are born in water, mates out of water, returns to water.

Terrestrials (Land insects that typically live and mate out of water. However, they make it to the water by accident i.e. falling in or getting blown into the water. Examples are: Grasshoppers, ants, beetles, crickets, cicadas, etc.

Water Creatures (Bugs or food that are born in the water, mature and stay in the water). So per se, they are not really flies. However, fly fishers still call them flies. Examples are: Leeches, aquatic worms, crawdads, scuds, fresh water shrimp, minnows, etc.

Other (salmon fly, damsel fly, stone fly, etc.)

Entomology is divided into groups and sub groups.

Orders > then

Families > then

Genera > then

Species

Unfortunately for us **every day fly fisherman**, the names are of 'Latin" origin, as one can see on the following slide. Fortunately there is usually a 'common' name associated with the Latin name.

Example of Groups and Sub Groups

Example: Mayfly (common name – small minnow mayfly)

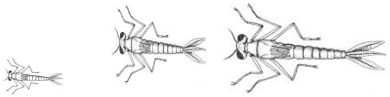
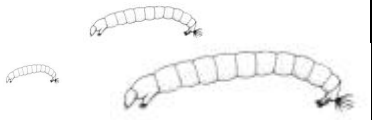
Order = Ephemeroptera

Family = Baetidae

Genera = Callibaetis

Species = Picta

Aquatic Insect Metamorphic Life Stages

Incomplete	Complete
Egg 	Egg 
	
Nymph  (numerous growth instars)	Larva  (numerous growth instars)
	
	Pupa 
	
Adult 	Adult 

Terminology

Abdomens- The rear and usually the longest (ten-segmented in mayflies) portion of an insect's body, to which the tails are attached.
Beadheads - A type of nymph fly typically with a brass bead which helps keep the fly very close to the bottom where trout are used to seeing and capturing naturals. Hares Ears and Pheasant Tails (above) are beadheads.
BWO - Blue winged Olive. Several genus and species of Mayfly, most frequently the baetis. Tied as nymphs, emergers and dry flies. They have different sizes, colors, and behaviors.
CDC - stands for "Cul de Canard" which literally translates to "butt of the duck". Used both to refer to the feathers from the area around the oil gland of a duck and also to the flies tied with these feathers. The feathers from this area are very wispy and impregnated with natural oils making them extremely waterproof.
Dry Fly - any fly fished upon the surface of the water; usually constructed of non-water-absorbent materials; most commonly used to imitate the adult stage of aquatic insects.
Duns - (1) first stage in the adult mayfly's life cycle; usually of short duration (1 to 24 hours); this is the stage most often imitated by the dry fly; They then molt into the spinner (imago) stage, in which they mate and die. (2) A darkish gray-blue color that is very desirable in some fly tying materials.

Terminology

Emergence - The transformation of a nymph or pupa into the adult winged stage of an insect. The term may refer to the emergence of an individual, or the daily or yearly event in which all individuals of a species emerge. Fly fisherman often refer to this transformation as “the hatch”.

Emerger - pertaining to aquatic insects, the name used to describe that time frame when the nymph reaches the surface and the adult hatches out; the emerging nymph may well be the single most important nymph phase for the fly fishers to imitate.

Hackle - A feather, usually from the neck area of a chicken; can be any color (dyed or natural); hackle quality, such as the stiffness of the individual fibers and amount of web, determines the type of fly tied with the hackle; many hackles are grown specifically for fly tying.

Hatch - The time when a large number of nymphs or pupas become fully winged flies, often producing frantic feeding activity among trout. .

Hoppers - Grasshopper flies.

Instar: Many invertebrates molt through dozens of progressively larger and better-developed stages as they grow. Each of these stages is known as an instar. Hard-bodied nymphs typically molt through more instars than soft-bodied larvae.

Larva - Many classes of aquatic insects, such as caddisflies, midges, craneflies, and many more, are known as "larvae" rather than "nymphs" in their juvenile stages. They have mostly soft bodies rather than hard exoskeletons. These insects also advance through a "pupa" stage before reaching adulthood. The larva is a bottom dwelling non-swimming stage of the insect.

Terminology

Metamorphosis- Metamorphosis is the change that occurs during the organism's development (**life cycle**) from egg to adult.
Midge- a term properly applied to the small Dipterans that trout feed on. Many people call them **gnats**.
Molt - when aquatic insects with hard exoskeletons (like mayfly and stonefly nymphs) grow bigger, their exoskeleton does not grow with them. Instead they grow a new, larger one underneath and shed the old one when it's too small. This process is called molting.
Muddler - A type of streamer fly that typically imitates Sculpins or juvenile bullhead catfish.
Natural - A natural is a real insect (or similar creature) a trout might eat. The term is used to specify the real thing as opposed to its artificial imitation.
Nymphs - The juvenile, underwater stages of mayflies, stoneflies, dragonflies, and damselflies and other aquatic insects whose juvenile stages are covered by hard exoskeletons. 90% of the time fish feeding takes place below the surface on nymphs. The word can also refer to the fishing flies which imitate these creatures, in which case it is used as a blanket term for flies imitating any underwater stage of an invertebrate (except for crayfish and leeches).
Nymphing - word describing fish feeding on nymphs; nymphing right at the surface can be difficult to tell from fish feeding on adults, careful observation should tell.

Terminology

Parachute - A type of dry fly where the hackle is wound horizontally around the base of the wing like a parachute instead of vertically around the hook of the fly. This drops the body of the fly down into the surface film of the water. It is usually most effective in medium to slow moving waters.
PMD - Pale morning dun
Pupa - In insects, the transition stage between the larva and the adult; to fly-fishers, caddis pupa are the most important of these insects.
RS2 - Rim's Semblance #2. The famous mayfly nymph pattern invented by Rim Chung.
Shuck - The shed exoskeleton left over when an insect molts into its next stage or instar. Most often it describes the last nymphal or pupal skin exited during emergence into a winged adult.).
Spent - The wing position of many aquatic insects when they fall on the water after mating. The wings of both sides lay flat on the water. The word may be used to describe insects with their wings in that position, as well as the position itself.
Spinner - The egg laying stage of the mayfly; overall not as important to the fly fisher as the dun stage. As spinners, they mate, lay eggs, and die.
Streamer - fly tied to imitate the various species of baitfish upon which game fish feed; usually tied using feathers for the wing, but can be tied with hair and/or feathers; tied in all sizes.

Terminology

Sternites - The bottom (ventral) part of a single segment on an insect's abdomen.
Stillborn - In fly fishing, a stillborn insect is one which got stuck in its nymphal or pupal shuck during emergence and floats helplessly on the surface instead of flying away. It is a specific class of cripple, although it is sometimes used interchangeably with that term.
Terrestrial - A terrestrial fly is a fly tied to imitate a ground insect that has fallen in the water or has drowned. Prime examples of terrestrial flies include the ant, beetle, cicada, cricket, and grasshopper. Terrestrials can make up more than 60% of a fish's diet at certain times of the year in late summer and early fall.
Thorax - The thorax is the middle part of an insect's body, in between the abdomen and the head, and to which the legs and wings are attached.
Wet Fly - (1) any fly fished below the surface of the water; nymphs and streamers are wet flies. (2) A traditional style of fly tied with soft, swept back hackle, and a backward sweeping wing; the forerunner of the nymph and streamer.
Wing pads - A protrusion from the thorax of an insect nymph which holds the developing wings. Black wing pads usually indicate that the nymph is nearly ready to emerge into an adult.

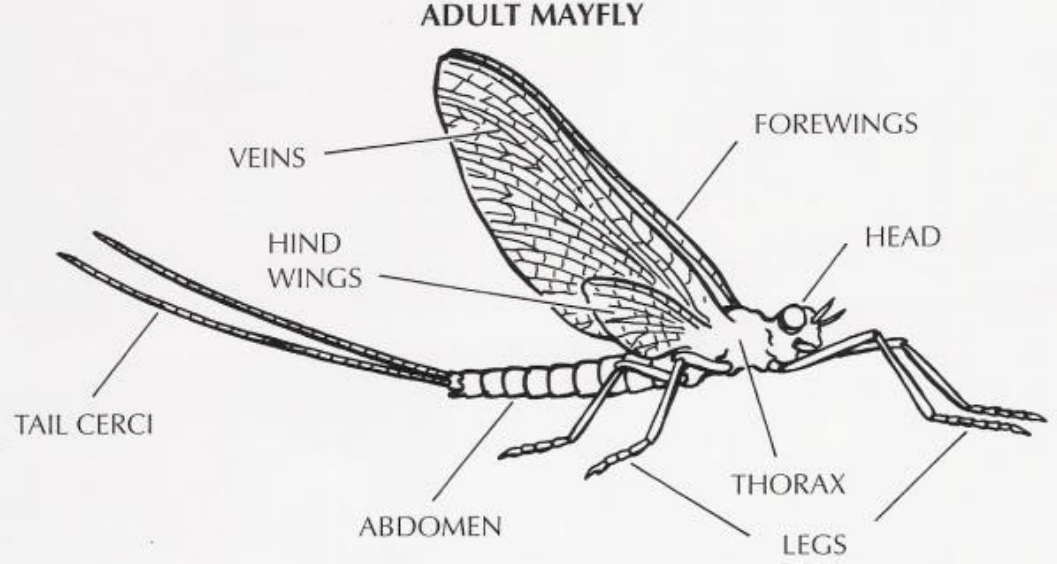
The Mayfly Food Group

commonly known as "up-winged" flies

Mayflies may be the most important insects for trout anglers to understand. They are an ancient order of insects, famous outside for their fragile beauty and short adult lifespan. Mayflies are found in fresh water around the globe occupying both lakes and rivers with species adapted to several different niches. Mayflies account for ~500 species in North America.

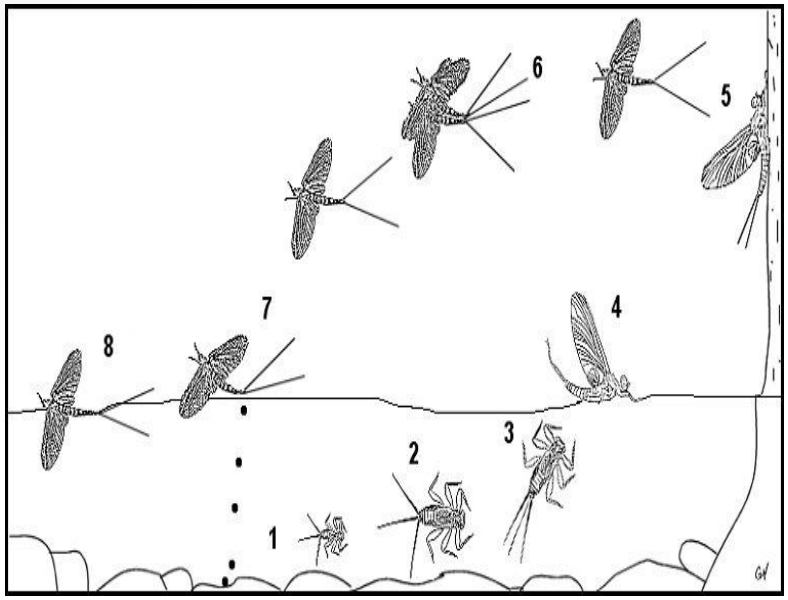
May fly

The Mayfly



Features of mayflies that distinguish the adults from the other insects include membranous wings held in a vertical plain when at rest, the front pair are large and the rear pair are much smaller (sometimes absent). The adults also have two or three long tails. The nymphs are unique in having a combination of three tails and either gill plates or forked gills that are found on the lateral and/or top surface of the abdominal segments. Of coarse, There are one or two species that prove the exceptions to the rules.

The Mayfly life cycle

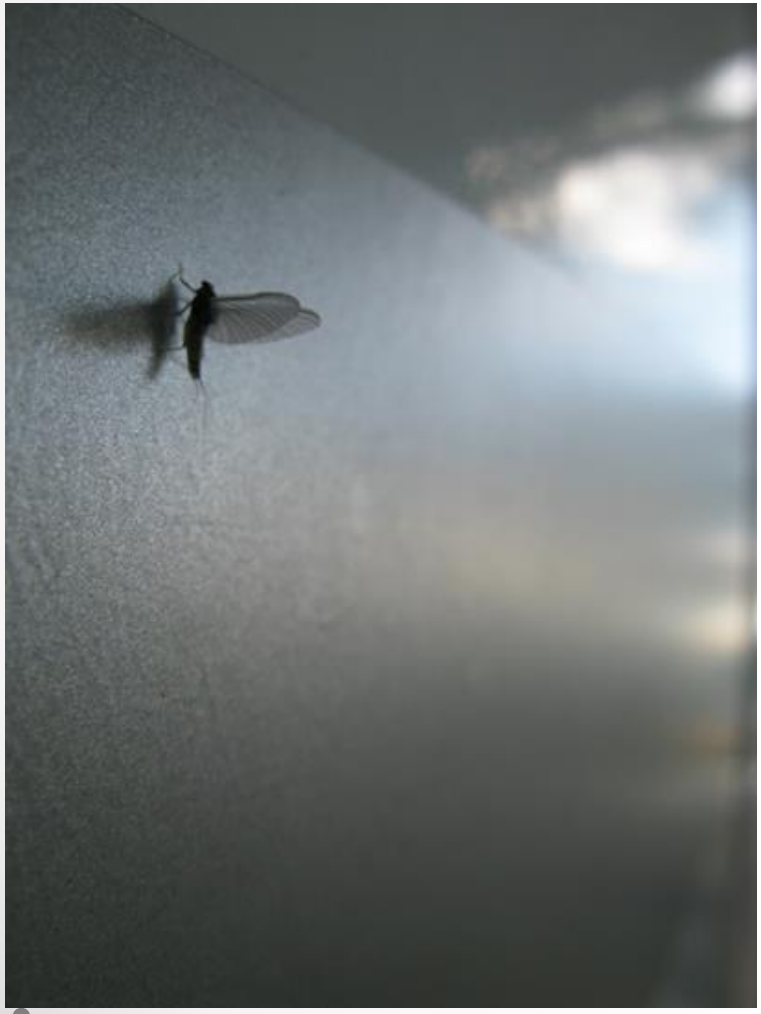


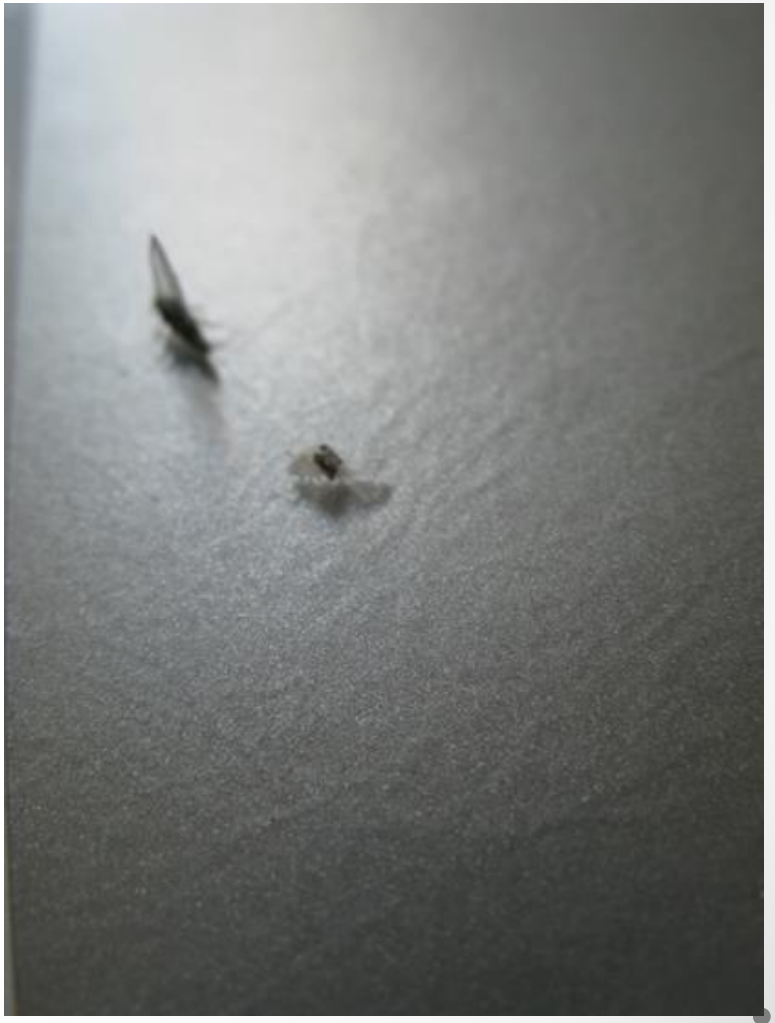
This life cycle can take up to 2 years. Step 4 to 8 only last a couple hours.

1. Egg matures into a nymph.
2. The nymph lives on the bottom growing in stages called instars until it matures.
3. The mature nymph swims to the surface (**emerger).** (Some experts say it rides to the water surface in a bubble of air.)
4. The mature nymph then changes to a fly (molts) and sits on the surface film as a 'Dun".
5. The dun then flies into the bushes, or trees along the river bank, where it sheds it's skin becoming an adult. (spinner or imago).
6. The spinner leaves the trees, or bushes to begin the mating swarm.
7. The female spinner dips her eggs on the waters surface, and they fall to the streams bottom.
8. After mating both male, and female spinners fall to the waters surface, and die.

The Mayfly life cycle

Personnel Pic of a Mayfly shedding its skin on the side of RV (Saratoga WY):
This is step 5 in previous slide





May fly

The Mayfly

Examples of Mature Mayflies are:

Blue wing olive, Blue Quill, Brown drake, Golden drake, Green Drake, March Brown, Quill Gordon, Red Quill, Slate Drake, Sulpher, Trico, Yellow Drake, etc.

The Mayfly

Examples of Mayflies fly patterns:

Some Mayfly Nymphs Examples

Anglers recognize four categories of Mayfly nymphs:

- crawlers
- burrowers
- swimmers
- clingers

Some Typical Mayfly Nymph Patterns

Copper John

Bead head Hare's ear

Overbite Baetis

Biot BWO Nymph

The Mayfly

When is the best time to fish "Mayfly" patterns?

Mayfly hatches generally happen from March through to November. Generally, emergence takes place from the morning to afternoon. Spinner falls usually take place in the evenings. Fish feed on emerging nymphs before moving onto hatching adults. They may move onto the duns and finally the spinners in the evening. This is dependent on the species of insect and prevailing conditions.

May fly

The Mayfly

What Imitations Should I Use for Mayflies: Obviously there are many versions.

Use something like a Hare's Ear or Pheasant Tail for general nymph fishing. An emerger pattern or a Klinkhamer is effective for the hatching adult. Several are made for specific hatches. Where possible avoid an overdressed fly. Quill and biot bodied patterns are effective. A clipped hackle dry fly makes an effective spinner pattern. Hackled wet flies can be effective where spinners get caught in the current.

May fly

The Mayfly

How should I fish Mayflies?

Use upstream nymph or a lifting nymph for fish taking naturals from the drift or ones swimming to the surface.

For emergers, duns and spinners employ shallow nymph or standard dry fly tactics.

Caddis Fly Food Group

There are ~12000 known kinds of Caddis flies. They are closely related to moths and butterflies. Caddis flies are relatively large aquatic insects that provide trout with an excellent source of protein. Understanding their typical life cycle and the ability to identify them from larva to adult makes them important aspects of fly fishing. Caddis, unlike mayflies undergo complete metamorphosis.

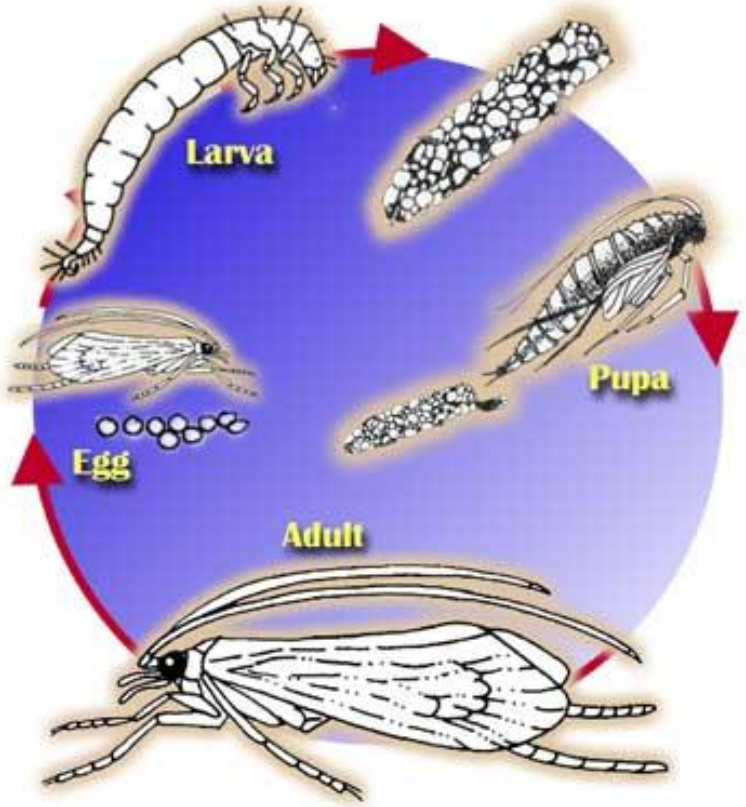
Caddis fly

The Caddis Fly

Characteristics are:

Two pairs of wings held over abdomen in triangular, "pup tent" shape. Their wings have fine hairs on edges. Their head has a long antennae.

The Caddis Fly Life Cycle



During the larval stage, caddis look like tiny, segmented worms. These wormy creatures are classified as either cased larvae or free-living larvae.

Caddis fly

The Caddis Fly

Examples of Mature Caddis flies:

Caddis fly

The Caddis Fly

Caddis are long-lived (compared to mayflies), vary in color even within the same species, and have overlapping hatch seasons.

On any day during the caddis season, trout are used to seeing adult caddis in a range of sizes and colors.

This means precise imitation is seldom necessary. "Close" is usually good enough when using caddis patterns.

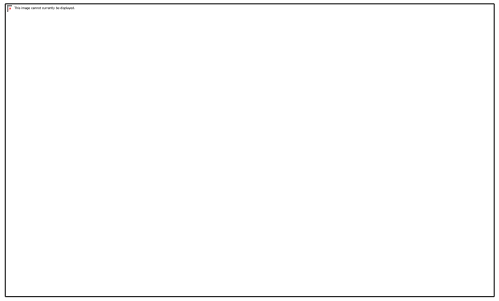
Caddis fly

The Caddis Fly

Larva Characteristics:

Caddis may or may not live in a case. Hooks are on last abdominal segment. Colors, sizes, and shapes may vary widely.

Larva in square stick case



Larva in pebble case

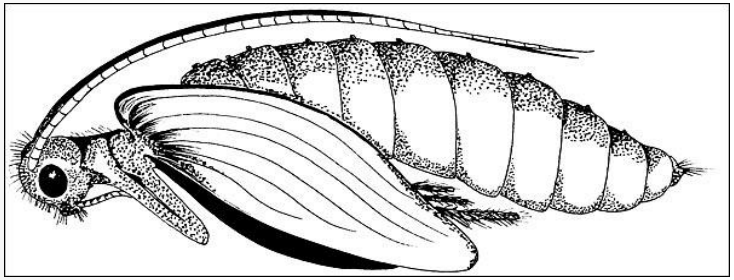
Caseless larva

Caddis fly

The Caddis Fly

Pupa Characteristics:

Two pairs of wings, not fully formed and swept along underside of abdomen. Legs not fused to body. Body usually encased in shroud. Body and shroud colors vary; body color may be different than either adult of larval forms.



Caddis fly

The Caddis Fly

When and how to fish "Caddisfly" patterns?

Caddis are most vulnerable during their pupa and emergent stages. Pupae, emerger, and cripple imitations will be the most important bugs to keep ready in your fly box. Because caddis instinctively spend very little time on the water after hatching to winged adults, caddis hatches are often disappointing to anglers looking to take trout on dry fly imitations. For the very best dry fly fishing with caddis imitations, look for females returning to the water's surface to deposit their fertilized eggs. According to experts, trout will aggressively take these sexually mature females. So when caddis females return to the water, this can mean fantastic results for well-prepared fly anglers.

The Caddis Fly

Imitations for Caddisflies:

Obviously there are many versions.

Stage	Fly Pattern
Larva	Case Caddis, Czech Mate
Emerger	Sparkle-Wing Caddis Emerger
Pupa	LaFontaine Sparkle Pupa
Adult	Elk Wing Caddis

Caddis Fly Patterns

Caseless Caddis

Elk wing Caddis

LaFontaine Sparkle Pupa

Sparkle wing emerger

The Midge Food Group

Chironomid is the scientific name for a midge

Midges are popular with anglers who fish fertile, placid spring creeks and still waters. They are tiny in size and this sometimes frustrates anglers who encounter trout feeding selectively on their frequent hatches. Their many thousand species are impossible to sort out. However, they all share similar stages and behavior.

The Midge

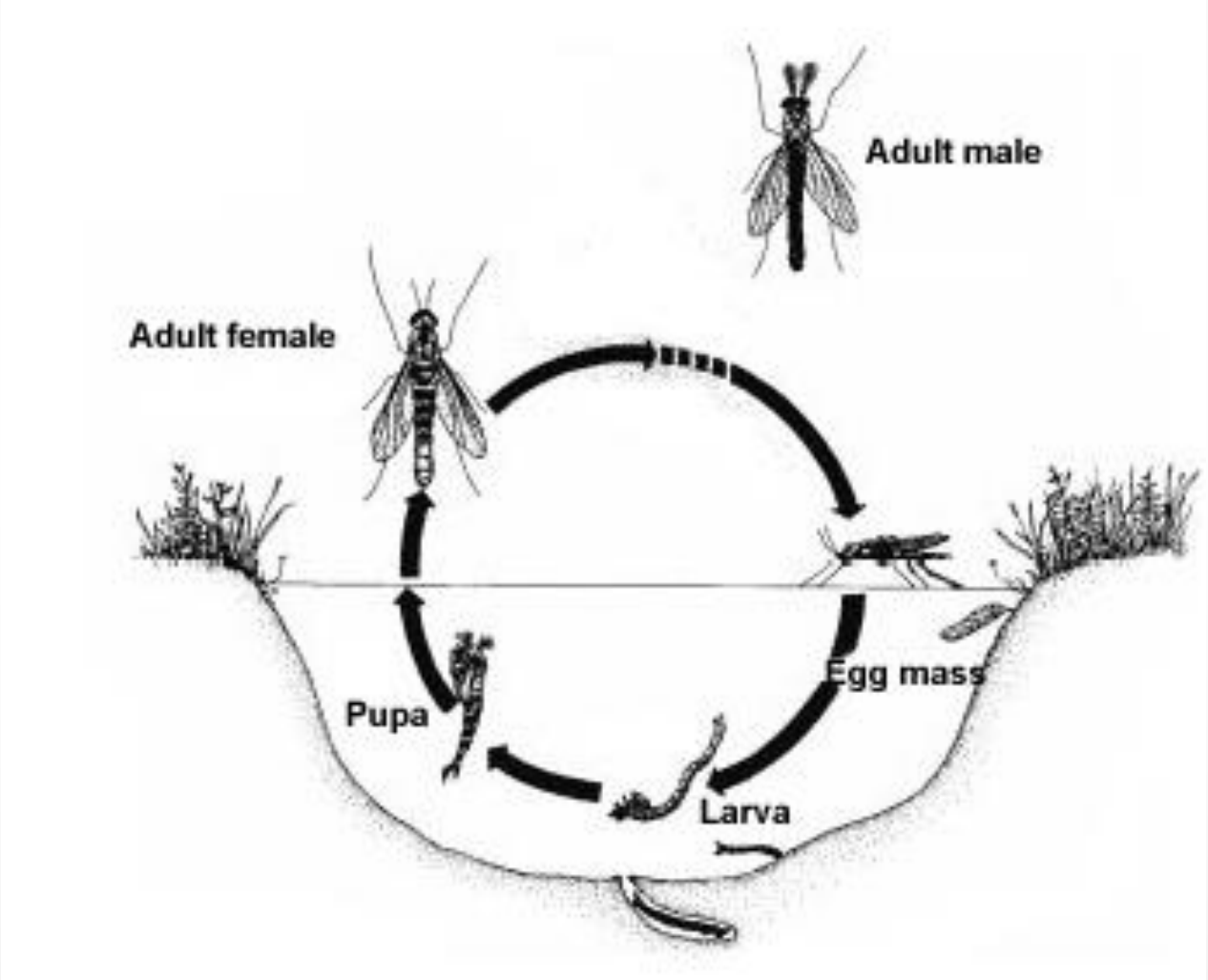
Midge Characteristics are:

They are small (1-10 mm length), delicate insects that are somewhat mosquito-like in appearance. However, they lack scales on the wings, and do not have a long proboscis …. and they do not bite.

Midges often occur in huge swarms, usually in the evening. The swarms may gather on the surface of stillwaters in clusters. (see the following slide) The larvae of midges occur in many types of aquatic habitats. The larvae of many midges are red, because hemoglobin is present in blood, and are known as bloodworms.

The Midge Life Cycle

i.e. Same as the Caddis Fly



The Midge Food Group

Examples of Mature Midge flies:

The Midge Food Group

Examples of a cluster of Midges:

The Midge

Examples of midge larvae & pupa:

The Midge

Examples of midge fly patterns:

Zebra Midge

Midge emerger

Snow Cone

Adult imitation

Griffiths Gnat- a cluster of midges

The Midge

When and how to fish "Midge" dry patterns?

It is not uncommon to see clusters of midges on the water's surface after strong hatches—especially during the winter and early spring. Experts have observed where groups of midges cling onto one another, twisting and turning on the surface. Trout feed confidently and voraciously when these clusters form.

Griffith's Gnats, Cannon's Snowshoe Midge Clusters, or Dubas's Midge Clusters are effective.

The Midge

When and how to fish "Midge" subsurface patterns?

Fishing larvae requires no sophisticated tactics. Many anglers dredge larvae patterns close to the substrate where the greatest concentrations are found. Good success is had with pale olive and red larvae imitations. Effective patterns include size Barr's Pure Midge Larvae, Mercury Midges, Mercury Blood Midges, and Snow Cone.

The Midge

When and how to fish "Midge" subsurface patterns?

Fishing pupae requires more finesse and skill than dredging larvae patterns. Concentrate your efforts in transitional zones that funnel into deeper water. Locate pods of feeding fish as opposed to targeting a single fish.

Getting your flies in the correct feeding zone can make or break your success.

The Midge

When and how to fish "Midge" subsurface patterns?

The best hatches occur during the low-light hours. Trout keying on emergers or adults are generally suspended just below the surface, not hugging the bottom. During the initial phases of the hatch, trout may eat both hanging pupae and adults.

Pupae should be fished in the surface film. Emergers should be fished half in and half out of the meniscus.

The Midge

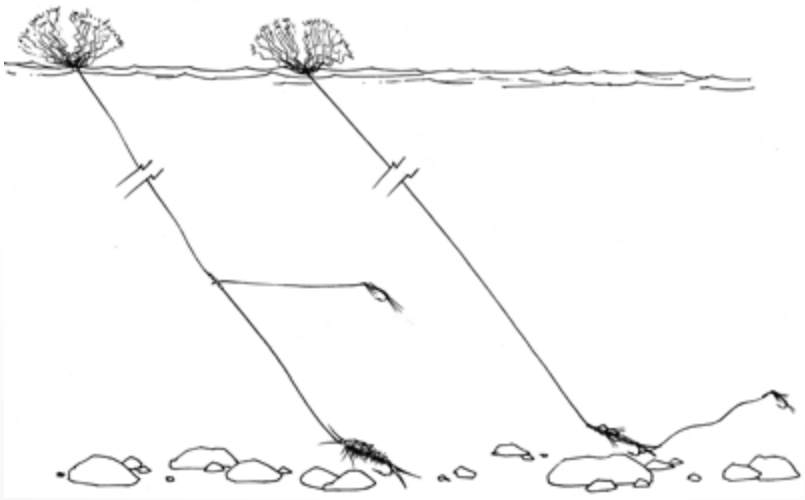
When and how to fish "Midge" subsurface patterns?

Favorite midge emergers include Morgan's Para-Midge, Cannon's Snowshoe Midge Emerger, Sprout's Midge, Tak's Emerger, and Befus's Para Emerger.

The Midge

When and how to fish "Midge" subsurface patterns?

Another midge tactic is to use multiple fly rigs and imitate 2 or more stages on one rig. i.e. larvae, pupa and emerger.



The Terrestrial Food Group







Terrestrials are defined as insects that are born, live, and reproduce on land. The only way terrestrials get to the water is by accident. (I.e. fall or get blown by the wind into the water.) Ants, hoppers, beetles, crickets, moths/inch worm and Cicada's etc.

Terrestrials

Fly Imitations for Terrestrials:

Grasshopper

Ant

Cricket

Beetle

Inch worm

Cicada pattern

Terrestrials

When is the best time to fish Terrestrial flies?

The best time to fish these patterns is from early spring all the way through the fall. Often, if your fly is the correct pattern but is too big or small it will get some looks but no strikes.

Peak hopper activity will usually occur around mid-day.

For the best results hopper patterns should be fished within a few inches of the bank.

Terrestrials

How to fish Terrestrials ?

Most ants, beetles and grasshoppers enter the water by falling from overhanging brush or from the side of the bank. Casting to the opposite bank and let the fly travel with the current. Keep enough slack line to prevent drag against the current.(i.e. dead drift) If the fly does not drift naturally and the trout may not strike your fly. With Grasshoppers, often the technique used is to actually overshoot the far end of the bank and pull the fly back to the water's edge. If there is no immediate strike, often a couple of twitches on your fly line will generate some action.

Terrestrials

10 tips for Terrestrials?

1: Get on the water early. Beetle Patterns work really well at first light, when hoppers can still be inactive and the low light.

2: Don't immediately cast to a trout you just saw rise. Waiting 10-15 seconds before presenting your fly will allow the feeding fish to get back into its feeding station.

3: Make sure you present your fly far enough upstream of a rising fish. Trout often drift back with the current to take food on the surface.

4: Take your time, waiting 45 seconds or longer in-between presentations to a rising fish. Continuously casting to a rising fish will often spook or put the fish down.

5: Don't stick with the same pattern if you're getting refusals. Change out the size or type of your terrestrial pattern.

6: Flat slow moving water, or fishing locations that have smart educated fish, lengthen your leader to 10-12 feet.

Terrestrials

10 tips for Terrestrials?

7: Don't give up on your drift too early, keep your fly in the target water and you may end up convincing that big trout your fly is the real deal. Sometimes trout will follow your terrestrial downstream several feet before deciding to eat it. Backwater eddies are also perfect places for letting your fly float for long periods.

8: Try slapping your terrestrials down on the water above a riser if a subtle presentation doesn't get the job done. This often triggers trout to feed during the terrestrial season, because it simulates terrestrials falling off trees and the banks.

9: If you have a fish turn off of your fly at the last second, try twitching your fly, and sometimes the fish will turn a 180 and eat your fly.

10: If all these tips fail to get a rising fish to eat, try tying on a short dropper and sinking a tiny ant or beetle off the back of your dry. Sometimes trout will take drown terrestrials with total abandonment. If that doesn't work, move on to another spot and come back later.

Water Creature Food Group

Not really flies, but fish love to eat them, so we study them.

This group food source is defined as water creatures. They are small fish, or crustaceans that are born in the water and stay in the water. (I.e. they don't morph into flies and leave the water and return again like flies do.)

Examples are: Leeches, aquatic worms, scuds (fresh water shrimp), crawdads, minnows, water boatman, sculpins, etc.). Each creature's life cycle may be different.

Water Creatures Examples

Leeches

aquatic worms

Scuds

Crawdads

Aquatic snails

Sculpins

The most important of water creatures for the White Mountains is: leeches, aquatic snails, scuds, and crawdads.

Water Creatures Examples

Fly Patterns For water creatures

Leeches

Aquatic Worm

Scud pattern

Crawfish

Snail pattern

Sow bug

Water Creatures

How to fish Water Creatures

The most effective way to fish “water Creatures” is to use sinking lines and fish them on the bottom or near it. Fishing off the middle is effective with an un-weighted scud or leech imitation. Simply retrieve it a bit and let is drop down, then retrieve again. The imitation of up and down motion swimming drives can induce a strike. Also fish near weed banks.

Other Category

- Stoneflys
- Damsel fly
- Salmon fly
- Etc.

Other Category

Stonefly

S**toneflies** vary in size from very small to gigantic. Habitat can vary widely. Stoneflies hatch out of the water, not in the water like most other aquatic insects. Most all stoneflies crawl to the shoreline, rocks or other objects that are protruding out of the water to hatch. It is during this migration that they are most available the trout to eat.

Nymph Characteristics: Two claws at the end of each leg. Two sets of wing pads. Two short, heavy tails. Two antenae. They look "armor plated."

Other Category

Stonefly

Examples of stoneflies: Little Yellows and Little Greens, Little (Tiny) Black, Golden Stones, Medium Browns and Yellows, Yellow Sally.

Adult stage

Nymph stage

Stoneflies –

Steve's personal example from the Flathead River in Montana – Near Glacier NP

Other

Other Category

Stonefly patterns

Adult

Nymph

Other Category

Damselfly

Damselflies are closely related to dragonflies and have a similar life-cycle.(Incomplete metamorphosis). damselflies are more numerous, and both nymphs and adults are eaten by fish.

Nymphs are usually found near the weedy margins of stillwaters or very slow portions of rivers. Through worm-like wiggling, they can swim slowly, but usually they cling to weed stems and ambush their prey. At this stage of their life they are sometimes taken by trout, and a damselfly nymph imitation is effective in the weeks leading up to the hatch. **Lots of Damselflies at Christmas Tree, AZ**

Other Category

Salmon fly- actually a huge form of stone fly.

The adults are large (up to 2 inches), and the abdomen, leg joints, and several thorax joints are a bright orange color (see below). Two pairs of large wings, kept flat against the body when at rest, are nearly as long as the body. They are found across western North America; from British Columbia to California. No so much in AZ. Some fly fishers go all the way to Montana just to fish the famous Montana "Salmon fly hatch).

Other Category

Stonefly, Damselfly, and Salmonfly

How to fish them

When mature, damselfly nymphs migrate in large numbers to above-water objects, travelling mostly in the top inch or two of water. This has been known to cause feeding frenzies. Since the adults hatch out of the water, nymph patterns are more useful than dry flies. Migration season--July on many stillwaters--can be the most productive time to fish a damselfly nymph.

Chart of Some Arizona Hatches & Streams

References From:

Arizona Trout Streams and Their Hatches . . . . . .*Charles Meck & John Rohmer*

Flyfishers Guide to Arizona . . . . . *Will Jordan*

River or Stream	Insect	Fly Imitation
East Fork (Black)	Grannom	Caddis
West Fork (Black)	Little Blue Wing Olive	Mayfly
Little Colorado	Little Blue Wing Olive	Mayfly
Little Colorado, West fork	Black fly	Beetle
Little Colorado, East fork	Midge	Midge
Oak Creek	Trico	Mayfly
Upper Verde	Little Blue Wing Olive	Mayfly
West Clear Creek	Little Blue Wing Olive	Mayfly
Canyon Creek	Little Blue Wing Olive	Mayfly
Tonto Creek	Black fly	Beetle
Blue River	Aquatic Beetle	Beetle

Other

Some Favorite Arizona Lake Flies

References From:

Flyfishers Guide to Arizona . . . . . ***Will Jordan***

Flies of the Southwest for Lakes an d Streams . . . . . ***Mike Yeager***

Black Wooley Bugger
Montana Nymph – also know as Bill's (Langdon) fly when tied with red tail & brown body
KP Bugger
Yeager Bugger
Arizona Peacock Lady
Renegade
Simi seal leech patterns
Ants & beetles

Black Wooley Bugger

KP Bugger

Renegade

Montana Nymph

Other

Other Internet Sources of Information on Entomology

- http://www.flycraftangling.com/index.asp?p=116
- http://www.flyfishingnc.com/fly-bugs/entomology
- http://www.flyline.com/entomology/entomology_1
- http://www.waterbugkey.vcsu.edu/orderlist.htm
- http://bugguide.net/node/view/15740

Get out on the water,
pick a fly,
catch some fish,
have some fun!