



## Mayfly

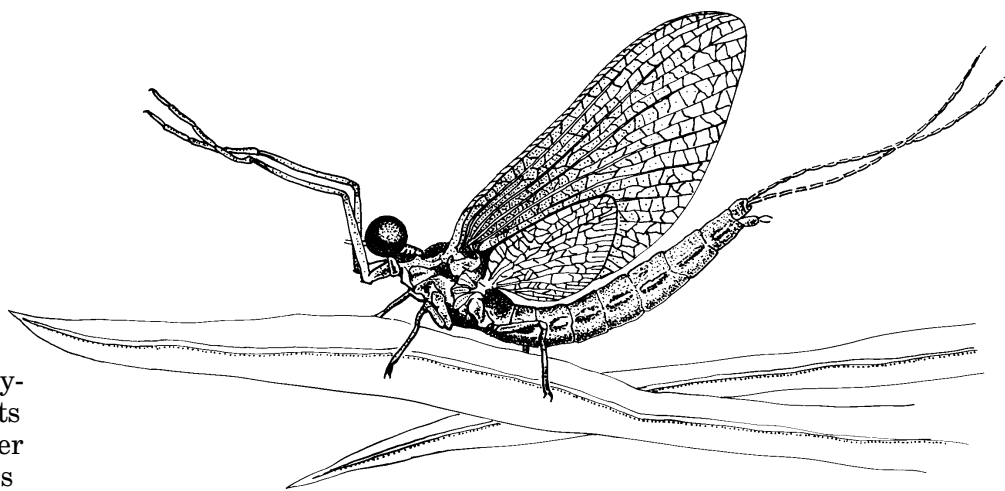
*Hexagenia sp.*

Within the class Insecta, mayflies are a group of aquatic insects that make up the scientific order Ephemeroptera. “Ephemeros” is a Greek term meaning “short lived,” and it refers to the adult stage of this aquatic insect that most often lasts only 24 hours, though in some species, the adult stage may last several days. All the rest of this insect’s life cycle is spent in the water as an immature nymph.

Approximately 600 species of mayflies are found in North America and approximately 200 of these, including the mayflies within the genus *Hexagenia* species, are found in North and South Carolina. The many mayfly species and the total number of individuals present in the water—particularly colder, less-polluted streams—are often far more numerous compared to other types of aquatic insects such as stoneflies or caddisflies.

### History and Status

Because of their association with the soft sediments of streams and rivers, burrowing mayflies such as *Hexagenia* are good indicators of water quality. Water quality biologists with the N. C. Division of Environmental Management have noted that burrowing mayflies are found primarily in waters where water quality is rated as excellent, good or good/fair, but not as often in waters with fair or poor water quality. Improperly treated sewage will deplete the water of dissolved oxygen and eliminate populations of burrowing mayflies.



Other types of water pollution such as toxic waste will also reduce the numbers of burrowing mayflies. In polluted waters, mayflies are replaced by aquatic insects such as aquatic worms and midges that are more tolerant of pollution.

### Description

The various *Hexagenia* species of mayflies are among the more common burrowing types, and since all mayflies are insects, they have six legs. Also, like all insects, mayflies have a head, a thorax and an abdomen. Body shape and form are adaptations that mayflies have evolved to survive on stream bottoms. For example, many mayflies are flattened so that when they cling closely to rocks, swift currents will not wash them off. Others, like *Hexagenia*, are adapted to burrow, and these have more rounded bodies. *Hexagenia* mayflies are slender and only slightly flattened, and can measure almost 1 ½ inches long when fully mature. These and other burrowing mayflies are distinguished by large filamentous gills along the abdomen.

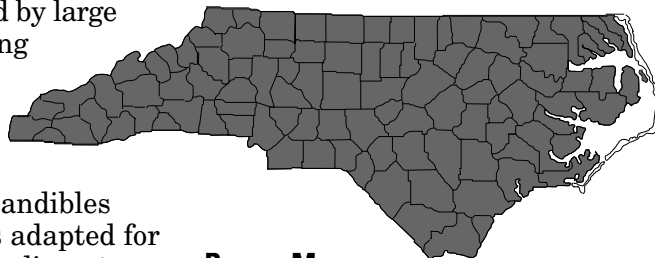
Immature *Hexagenia*, called nymphs, have narrow heads, tusked mandibles and strong front legs adapted for burrowing into soft sediments, a body shape and function that has

been compared to a modern backhoe. The nymphs are very shy creatures that avoid light and dig furiously to escape into the sediment when collected.

### Habitat and Habits

The life cycle of all mayflies, including burrowing mayflies, is comprised of several stages: egg, nymph, subimago, and an imago or adult. Almost the entire life stage of any aquatic insect is spent as the immature nymph living on the bottoms of streams, rivers and lakes. Burrowing mayflies construct tube-shaped burrows that face upstream into the current. The mayfly beats its filamentous gills rhythmically from front to rear so as to create a current that circulates food through the burrow. These nymphs are particle feeders. The mayflies can also adjust the rhythm of their gill beats to compensate for low dissolved oxygen in the water. The burrows also serve as refuges from predators such as fish.

As the nymph grows, it sheds

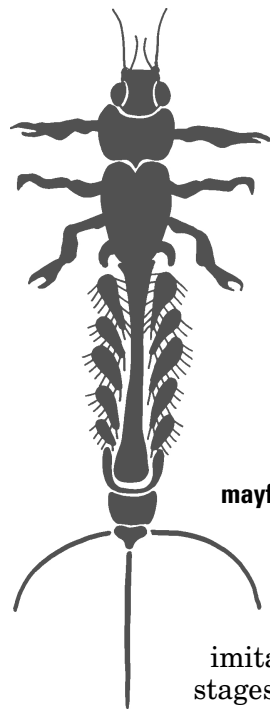


#### Range Map:

Found statewide

**WILD  
Facts**

its elastic exoskeleton several times in a process known as molting. During the final molt as a nymph, the exoskeleton splits down the back and a winged version, the subimago (also called dun), then emerges underwater and swims to the surface to fly away. More often, the nymph swims to the surface and the winged subimago hatches on the surface and drifts along drying its wings until it flies into nearby trees. The subimago tends to hatch during the day, sometimes in vast numbers that attract feeding fish. Unlike all other aquatic insects, mayflies molt once again—usually overnight in trees adjacent to the stream—into the imago or adult (also called spinner) stage. Then, most often about dusk, swarms of male mayflies in the imago (spinner) stage can be seen rhythmically flying up and down over a stream or river to attract a mate, while female mayflies will dart through the swarm. Once mating has been completed, the female soon deposits her eggs in the water. Adult mayflies are unable to feed, and once egg laying is complete, both the male and female mayflies die and fall to the water where many are eaten by fish.



mayfly nymph

create close imitations of these stages using feathers, fur and other materials to tie artificial flies on small hooks. These artificial flies are often quite handsome and artistic, and are used to catch fish, most often during hatches.

**Range and Distribution**

Mayflies of the genus *Hexagenia* are widely distributed throughout most of the United States and are common in relatively unpolluted freshwater rivers in North Carolina. Both one- and two-year life cycles have been reported, with temperature apparently the major factor. In northern rivers two years are required, but only one year is required to complete the life cycle in southern waters.

**People Interactions**

Fly fishermen have learned to recognize the various stages of many mayflies, including the nymph, subimago (dun), and the imago (spinner). Fishermen often

**MAYFLY**

*Hexagenia*

**Classification**

Class: Insecta

Order: Ephemeroptera

**Average Size**

Mature nymph: 1 to 1 ½ inches

Adult: 1 ½ inches

**Food**

Nymphs feed on benthic algae, protozoans, bacteria and organic detritus found in the sediment of rivers, lakes, and ponds. The adult does not feed.

**Breeding**

After the subimagos or duns undergo metamorphosis into the imago or spinner, swarms of male mayflies gather to breed in late afternoon, while female mayflies will dart through the swarm. The female soon deposits her eggs in the water and shortly thereafter both the females and males die.

**Young**

Immature mayflies are called nymphs and are found on the substrates of streams, rivers and lakes. As the nymph grows, it sheds its elastic exoskeleton by molting.

**Life Expectancy**

Both one- and two-year life cycles have been reported. In rivers in the northern U.S. two years are required, but only one year is required to complete the life cycle in warmer southern waters.

**References**

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 Schwiebert, Ernest. *Nymphs: A Complete Guide to Naturals and Imitations*. (Crown Publishers, N.Y. 1973).

**Credits**

Written by David Penrose.  
 Illustrated by J.T. Newman.  
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