The moment of the rise—of unique fascination to the angler/entomologist. Photos by Carl Richards.

Here is the article we—and probably many others—wish we had read in our first fly-fishing days astream. It puts the joy back in trouting. Better late than never!

The Practical Entomologist

CARL RICHARDS

WHY STUDY ENTOMOLOGY? Must we become Latin scholars in order to become accomplished dry-fly fishers? Is it really that important?

The answer to the latter is an emphatic yes, it is very important! The study of entomology will help us catch more and larger fish than otherwise would be possible. Just a basic knowledge of the hatching and egg-laying activities of trout-stream insects will allow us to select the artificial that closely resembles the naturals on which fish are feeding at any given time and to fish that artificial in an enticing, realistic manner. How deeply one delves into the discipline is, of course, a personal choice. Some will become engrossed in the study for its own sake, since entomology can be almost as interesting as fly-fishing itself. Others will desire only the basics, which will at least allow them to choose the right fly at the right time and to become more successful fish-catchers. A certain minimum knowledge, however, is essential to fish the hatches successfully and that, I feel, is what dry-fly fishing is really all about—fishing the hatch. The study need not be too involved, but certain elementary facts must be learned and committed to memory or one will be helpless when trout are feeding selectively.

In my travels around the country I find that many anglers, and even some veterans, know little about basic trout-stream insects. This limits their fish-taking ability drastically. To me, the study of aquatic entomology is at least half the fun of fly-fishing. I admit it is not necessary for an angler to be able to differentiate between a male *Siphlonurus occidentalis* subimago and a female *Siphlonurus quebecensis* imago to be successful, but he should at least know the difference between a mayfly and a stonefly. He should also know the difference between a mayfly dun and a mayfly spinner, be able to recognize what is on the water at a given time, and select an appropriate imitation that will fool some fish. So, though you don't need to become a Latin scholar, you do need to become a practical entomologist.

Let me illustrate how helpful a little familiarity with the hatches can be. About a month ago I was fishing Michigan's incredibly rich Au Sable on a warm June evening. It was about an hour before dusk, a small

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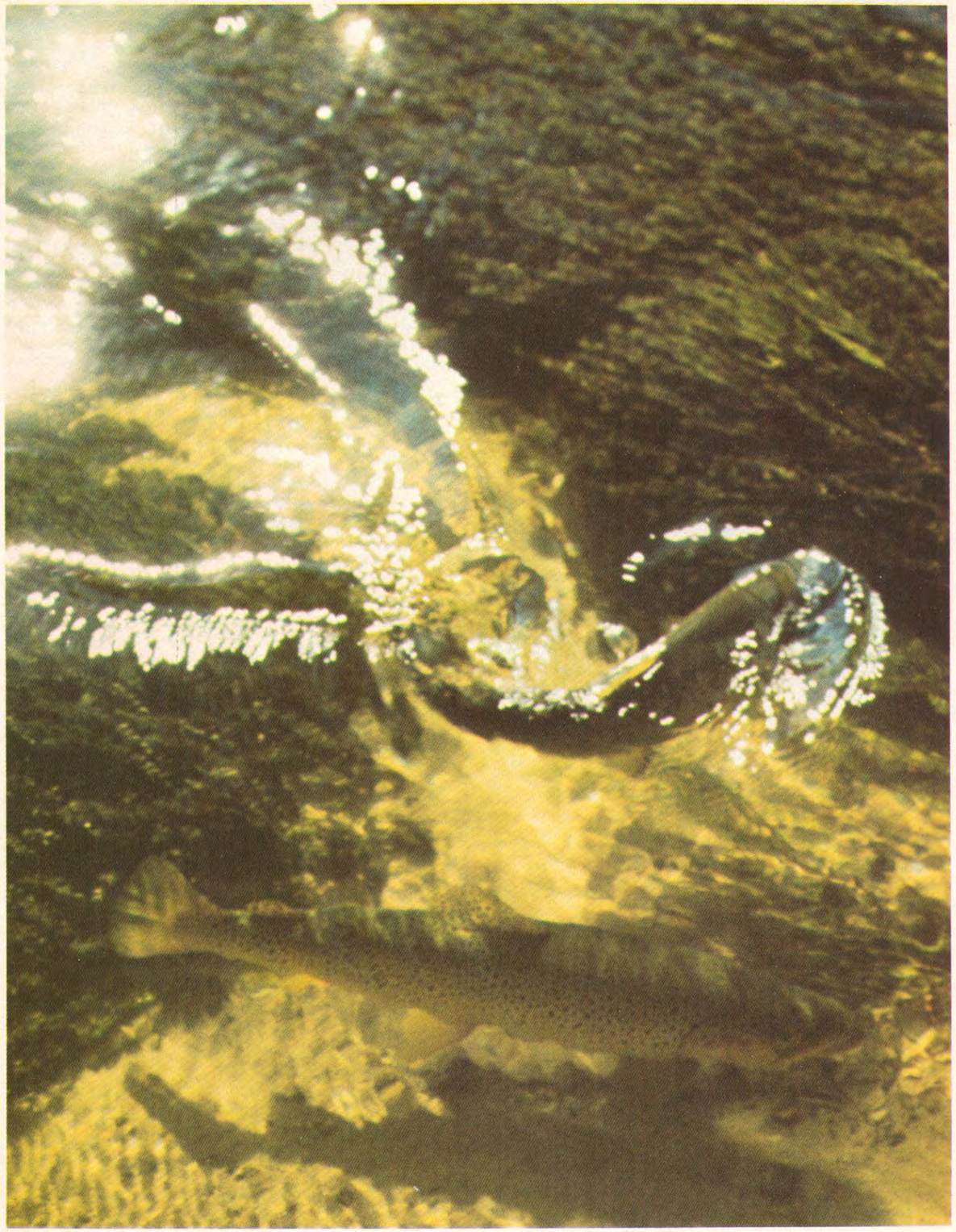
CARL RICHARDS became a recognized authority on imitating and fishing the hatches following the publication of *Selective Trout* in 1971, which he co-authored with Doug Swisher. This article will subsequently appear as his contribution to the anthology *The Masters on the Dry Fly*, edited by J. Michael Migel, and to be published by J. B. Lippincott Co. this fall.



These photographs illustrate the stages of the life cycle of the mayfly that are of most importance to the fly fisherman. Above: the subaquatic stage, or nymph.

Directly above: the adult stage, or the dun. Below: the spinner. Note the tanslucent quality of the spinner's wings when compared to those of the dun.

caddis hatch was in progress, and the fish were taking a size 18 Henryville Special with splashy enthusiasm. I noticed a young fellow downstream who appeared to be casting fairly well but was not hooking any fish. As I waded closer to his position, he asked what the fish were taking and I told him. He was obviously a beginner and had no notion of the correct fly to use to imitate a caddis hatch, so I presented him with a Henryville Special. I explained that a little later on the hatch would switch to a small, yellow stonefly, and then, just at dark, a size 16 Pale Evening Dun would appear. I picked out two suitable patterns from his fly box and proceeded on my way. After dark, as I waded back to the car, I encountered the young angler, who made up in enthusiasm what he lacked in experience. He was astounded that I was able to predict which insects would hatch and what patterns would take fish at such a precise time. He had been camped in the area for three days and until then had been unable to hook even one fish. He had been casting over hundreds of risers for three evenings without taking any of them.

It was easy for me because I had been there before. However, if he had only known the difference between an adult caddis, an adult stonefly, and a mayfly spinner, he could have easily captured a specimen, matched the size and color with the correct type fly, and he would have been catching fish from the first day. That is what I am going to explain here: how to recognize the basic orders of aquatic insects, how to capture one when fish are feeding during a hatch, and how to pick an imitation that is the correct size, color and shape.

Certain basic types of aquatic insects make up the major portion of the trout's diet. The four main insect orders that emerge from our trout streams and lakes (listed in degree of their importance) are: mayflies *(Ephemeroptera)*, caddisflies *(Trichoptera)*, midges *(Diptera)*, and stoneflies *(Plecoptera)*.

All four orders belong to the class *Insecta*. The practical entomologist should understand basic biological classification. All living things are classified as plant or animal. All members of the plant or animal kingdom are classified under categories that progress from the general to the specific. An example would be the famous Brown Drake, found in both the East and the West:

Kingdom:	Animal
Subkingdom:	Invertebrate (all animals without backbones)
Phylum:	*Arthropoda* (all animals with bilateral symmetry, external skeletons, and jointed legs)
Class:	*Insecta* (all true insects)
Order:	*Ephemeroptera* (all mayflies)
Family:	*Ephemeridae* (all true burrowing mayflies)
Genus:	*Ephemera* (a group of related burrowing mayflies)
Species:	*simulans* (a particular kind of burrowing mayfly; members of this group can interbreed)

To be an effective hatch-matcher you must at least be able to differentiate between adult mayflies, caddisflies, midges, stoneflies, and all the immature stages of each of these orders, and do so rather quickly. Many hatches and most spinner falls do not last very long. You do not have time to try four or five patterns on a trial-and-error basis. Rather, you should be able to choose the right fly at the right time, only then can you be suitably equipped to hook your share of fish on the dry fly.

Mayflies

THE MAYFLY *(Ephemeroptera)* is the single most important order of trout-stream insect. All mayflies have two large, upright wings, two or three tails, and most have two very small hind wings. They look like little sailboats floating in the current and are the only trout-stream insects with upright wings. The life cycle is: egg, nymph, dun (subimago), spinner (imago).

The Nymph. The eggs hatch into an underwater form called a nymph, which usually lasts about a year but may last two months to two years or more, depending on the species. They range in size from 3 to 36 mm. or more and have three tails (rarely two) and gills emanating from the sides of the middle segments of the abdomen. The nymphs grow from a very small size through progressively larger stages, each stage accompanied by a molt and each called an instar. They vary greatly in shape, depending on the ecosystem they have become adapted to, such as fast or slow water. Most are dirty tan to brown in color with a lighter underside, but they can vary from cream to olive to black.

The Emergence. When the nymph is fully grown it swims to the surface and changes into a winged fly called a dun (subimago) by splitting its nymphal skin and emerging from it. The dun rests on the surface, drying its wings, and then flies away to nearby trees or meadows. This entire procedure is called the hatch. At this time the nymphs and the duns are extremely vulnerable. Before and during the hatch a standard fur-bodied type of mayfly nymph of the correct size and color is a good imitation. During the hatch a mayfly-dun imitation such as a Sidewinder No-Hackle Dun is my personal choice.

A standard hackle pattern can be fairly effective if tied sparsely, that is, with the hackle very short (one half the length of the body) and two or three turns only, although it presents an inferior outline. The fur body is what really floats both the No-Hackle Dun and the sparse standard pattern. I always use fine-wire hooks, which are a great help in flotation.

One of the most deadly patterns of all during an emergence is the floating nymph. A few years ago I purchased a stomach pump so I could see what the fish were eating without damaging them. I learned, to my great surprise, how ignorant I was about how trout feed during a rise. During my first sessions with the pump, I selected a good fish which was feeding regularly on the surface and which I believed to be taking only duns. On examining the stomach contents I found these trout invariably took two or three nymphs for each floating dun. It was not nymphs at the beginning of the hatch and duns toward the end, as we had all been taught. It is my belief trout prefer the floating nymphs because they have more time to capture the nymph. The dun, after all, can fly away at any time but the nymph cannot.

The Spinner Fall. After the dun has dried its wings and flown to the trees, it rests for a period of a few hours to a few days and then undergoes a final molt into a spinner (imago). *Ephemeroptera* is the only one of the four important orders that undergoes a molt after attaining the winged stage. The dun is a drab insect with dull, opaque wings, and tails approximately equal in length to the body. The spinner is, by contrast, bright and shiny, with long tails (twice as long as the body) and clear transparent wings. The spinners return to the river, mate in a swarm (usually over riffles), and fall spent into the stream after egg-laying. At this time (the spinner fall), the correct imitation is a one-half-spent or full-spent mayfly spinner imitation. My personal choice is a Hen Spinner in the correct size and shape.

Spinner falls occur more often in the evening or at dark, but can also happen during the morning hours, depending again upon the species and, of course, the weather. There are approximately 120 *Ephemeroptera* species of major importance to the fly fisherman in the United States and, with a little observation, you will quickly become familiar with the important ones in your area. Usually one stream or geographic area has only about ten to fifteen species that are of great interest to the average fly fisher.

As a general rule, early-season mayflies (March-May) tend to be dark in color: dark gray wings and dark brown or olive bodies. Later, as the lighter yellows and greens appear, the prevalent insects are lighter in color, most likely to blend in with the background and escape their many predators. The wings become pale gray and the bodies yellow and pale buff or olive. Then in September and October, emerging flies are darker again. As the autumn leaves turn dark, so do the insects.

Caddisflies

CADDISFLIES ARE ALSO very important trout-stream insects, and in some locations they are even more numerous than mayflies. They can easily be distinguished by their four wings of nearly equal length which are covered with tiny hairs and, when at rest, are carried in an inverted V or tent over the back. They are usually medium to small in size (#14-24) and have no tails. There are over one thousand known species on this continent.

The life cycle of a caddis differs from the mayfly and follows this order: egg, larva, pupa, adult. The eggs are deposited in or near the water, eventually hatching into a worm which may or may not build a case, depending on the species. Two large groups of caddis larva exist. One group builds a case or house (evidently for protection and camouflage) in which the larva lives. These cases may be constructed of practically any material such as twigs, stones, and bits of leaf or bark. The other caddis are free-living, meaning they range about the bottom of the stream without cases. When matured the larva makes a cocoon (much like a caterpillar) in which it changes into a pupa. When the pupa

Two stages of the life cycle of the caddisfly with which anglers should be familiar: above, a caddis larva just before it pupates into an adult.

Directly above: a caddis adult viewed from below—note the tent-like configuration of the wings. Bottom: an adult caddis imitation.

is fully developed, it cuts its way out of the cocoon and migrates to the surface. Some species crawl out of the water to emerge, and some drift in the film until the pupal skin is broken and the adult flies away. The adult caddis are able to live much longer than mayflies, as they can absorb water. Most species mate at rest, so the females are the ones taken by trout at egg-laying time. The eggs are deposited on the water, on vegetation overhanging the water, or underwater by diving females.

During a caddis hatch three imitations are effective. Due to the drifting of the pupa in the film before emergence, a pupal imitation is often deadly. The stillborn adult, which is a pattern tied to imitate a fly stuck halfway out of the shuck, is, in my experience, the most deadly of all the patterns during an emergence. The Henryville Special is good at hatch time and during the egg-laying flight. A spent caddis is effective at the end of the fall of spent adults.

Of course, the angler must match the size and color of the artificial with the natural. As with all flies, this cannot be done by observing the natural on the wing; a specimen must be captured and examined in the hand. Adult caddisflies are jumpy and wary, thus rather difficult to capture. Often a net is required. Caddisflies are attracted to bright lights, however, and during the evening your car lights can be a good collecting spot. With so many species existing, most anglers do not bother to identify this order precisely as to species. It is enough to be aware of the five main colors — tan, gray, olive, cream, dark brown — and to have reasonable imitations in sizes from 14-20.

Midges

THESE FLIES HAVE ONLY two short wings (shorter than the body), which lie flat along the top of the body, usually slightly to the side in a V, and possess no tails. Most are small, sizes 22-28 and even smaller. The life cycle is: egg, larva, pupa, adult. At hatch time the pupa ascends to the surface where it drifts for a time; the winged insect then emerges and flies away.

During the hatch a pupa or stillborn artificial is usually effective; a hackled adult type can be used later during the emergence or at the egg-laying flight.

These flies are especially important to trout in slower-moving water such as spring creeks and limestone streams. Some lake species are fairly large. They are rarely of much importance in faster currents. This is a very large and diverse group; they can be almost any color, but black and olive are common. When trout are feeding on midges, they can be extremely selective. Exact size in the artificial is often critical. An error of a single size (20 instead of 22) can mean a discrepancy of over 30 percent, and almost always this is perceived by the critical eye of a brown trout. To be effective, close imitations are necessary!

Stoneflies

THIS RATHER SMALL ORDER of flies is of very little importance in slow waters, yet in turbulent, rocky streams, such as the Madison and the Big Hole, they provide the largest flies and the most spectacular fishing of the season. In certain Oregon streams they are the second most important trout food. Stoneflies vary in size from very large to very small (#2-20). Adults have four long wings, which are hard, shiny, heavily veined, and held flat over the back when at rest.

The life cycle is: egg, nymph, adult. The generally flatish nymphs are readily distinguished from mayfly nymphs since they have only two short tails with rather long antennae, no gills on the abdomen, and two equal wing cases. When the nymph is mature, most species (but by no means all) crawl to land and emerge. They mate at rest and return a few days to a few weeks later to lay their eggs.

The emergence is important only in those species that emerge in water, and they are best imitated by a combination latex-and-fur stonefly nymph or a down-hair-wing dry imitation. The egg-layers are well imitated by an adult stonefly artificial with a lot of hackle to simulate moving wings. Many of the medium and small stones are yellow with a few showing olive, tan, and dark brown. Usually the underside of the nymph is much lighter than the top.

Trout, of course, feed on many other food items besides the four major orders listed above. Although these other orders are normally of lesser importance, when they are numerous fish will feed on them selectively, so a few representative imitations should be carried for shrimp, beetles, spiders, moths, craneflies, grasshoppers, ants, dragonflies, damselflies and scuds. Some of the above are not aquatic but terrestrial, and some are not even insects but crustaceans.

Selecting an Artificial

NOW ASSUME WE HAVE the preceding firmly in mind, can distinguish between all the stages of all the naturals, and know what pattern types to tie on to imitate the various stages of the four major orders of aquatic insects. How do we translate this knowledge into a fishing situation? Imagine you are in the middle of a pool with fish rising all around, flies buzzing in the air and drifting on the currents. How do you select the correct imitation? That's the meat of this discussion — how to pick an artificial at the right time which will take fish when trout are rising to naturals. It can be easy if you are not rattled by the feeding fish. The first thing to do is find out what type or order of insect is on the water, and this is done by capturing one and examining it closely in the hand, preferably with an 8x or a 10x glass. If the flies are on the water, a simple tropical-fish aquarium net can be dipped onto the flow, and the current will carry the specimen into the net. If the fly is in the air, a simple net can be fixed to the tip of the fly rod and used in the fashion of a butterfly net.

Once the specimen is in the hand, the order and stage is determined (e.g., mayfly nymph, dun, or spinner). Then an artificial of the correct size, shape, coloration and type is selected from the fly box, and you should be in business quickly and logically. This whole process takes place in the heat of battle, however, and a certain

The photo above shows an imitation of an emerging adult midge.

Directly above: an adult stonefly. Note how the wings lie flat, overlapping each other. Below: several adult stonefly imitations (drys).

calm deduction is required. Most people get so excited by splashing trout that they take a wild guess as to the correct pattern and immediately begin to flail the water. They normally end up exhausted, frustrated and fishless. To be successful you must remain calm, patiently obtain a specimen, and know a mayfly has upright wings, a caddis has tent-shaped wings, a stone has flat wings over the body, and a midge has flat, V-shaped wings (flat but to the side of the body), and you must know which artificial type works when each natural is on the water. If you are thoroughly familiar with these facts, you will be light-years ahead of the majority of dry-fly anglers and much more effective!

The Multiple Hatch

I HAVE JUST DESCRIBED a simple hatch where only one or at the most two types of insects are hatching at a time. Any observant fly fisher with a little knowledge of practical entomology should be able to choose his pattern and do well at the rise or the spinner fall. A much more difficult experience will be had during a multiple hatch. At times, especially on rich streams, many different types of insects can be on the water at the same time. On the lime-rich Rogue near my home, I have seen midges, caddis, stones, craneflies, and four mayfly species, both duns and spinners, simultaneously. During a multiple hatch such as this, trout usually feed selectively on one of the types.

How do we select the right fly? This is a difficult problem even for the veteran anglers; the answer is never simple. Experience, knowledge and close observation are required. A few bits of information should be of help. First, trout will usually feed on the insect present in the greatest numbers. Quite often a small fly will be present in company with a large fly but in much greater number; the fish will feed on the smaller fly exclusively, though the inexperienced angler usually tries the larger fly first. Try to decide which natural is most numerous. If a suitable imitation does not work within five minutes, look again and try another idea. Do not keep casting uselessly with the same pattern.

Next, try to identify the riseform and relate that to a fly type. Trout will rise very quietly and deliberately to insect forms which are smaller and cannot escape, such as medium to small mayfly spinners. The larger and more escape-prone the insect, the more hurried and splashy the rise. Therefore, if you observe that size 12 Green Drake duns and size 18 Baetis spinners are both on the water, and the riseforms are quiet dimples, the obvious choice would be size 18 Hen Spinner in the correct color. Conversely, a violent riseform would indicate a size 12 Sidewinder Dun to imitate the Green Drake.

These multiple hatches can be mystifying, so don't be discouraged by a few failures. One of the most pleasing aspects of dry-fly fishing is its complexity. I, for one, would soon tire of constant success, and multiple hatches certainly ensure against that. However, the practical entomologist will have a fighting chance at a solution to the problem; the uninformed will be all but helpless. A thorough study of practical aquatic entomology will pay huge dividends at hatch time.

Further Reference

EACH OF THE FOLLOWING BOOKS provides a basic introduction to the study of trout-stream insects. Some go into greater depth than others, but all will be of help to novice and experienced angler/entomologists alike who have discovered the value of a practical approach to the insect life in our trout waters. THE EDITORS.

Selective Trout by Doug Swisher and Carl Richards. Crown Publishers, Inc., N.Y., N.Y., 1971; 184 pp., $6.95.

Already a classic work in angling literature, *Selective Trout* provides a broad and thorough introduction to the collection and identification of trout-stream insects, plus an innovative approach to their imitation.

Hatches by Al Caucci and Bob Nastasi. Comparahatch, Ltd., N.Y., N.Y., 1975; 320 pp., $15.95.

A definitive work on American mayfly hatches and their imitation, this book is comprehensive, well organized and well researched.

Matching the Hatch by Ernest Schwiebert. Macmillan Company, N.Y., N.Y., fourth printing 1968; 221 pp., $7.50.

This book is one of the finest introductions to trout-stream entomology and ecology. It identifies most of the principal American trout-stream insects and lists patterns to imitate them.

Modern Dry Fly Code by Vincent C. Marinaro. Crown Publishers, Inc., N.Y., N.Y., second edition 1970; 269 pp., $10.00.

This is the classic introduction to the imitation of aquatic and terrestrial insects, and to understanding the subtleties of the feeding behavior of trout.

New Streamside Guide by Art Flick. Crown Publishers, Inc., N.Y., N.Y., 1969; 173 pp., $4.95.

The *Streamside Guide* is the practical primer for the collection, identification and traditional imitation of Eastern trout-stream insects.

The Caddis and the Angler by Larry Solomon and Eric Leiser. Stackpole Books, Harrisburg, Pa., 1977; $13.95.

The authors introduce anglers to the entomology of caddisflies, long neglected in favor of the study of mayflies.

The Mayflies of North and Central America by George F. Edmonds, Jr., Steven L. Jensen, and Lewis Berner. University of Minnesota Press, Minneapolis, Minn., 1976; 330 pp., $28.50.

This technical reference is designed for use in a biological science library, but its authoritative completeness makes it a valuable reference for anglers.

Nymphs by Ernest Schwiebert. Winchester Press, N.Y., N.Y., 1973; 339 pp., $9.95.

Nymphs is the definitive study of the subaquatic stages of American trout-stream insects of value to the angler.