

A History
of the
Entomology of

Fly Fishing



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The history and development of entomology as a science is well understood and has been documented in many texts. Likewise, the development of the sport of fly fishing and fly tying is also well documented in the published literature. Although the timelines for major developments and “milestones” in each are remarkably similar, they seem to have been on a parallel course of development that rarely intersected. The result has been a popular international pastime created and maintained by gifted amateur/hobbyist entomologists without the insight or understanding that the discipline of entomology could contribute to the subject. This sounds like a criticism and will surely be viewed as arrogant by some—a common refrain from fly fishers is that fish do not know the species names of the food they consume. It is very clear that most fly fishers do not know the species names either, even though many are not reticent about using them. More than 15,000 artificial flies are available (Banasch 2000), each with its own name, and many are intended to mimic an aquatic insect. These, in turn, have been given multiple common names, so the discipline of fly fishing is incredibly confusing, especially for newcomers to the sport. This historical lack of rigor in identifying and naming the arthropods on which the sport is based truly confounds the already difficult concept of “matching the hatch”—a paradigm well entrenched in the fly-fishing psyche. In this article, I review the parallel development of fly fishing and aquatic entomology and discuss how the two are now becoming directly connected as more

sophisticated and knowledgeable anglers embrace advances in the systematics of aquatic insects.

Mayflies: At the Beginning of Entomology and Fly Fishing

It is well known that mayflies are some of the oldest insects, appearing in the fossil record some 300 million years ago during the Carboniferous period. It is less well known that one of the oldest written texts, *The Epic of Gilgamesh*, which describes the life of a Babylonian ruler from around 2,700 BCE (Macadam 2011), included a passage that refers to mayflies. A key in determining whether this text really refers to mayflies rests on the translation of the Arabic word *klil*. George (2003) suggests that this could mean alderflies or dragonflies, but prefers to interpret this as “mayflies” due to the ephemeral nature of the insects described in the text. A short passage in the *Epic* describes the briefness of Gilgamesh’s life: “*Ever the river has risen and brought us the flood, the mayfly floating on the water. On the face of the sun its countenance gazes, then all of a sudden nothing is there.*”

The passage is thought to refer to the brevity of the adult mayfly’s life and how our own lives are just as brief. Often in translating something as ancient as the *Epic*, words are chosen at the discretion of the translator, based on his or her own interpretation of the text. The original Sumerian or Akkadian term used in the *Epic* literally meant “water locust” (Soldán 1997). Soldán believes that this passage in the *Epic* refers to the Mesopotamian mayfly, *Mortogenesia*

mesopotamica (Ephemeroptera: Palingeniidae), and the term "water locust" would have fittingly described this insect, which appears in huge swarms in the Tigris/Euphrates river system.

There is some confusion regarding the origin of the English word "mayfly," especially when fly-fishing literature is reviewed. The first use of "mayfly" appears in the *Compleat Angler* (Walton 1676), in which Cotton states, "we have four several flies which contend for the title of the May-Fly." The British settled this many years later (at least in the U.K.) by using the term "mayfly" exclusively for the green drake (*Ephemera danica* Muller) (McDonald 1972). The name is thought to be connected to this species because it first becomes active when the "Mayflower" or hawthorn is in bloom (<http://tinyurl.com/zwtxd39>), but the true etymology is uncertain.

We now use mayfly as the common name for the order (following the example of Eaton 1883–1888), but the origin of the ordinal name can be traced to the writings of Aristotle (<http://tinyurl.com/anwrqh4>) in his *History of Animals*, 350 BCE. He called the insect "ephēmeron," which means "one day living" (Soldán 1997): "Bloodless and many-footed animals, whether furnished with wings or feet, move with more than four points of motion; as, for instance, the dayfly (ephēmeron) moves with four feet and four wings: and, I may observe in passing, this creature is exceptional not only in regard to the duration of its existence, whence it receives its name, but also because though a quadruped it has wings also..."

Aristotle has been criticized for making an incorrect observation regarding the number of legs on his dayfly (Wilkins 2008). However, both sexes of mayflies will often raise the front legs forward and above the head (Fig. 1), making it appear that only the middle and hind legs are used in locomotion. If Aristotle made a similar observation, it is understandable how he could assume that his dayfly moved on only four legs.

The first recorded artificial fly dates back to the historian Claudius Aelianus (ca. 175–ca. 235 CE) who, in his *De Animalium Natura XV1*, described an insect that Macedonians were trying to imitate by tying feathers onto hooks. Berenbaum (1995) and Valla (2009) provided more details regarding the original description of this fly (variably

spelled "Hippurus," "Hipporous," or "Ikkouron") but it remains unknown today. Reuben R. Cross, one of the fly-fishing pioneers in the eastern U.S., provided his perspective on this first artificial fly (1936): "In Macedonia 2,000 years ago the first fly-tying anglers imitated a troublesome yellow-jacket-like horse fly called Hippurus by dressing their bronze hooks with purplish wine colored yarn and tying in a pair of wax colored hackle tips as wings. There is no record of hackle being used to imitate legs. They called their creation Hippurus after the natural fly, floated it on the surface of the Astraeus River and took their trout much in the manner used by our dry fly men today."

Cios (2005) provides a complete history of those who attempted to identify the insect used as a model for the fly, and the following families and orders were considered: Diptera (Tabanidae, Hypodermatidae, Stratiomyidae, and Syrphidae) and Odonata. One author (Magee 1995) believed it to be a mayfly (Ephemeroptera), but provided little evidence. Using the original description of the fly's appearance and biology compared with the known foods of salmonids as well as the history of fly fishing in Europe, Cios concluded that Magee was correct, and he speculated that the Hippurus was a mayfly in the genus *Oligoneuriella* (Ephemeroptera: Oligoneuriidae). Thus, the very first reference to fly fishing was focused on a mayfly, and this remains one of the oldest references to mayflies and entomology in the European literature.

Solving the identity of insects used as imitations in fly fishing can shed light on the development of the sport, but can be very difficult. Almost all the early references to fly fishing clearly indicate that this sport developed in close connection with observations of insects and fish feeding on them. As the systematics of aquatic insects developed over time, names have changed as the decades (and centuries) passed. Without any voucher specimens to examine, it becomes detective work to try to determine which insects were used as models by some of the original fly fishers. This has not stopped people from trying, and there is remarkable agreement (at least at the ordinal level) going back to flies tied in England more than 500 years ago. Of course, the task is simplified with respect to mayflies, as there are only 51 known species in that country (<http://tinyurl.com/zwtxd39>).



Figure 1. *Hexagenia limbata* (Serville), (Ephemeroptera: Ephemeridae) taken at the Fall River; Fall River Mills, CA. July 3, 2010. Photo by M. P. Parrella.

As the sport of fly fishing gradually came to the eastern U.S., many of the fly patterns and common names of these flies also came across the Atlantic. The aforementioned Green Drake is a classic example. Using similar patterns and common names was a good place to start, but what was not understood at the time was the great diversity of aquatic insects and the fact that this diversity in North America dwarfed that of the U.K. There are currently 649 valid mayfly species in North America (www.entm.purdue.edu/mayfly/na-species-list.php), and there may be 29 species (or more, many with overlapping phenology) in just one riffle of one stream (<http://tinyurl.com/a7exn2j>). This diversity makes the following statement by Schweibert (1955), regarding North American fly fishing, seem exceedingly optimistic: "It will be many years before all our leading hatches, like those of the British Isles, have been classified and successfully imitated."

When fly fishing evolved in the U.S. in the Catskill Mountains of New York state (1860–1920, with strong connections to the U.K.), there began a profusion of new fly patterns and common names mixed with the old. This has resulted in a bewildering array of common names that may or may not be linked to actual insect species. This prompted Marbury (1892) (Fig. 2) to suggest that until something like Ronalds' *The Fly-Fisher's Entomology* (1836) is published in North America, the debt that is owed to English fly tiers should not be forgotten. The mix of the old with the new has been amplified with each passing decade so that today the nomenclature used in fly fishing is so vast and complex that it is almost impossible to unravel.

Until the 18th century, much of the knowledge of mayflies was obtained through the assistance of fishermen who were very observant naturalists, and as suggested, they were not shy about naming aquatic insects or the flies tied to imitate them. However, written accounts of fly fishing were virtually non-existent for more than 1,000 years after Aelianus. This changed when Juliana Berners, a prioress of the nunnery in the Benedictine convent at Sopwell, near St. Albans, England, published *A Treatise of Fysshynge wyth an Angle* (TFA) in 1496. *The Boke of St. Albans*, the first English sporting magazine book, was originally published in 1486, and Juliana Berners' TFA appeared as Chapter Four in an edition of the *Boke* published ten years later:

The Contribution of Juliana Berners

Although there have been challenges raised regarding the connection between Dame Juliana Berners and the TFA (Hills 1921), her name has been inexorably linked to it. Berners' contribution to fly fishing notwithstanding, she was one of the first women to publish in English, and *The Boke of St. Albans* was the first sporting book (and the ninth book) ever published in English (Law 2003). It turned out to be a bestseller, with more than 800 copies printed by 1530. The most significant and lasting contribution that the TFA has made to the literature and practice of fly fishing is probably in the description of 12 fly patterns that were generally spread across the year. These included a Dun Fly (May), another Dun Fly (March), The Stone Fly (April), Ruddy Fly (May), The Yellow Fly (May), The Black Leaper (May), Dun Cut (June), Maure Fly (June), Tandy Fly (June), Wasp Fly (July), Shell Fly (July) and Drake Fly (August). These flies—forever known as the



Figure 2. The Mayflies of Marbury (1832, reprinted 1976) and their imitations. 189 – Pheasant, 190 – Puffer, 191 – Parker, 192 – Professor, 193 – Blue Professor, 194 – Poor Man's Fly, 195 – Queen of the water, 196 – Quaker, 197 – Quack Doctor, 198 – Red Fox, 199 – Romeyn, 200 – Red Ant, 201 – Red Head, 202 – Red Ash, and 203 – Reuben Wood. Each of these flies (in addition to hundreds of others) is given its own detailed origin and history.

XII—are beautifully reproduced (both tied and painted) in McDonald (1972). They were tied with natural materials (dyed wool, silk thread, and feathers). Fly tiers around the time of the TFA were not only fishermen; many were avid hunters who expanded the arsenal of fly-tying materials to include fur and feathers from the game they took. This practice continues today, although there are numerous synthetics that fly tiers use in place of natural materials.

How significant Berners' contribution was to fly fishing is not in question; however, it made little (if any) contribution to the science of entomology. In McCafferty's (1981) classic text connecting aquatic entomology to fly fishing, he does not mention the TFA, even in the section where a historical perspective is provided. It is clear that many of the flies depicted in the TFA were mayflies, with the exception of the Black Leaper, the Dun Cut, and the Shell Fly, which probably imitated caddisflies (Ames 2009).

If this were a superficial piece of work with no lasting connection to fly fishing or entomological terminology, it could be dismissed as contributing only to the history and lore of the sport. This was not the case. Berners was the first to use the term "dun" (actually *doone* in middle English). Although she apparently meant this to refer to the insects' dull brownish-grey color (Law 2003), the term "dun" is widely used today in the fly-fishing literature to refer to the subimago stage of mayflies. Almost four centuries later, Ronalds (1836) used the term "dun" in

the common names of many flies, and he also identifies these dun flies as the "pseudimago" (although this was not exclusive).

On a more confounding note, Berners was the first to associate emergence of aquatic insects with a particular time of the year, an easy trap to fall into for simplicity's sake, and the common name of the order Ephemeroptera (mayflies) implies as much. Of course, this is a gross misnomer, as some of the more diverse families of mayflies (e.g., Baetidae) have species emerging every month of the year, depending on climate and geography (Hafele and Hughes, 2004). A good measure of the impact of her work would be to ask whether any of the 12 stylized fly patterns debuted by Berners more than 500 years ago survived to the present. The answer is a definitive "yes," as noted by Law (2003): "These flies were to be with the literature for hundreds of years; in fact, they are still useful patterns and their styling would be resurrected in the Swisher and Richards (1971) no-hackle revolution of the 1970s."

Markham Leads to Isaac Walton and Charles Cotton: *The Compleat Angler*

Over the next 150 years, there were a number of books on fly fishing worth noting (see McDonald 1972 and Law 2003 for a complete review), including at least 16 reprints of the *TFA*. Among these was Markham's (1614) *A Discourse of the Generall Art of Fishing, with the Angle, Or Otherwise*, a work that is considered the fifth book on angling ever written (McDonald and Webster 1957). He was the first to stress the need to make an exact copy of the natural insect when tying flies, to the degree that he recommended having the natural as a model in front of you while tying the artificial (Hills 1921).

Although Markham's work (and others) contributed to entomology and fly fishing after the *TFA*, the 1653 publication of Isaac Walton's *The Compleat Angler* altered the landscape. This is one of the most widely circulated books ever printed, second only to the Bible (Law 2003). Fly fishing per se occupies only a little of the early editions of this book, and as noted by Law (2003), "Isaac Walton was an incorrigible bait fisherman." Nonetheless, Walton did parrot the XII flies from the *TFA* and was the first to use the term "artificial fly." This was used as a general term to mean any flying insect, but by the 19th century, when it was usually shortened to just "fly," it could refer to almost any conceivable trout food (leeches, crustaceans, spiders, etc.).

When Charles Cotton was invited to contribute to the fifth edition of *The Compleat Angler* in 1676, he expanded the fly-fishing focus of this publication in a major way and brought the list of important flies up to 65. Because of his contribution, Charles Cotton is generally considered the father of modern fly fishing. He was the first to correlate aquatic insect biology and fly fishing (McCafferty 1981), and also expanded on the convention (started by Berners) of having a different fly for every month of the year. The *Compleat Angler* remains popular today and is still in print, having undergone more than 400 editions and reprints (Fig. 3).

Hills (1921) noted that when fly tying began in earnest, there were three distinct principles, or categories of imitation. These were the "Fancy Flies" that imitated fly life generally, and were a fair copy of an insect but could not be connected with any particular genus, species, or group. Then

came the general flies that imitated a genus or a group, but not an individual, and the final category (and ultimate fly-tying achievement) is an actual copy of the individual species that trout are taking. These broad categories of imitation are generally used today (Whitlock 1982; Whillock 2006). Proper (1982) has some fun with this and presents a table comparing flies that appeal to trout vs. flies that appeal to fishermen. It follows that the more the goal was to tie an exact imitation, the more closely connected the model was to the mimic, and the more seriously the common name was taken. (It would be several hundred years before species names came into the picture.) It turns out that Cotton himself was a believer of exact imitation, and many of Cotton's flies have common names that are directly connected to the model. As stated by Hills (1921): "In fact, actual imitation of the living insect was just as much a commonplace in the seventeenth century as it is now in the twentieth."

Although there were a number of publications that connected entomology and fly fishing in the 200 years after Cotton's contribution to *The Compleat Angler*, many authors tied flies to imitate naturals, but they had no idea of the identity of the natural fly. There was little science behind their observations, but they could scarcely be faulted, as this reflected the entomological knowledge base



FLY-FISHING ON THE DOVE IN WALTON AND COTTON'S TIME

Figure 3. Fly fishing during the time of Isaac Walton and Charles Cotton (late 1600s; from the *Compleat Angler* 1915 reprint).

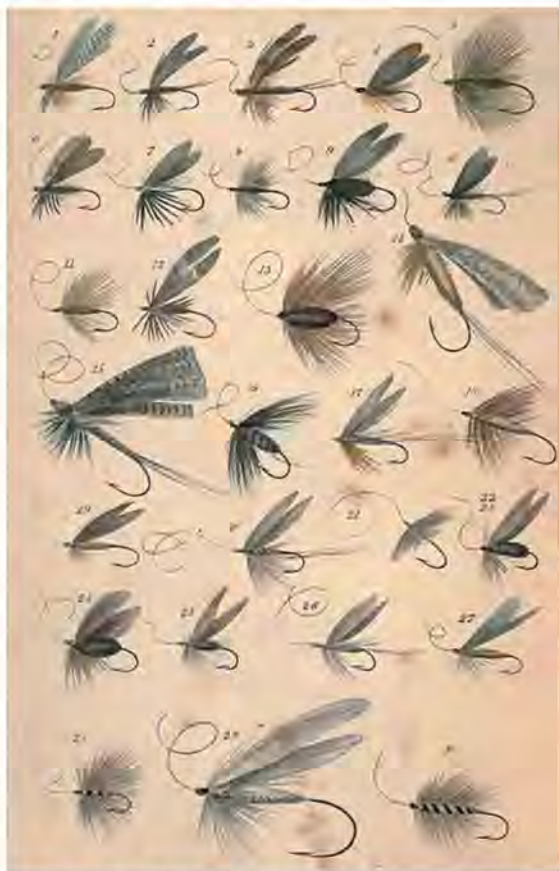


Figure 4. The 30 most important flies as deemed by Bowlker (1746): 1. Red fly; 2. Blue Dun; 3. March Brown; 4. Cowdung Fly; 5. Stone Fly; 6. Granam or Green Tail; 7. Spider Fly; 8. Black Gnat; 9. Black Caterpillar; 10. Little Iron Blue; 11. Yellow Sally; 12. Canon or Down Hill Fly; 13. Shorn Fly or Marlow Buzz; 14. Yellow May Fly or Cadow; 15. Grey Drake; 16. Ori Fly; 17. Sky Blue; 18. Caddis Fly; 19. Fern Fly; 20. Red Spinner; 21. Blue Gnat; 22 & 23. Large Red and Black Ants; 24. Hazel Fly or Welshmans' Button; 25. Little Red and Black Ants; 26. Whirling Blue; 27. Little Pale Blue; 28. Willow Fly; 29. White Moth; and 30. Red Palmer.

at the time. With the exception of the Odonata, general entomology had been sadly neglected and little effort had been expended on classification (Herd 2011).

Although the stylized flies tied by Berners are similar to the ones available today, the names that she gave these flies are no longer with us. Walton and Cotton swallowed these names whole (Hills 1921), and this list was expanded and added to by subsequent authors over the ensuing years. approximately three-quarters of a century later, Bowlker (1746) was the first to set this straight, rejecting many of Berners' and Cotton's flies. Berners' flies were rejected because "their original derivation had long been forgotten and their very names were corrupted and had become meaningless counters, unrelated to the natural insects from which they were copied" (Hills 1921). Bowlker also rejected many of Cotton's flies because his list of 65 was too long, and the connection between Cotton's flies and the naturals was impossible to determine. In its place, Bowlker provided thirty flies that were all easily recognizable, many of which are used today, including the March Brown, the Grey Drake, and the Yellow Sally (Fig. 4). (Hills 1921; Hills credits the March Brown to Chetham (1681), who called it the Moorish Brown.)

In addition to adding to the directions for fly fishing (most notably upstream fishing), Bowlker introduced elaborate fly-tying methods and designs intended to mimic the detailed structures of aquatic insects (McCafferty 1981). Although Bowlker is credited with "cleaning up" the common names of artificial flies, his 1746 book was a broad treatment of all kinds of fishing, with only one chapter devoted to fly fishing. There is very little reference to entomology in this work.

Alfred Ronalds and The Fly-Fisher's Entomology

The modern age of "matching the hatch" was ushered in with the publication of *The Fly-Fisher's Entomology* by Alfred Ronalds (1836). He provided information on 47 artificial flies, and depicted both the artificial and the model in beautiful, detailed illustrations (Fig. 5). As noted by Law (2003), Ronalds completed the bridge between the practice of angling and the science of entomology, giving the artificial fly a description and a definition rooted in taxonomy. However, there is nothing in Ronalds' background to suggest that he had the ability to accomplish this; he was an engraver, lithographer, and copper plate printer (<http://www.flyfishinghistory.com/ronalds.htm>). Nonetheless, he was the first to establish a direct relationship between the common name of the artificial fly and scientific name of the insect model (not always correctly; Hills 1921).

In addition, Ronalds was astute enough to recognize that the fly-fishing community was not ready for Latinized scientific names. Therefore, the Latin name was always subservient to the more useful common name (Law 2003). Ronalds was also credited with one of the first perspectives on trout vision relative to the refraction of light as it travels from air into water. Many editions of the original

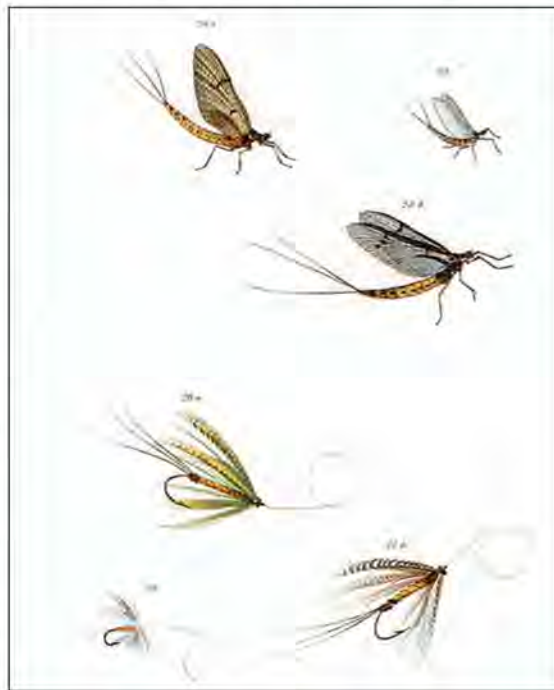


Figure 5. Mayflies from Ronalds (1836, reprinted 1990) and their imitations. 28a - Green Drake (May Fly, Cadow), 28b - Grey Drake (Glossy-winged Drake), 29 - Orange Dun.



Figure 6. Stewart's (1857) flies tied with a palmer hackle (no wings). This is his "black spider," a precursor to "wet flies" that are still tied today.

1836 publication have appeared over the subsequent 160 years, although it appears that Ronalds only contributed up to the fourth edition. Others were involved in editing subsequent editions and taxonomic mistakes were

made. Herd (2011) stated that "*The Fly-Fisher's Entomology* is a rare example of an influential standard work which disimproved with age." Ronalds's scientific classification was not perfect to begin with, and many of the flies were not exact imitations of the originals. As indicated by Proper (1982), a fly tied to mimic a spittle bug (Hemiptera: Cercopidae) (Ronalds, Plate 35) looked nothing like the original. Of note is that both Proper and Marinaro (1950) make the mistake of assuming this is a Jassid (Hemiptera: Cicadellidae).

Ronalds's 1836 book is on the "elite" list of almost every publication that reviews the history of fly fishing. However, this work is virtually non-existent in any formal entomological literature. The book contains no references other than a few footnotes, but Herd (2011) suggests that Ronalds kept up with the scientific literature and worked with the entomologist and coleopterist J. F. Stephens, who worked closely with Darwin. However, Ronalds' work cannot be called a taxonomic publication and, as such, does not appear in the literature when extensive reviews of entomology (Lindroth 1973) or aquatic entomology (Miall 1922) have been done.

Stewart, Halford, Mosley, Skues, and Gordon: the Bridge from the U.K. to the U.S.

After Bowlkars (1746) and Ronalds (1836), the work of Stewart (1857) was a major step forward in fly-fishing history. Until Stewart, fly fishers relied on the size, shape, and color of the their flies to fool fish. Stewart, however, emphasized presentation and action (behavior) of the fly in the water as the key to being a successful fly fisher. Although Bowlkars (1746) discussed upstream fishing more than 100 years earlier, Stewart was the first to articulate the benefits of casting upstream, where the fly was under better control and a drag-free drift was easier to obtain. He believed that presentation was far more important than imitation, although he felt that shape was still critical. Stewart defined artificial flies as falling into two groups: those with wings and those without wings (Stewart 1857). The latter were tied with a palmer hackle, and Stewart called these "spiders" (Fig. 6). He believed these wingless flies were the most important food for fish, and one of his flies, the Stewart black spider, is still available today and highly recommended for Tenkara fly fishing (www.tenkarabum.com/stewart-spider.html).

When the art and sport of fly fishing was developing, the fly was either dry or wet. A wet fly is relatively flat, with soft, flowing hackle, and is literally fished wet (i.e., below the surface). This tends to mimic an emerging nymph/larva/pupa or an adult that has returned to the water to lay eggs and has died (a "spent wing" or "spinner" in fly-fishing terminology). The dry fly is more three-dimensional

and stands up in the water on its stiff hackle and tail, and is literally fished dry, often with the aid of waterproofing, or at least repeated false casting until the fly is dried. This mimics the newly emerged adult (subimago or dun for mayflies in fly-fishing terminology) or an adult returning to the water to lay eggs. Both the wet and dry fly are generally found in the equipment of most experienced anglers, but this was not always the case. Prior to 1840, fly fishing with wet flies dominated. This gradually changed, and from the 1840s–1860s, more and more dry flies were being used on English waters, so by 1880, the dry fly was the only way to fish.

Frederic M. Halford is generally accepted as the "father of modern dry fly fishing" (Hills 1921). Although he did not invent dry fly fishing, he is largely credited for perfecting the dry fly technique (Schwiebert 1955) and was a fierce defender of this method of fly fishing. Halford's *Dry Fly Entomology* (1897) is generally considered the second great work on aquatic entomology related to fly fishing (after Ronalds). Halford was obsessed with obtaining an exact match to the color of the insects he was imitating, and spent many thousands of hours comparing his artificials to preserved naturals (www.flyfishinghistory.com/dryfly.htm).

Underlying Halford's work was his connection to prominent entomologists of his day, including Robert McLachlan (1865) and A. E. Eaton (1883), the leading experts on Trichoptera and Ephemeroptera, respectively. Although Halford's grasp of entomology was never particularly deep (Herd 2011), he paved the way for an entirely new approach to fly tying based on fidelity to the correct identification of the model. Despite his painstaking research, Halford was criticized for his approach, and Hills (1921) stated that "Halford's book is not satisfactory. It is the work of one who was a great fisherman but not a naturalist, and I do not think that anyone who is not could possibly succeed."

Despite these comments, Halford's *Dry Fly Entomology* was an entomological tour de force, with a thorough introduction regarding basic aspects of insect morphology and physiology and supported by referencing authors who published the latest and most reliable entomological texts (Fig. 7). One of the most important of Halford's accomplishments was to devise what are called the "1910" series of fly patterns—the first comprehensive list of mayfly spinners based on a modern classification of the Ephemeroptera. Although a fierce and unyielding advocate of the dry fly, Halford recognized the importance of the immature stages of insects in the diet of trout. He supported the concept that "while floating food is caviar, sunk or midwater food is beef to the fish." Nonetheless, Halford considered that the dry fly had superseded, for all time and in all places, all of other methods of fly fishing, and those who thought otherwise were either ignorant or incompetent (Hills 1921).

An important turning point in the interaction between entomology and fly fishing occurred when Halford asked Martin Mosley to contribute to one of his last books. Mosley worked at the British Natural History Museum on the taxonomy of the Trichoptera (1939), and his book (*The Dry-Fly Fisherman's Entomology*, 1921) was a pocket-sized edition of Halford's earlier publication, but with detailed color plates (Halford's were in monochrome) depicting the flies and their models (Barnard 2011). This was a great step forward from anything that came before and is

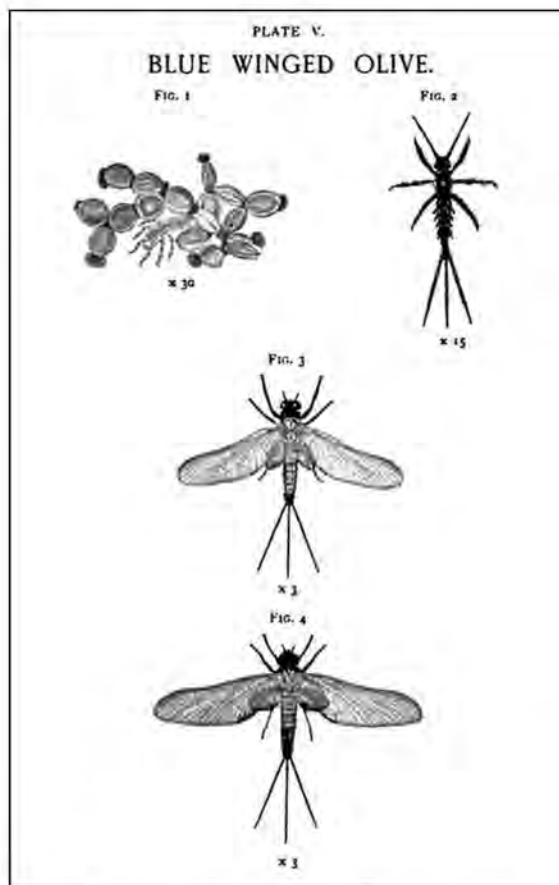


Figure 7. A beautifully drawn life cycle of *Ephemerella ignita*, the Blue-Winged Olive. Newly-born larva and eggs are shown in Fig. 1; a larva at the age of 3 months is shown in Figure 2; Figures 3 and 4 are the male and female subimago of this species, respectively (from Halford, 1897).

often compared to the publication by West (1921), which is often criticized for the position of the wings on many of his illustrations of insects (Fig. 8). In defense of West, his book was put together from notes and observations made for personal use. In addition, he states, "The expert entomologist may scorn the feeble attempt; this however is not written for his edification, but for the humble followers of the immortal Walton who prefer wading in a pellucid stream to the intricacies of an entomology."

Until Mosley, fly fishers were prone to name the insect models after the flies that were tied to represent them. Mosley's approach was based on science rather than observation, and he was the first to dismiss this age-old habit and considered it an obstruction to progress. This was a landmark step in bringing the discipline of entomology together with fly fishing and was the first attempt to bring science to bear in the naming of artificial flies and their models.

Although many fly fishers recognized the importance of the immature stages of aquatic insects as food for trout (including Halford himself), George Edward MacKenzie Skues (1921) is considered the progenitor of nymph fishing (Hafele 2010). Skues is credited with being the first to thoroughly study the underwater immature stages of insects and to develop flies, as well as tying and fishing techniques to imitate them. While Skues was a brilliant writer and a keen observer, he was not an entomologist.

In fact, in his 1921 publication, he stated, "A new Ronalds is called for to classify and illustrate the successive series of nymphs and larvae for the benefit of anglers. Let him stand forth!" Skues had many heated debates with Halford over the merits of fishing with dry flies vs. nymphs, a debate that is still current. Nonetheless, today every fly-fishing store and catalog offers an incredible diversity of flies that generally fall into one of three categories: dry flies, wet flies, and nymphs.

In the United States, sport fishing was practically unknown before 1830. The first to write about the theory and practice of fly fishing in North America was Thaddeus Norris (Schullery 2006), who plied the waters in the Pocono Mountains of Eastern Pennsylvania. Some consider Norris to be the pioneer of American fly fishing, but fishing with the dry fly would not be taken seriously for many years after Norris's work, and only when the brown trout became established in American waters. It was Theodore Gordon, fishing in Willomec Creek in the Catskill Mountains of New York, who would be credited with advancing fly fishing in North America and who popularized dry fly fishing in the U.S. (Van Put 2007).

Theodore Gordon made the connection between traditional English dry-fly methods and the adoption of the dry fly to American waters. He was a prolific writer of letters, book chapters, and articles in magazines and newspapers, but he did not write a book. Gordon communicated with Halford in England, and asked what flies he would



Figure 8. Hand-drawn flies and their imitations by West (1921). West was often criticized for the position of the wings (see text).



Figure 9. The Quill Gordon tied by Theodore Gordon, the progenitor of dry fly fishing in America. (photo by Valla [2009], with permission).



Figure 10. A modern version of the Quill Gordon tied and photographed by M. Valla (2009) (with permission). This represents the Catskill style of dry flies.

recommend for use on American trout streams. Halford responded that he did not know the species in Eastern U.S. streams, so he sent Gordon a full set of his dry flies to choose from, each carefully identified in pen and ink. Thus the dry fly winged its way to the New World (McDonald 1972; Van Put 2007).

These flies were not very effective, and this spurred Gordon to tie imitations of natural insects he found along Catskill streams, creating some of the first purely American dry flies that were (and are) accepted as standard fly patterns. One, the Quill Gordon, bears his name and is widely used today (Figs. 9 and 10). For a time, Gordon was a strict imitationist—he tied flies to mimic individual species as closely as possible. He gradually adopted a more moderate approach, which was probably a result of becoming a professional fly tier. As noted in McDonald (1972), “He came to believe that under all but the most difficult circumstances, an imitation covering any group of species was sufficient for good fishing. Gordon regarded his Quill Gordon as a pivotal fly that was subject to different dressings. This famous standard fly apparently was not meant to represent a single insect. ‘I can vary them to suit,’ he said.” Although an advocate of the dry fly, he never turned away from fishing with wet flies and nymphs. Rather than siding with Halford or Skues in the great debate, he performed the joint services of both and introduced the complete palette of fly fishing to North America.

There were many others around the time of Gordon

who contributed to entomology and fly fishing (reviewed in McDonald 1972, Law 2003, and Van Put 2007). However, it was Gordon who really developed the art and practice of fly fishing in North America with a strong connection to aquatic entomology. In the summer of 1900, a reporter for the *New York Times* wrote, “Anglers who are interested in the Entomology of Fly Fishing will be glad to know that Theodore Gordon, the famous amateur fly tier is at Hornbeck’s, at Rockland for the season. His studies will no doubt have interesting and valuable results” (Van Put 2007).

Descent Into Confusion

The confusion surrounding common names of trout flies and their association with the aquatic insects they are intended to mimic has descended to us from the English line, beginning with Berners and progressing through Markham, then Walton/Cotton, followed by Bowllers, Ronalds, and Stewart, and then through Halford, Mosley, and Skues and across the Atlantic to Norris and Gordon. This has continued from Gordon through the creations and identifications of contemporary fly tiers, some of whom will be mentioned in the ensuing discussion. In 1997, Proper wrote the forward to a reprint of Marinaro’s classic book *A Modern Dry-Fly Code* (1950) and summarized the situation with common and species names by stating:

“It was not that American Anglers made a point of copying British Flies. We had, on the contrary, lost track of whom we were copying. We were taking the advice of writers who had borrowed from other writers and so on back to 1886, when somebody read Halford. We were working from copies of copies of copies, and the product had lost its relation to nature—American or British. At the core, the problem was that fishing authorities, with honorable exceptions, were dispensing advice uncluttered by sources.”

He goes on to poke fun at entomological interpretation made by anglers across the Atlantic with the following: “Note for British Readers: A mayfly, to anglers in America (and scientists everywhere), is any member of the order of Ephemeroptera.”

Entomology as a Young Discipline

In discussing the evolution of the common name of the mayfly called the Green Drake and the species associated with it, McDonald (1972) devotes an entire chapter. He tries to follow the name from its origin in England and across the Atlantic, but loses the thread along the way. McDonald notes, “If the reader can stand a brush with Entomology—the relatively young discipline that deals with the class of animals most noted in the kingdom, called ‘Insecta,’ I think I can demonstrate that the green drake is the subject of the tallest tale in fishing.” McDonald’s use of the term “young” to describe the discipline of entomology is interesting and may be his attempt to partially explain the disconnect between entomologists and fly fishers.

Jan Swammerdam (1637-1680) was the first to systematically study the morphological changes in insect life cycles, and was considered the greatest comparative anatomist of the seventeenth century (Tuxen 1973; Ergoton 2005). Mayflies were among the insects studied

by Swammerdam, and he published the drawings of dissected male and female mayfly nymphs (Cole 1944). One could hardly expect Walton/Cotton, who published *The Compleat Angler* at about the same time, to be aware of this work. Modern classification would not begin until 100 years later with the publication of *Systema Naturae* (1758) by Carolus Linnaeus. Linnaeus and Fabricius were the leading entomologists of the 18th century and were species describers and system builders at the same time. However, a satisfactory general system of classification was needed, and it was Pierre André Latreille who developed a practical system (a compromise between Linnaeus and Fabricius) that focused on morphological characters from all parts of the insect body (Lindroth 1973). These landmark studies on classification had a very encouraging effect, and many books and monographs focusing on the descriptions of new groups or selected faunas appeared in the latter part of the 18th and into the 19th century (Tuxen 1973).

In his *Dry Fly Entomology* (1897), Halford cites some of these studies pertaining to aquatic insect groups including Diptera, Ephemeroptera, Neuroptera, Plecoptera, and Trichoptera. Most who wrote about fly fishing and entomology at that time were not so thorough, or they felt that the system was too complex or inaccurate to be of any benefit. Robert B. Roosevelt, President Theodore Roosevelt's uncle, was one of the first to write about fly fishing and entomology in North America (1865), and he considered Latreille to be the founder of modern entomology. Nonetheless, Roosevelt had issues with the insect classification system: "Being so numerous and so nearly allied, their classification is entirely imperfect, and like a similar attempt with any other part of animal life, a failure." Such a perspective was common at the time, as noted by Marbury (1892): "Except to a studious few, dissertations upon the intricacies of entomology and of artificial fly nomenclature are wearisome and to be avoided."

In North America, the scientific study of insects started more than half a century later than in Europe. Thomas Say, the seminal American entomologist, and Benjamin Walsh, a British émigré, did extensive studies in terrestrial and aquatic systems. Thomas Say had a particular fondness for river fauna, and he described many insects (including ten mayfly species) and mussels from these environments. As noted in McCafferty (2001), the first mayfly described in North America was in New Jersey in 1802 (*Ephoron leukon* Williamson), and all told, 96 valid mayfly species were

described in North America in the nineteenth century. This work by Say (and others) was either not known or was ignored by fly fishers interested in aquatic entomology.

In 1916, Louis Rhead published *American Trout Stream Insects*. He was a proponent of exact imitation, and spent three years collecting insects along the Beaverkill River in the Catskill Mountains of New York State. The plates of natural flies depicted in his book, although beautifully drawn, were not described in a scientific manner, and Rhead devised his own names for them (Fig. 11). As stated by Van Put (2007), "How ironic is it that not one of the many flies he designed and promoted are known to trout fisherman today, and many of the flies he dubbed as 'useless' are still in use."

James G. Needham probably deserves the most credit for formalizing aquatic entomology into a distinctive discipline in the first half of the 20th century (McCafferty 1981). With his students and colleagues, Needham published on nearly every major order of aquatic insects. Needham made some of the identifications for Preston Jennings' 1935 classic, *A Book of Trout Flies*, which was the first book to accurately identify the major fly hatches found along American trout streams and connect them with artificial flies. This foundational work became the model for Flick (1947) and Schweibert (1955) and others to follow. The art and sport of fly fishing was finally in lock-step with the science of entomology.

The Situation Today

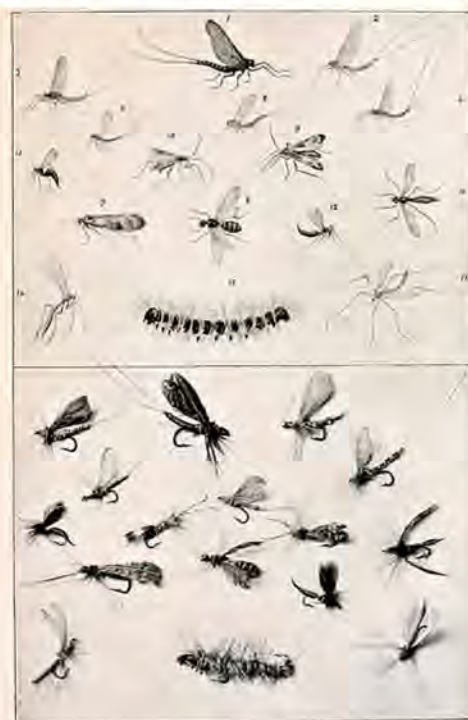
As noted in Merritt and Cummins (1996), studies on aquatic insects have expanded exponentially over the past three decades. Most of this work has been ecological in nature

No.	NAME	DATE OF RISE	TIME OF DAY	WEATHER	FAMILY	ORDER
* 1	BLACK DOSE DRAGON	middle to late	evenings	wet days	Drake	Ephemera
* 2	SMALL PINE TAIL	middle to late	evenings	warm afternoons	Drake	Ephemera
3	GREEN-HORNED DRAGON	early to late	late afternoon	wet days	Drake	Ephemera
4	BROWN TIP	early	evenings	wet days	Drake	Ephemera
5	SPENCER ORANGE	late	evenings	warm evenings	Drake	Ephemera
6	SPOTTED DRAGON	early to late	all day	warm days	Drake	Ephemera
7	AUGUST DUN	late	afternoon	dull and warm	Dun	Trichoptera
* 8	RACE-THREE ANT	late	all day	warm	Ant	Hymenoptera
* 9	BROWN BOAT	late and middle	day only	warm	Four Wing Fly	Hymenoptera
10	GRAY BEE	late and middle	day only	warm	Four Wing Fly	Hymenoptera
11	BLACK SPINNER	late and middle	day only	warm	Four Wing Fly	Hymenoptera
* 12a	BEST GNAT	late and middle	day only	warm	Two Wing Fly	Hymenoptera
* 12b	BROWN GNAT	early to late	day and evening	hot days	Two Wing Fly	Diptera
13	GREEN SPINNER	early to late	day and evening	hot days	Spinner	Diptera
14	FLEETLY SPINNER	middle to late	evenings	warm days	Spinner	Diptera
15	GRAY HAW CATERPILLAR	only	all day	warm days	Caterpillar	Diptera

Immediately as August insects are few and of less importance and the trout season is closed in most of the states, a colored plate is unnecessary when color details are fully described in the following chapter.

The lower section contains artificial imitations, tied by the author. Though fairly representing the insects in form and color, they are very poor indeed as compared with the beautiful flies of the four preceding months, tied by professional fly makers for commercial use.

CHART KEY TO ENABLE ANGLERS TO FISH INTELLIGENTLY ACCORDING TO TIME, DATE AND RISE.



A SELECTION OF THE BEST ARTIFICIAL FLIES FOR THE MONTH OF AUGUST 1916 CORRESPONDING ARTIFICIAL FLIES TIED BY THE AUTHOR.

Figure 11. A panel from Louis Rhead's *Trout Stream Insects* (1916), showing the flies he drew and the patterns he designed to imitate the naturals. He devised his own classification scheme and none of his fly patterns have endured (see text).

and is a reflection of the increasing importance of aquatic organisms as biological indicators of the health of aquatic systems everywhere, the need for better fisheries management, concern about aquatic insects as vectors of disease, and the use of aquatic organisms for biological control of invasive pests. Certainly fly fishers with an interest in aquatic entomology have taken advantage of this; many of the publications produced over the past 30–40 years have been consistent with the current classification of aquatic insects. This turns out to be a moving target, as increasing knowledge of the makeup of aquatic insect fauna necessitates a continual revision of the scientific nomenclature. Certainly books by Borger (1980), McCafferty (1981), Hafele and Hughes (1981), and Whitlock (1982) have set the bar very high.

More recently, the focus on exact imitation has led to the concept of artificial flies as art (Whitlock 2006). Whitlock has spent more than 160 hours tying one fly, and this has led him to develop his investigations into “C.R.A.T.E.” (catching rate and tying effort): does the extra time at the fly-tying vise produce a fly that catches more fish? As in the Whitlock (2006) publication, more and more fly fishers with an interest in entomology have turned their remarkable skill at macrophotography (and video) on the subject, and this has provided new insight into the morphology and behavior of aquatic insects (Fauceglia 2005; Cutter 2007; Ames 2009; Ozefovich 2009; Thomason 2010).

There is still the looming issue of linking the common name of an artificial fly to the species of insect that was the model. Although Mosley (1921) was the first to modernize the naming process, it is difficult to go back in time to decipher naming in the past. As noted by Herd (2011), “The lack of a key linking pre-nineteenth century flies to naturals is a problem we face even today and it is the biggest obstacle that any student of early patterns has to overcome.” Just as McDonald (1972) spent an entire chapter tracing the lineage of the Green Drake, tracking some of the more famous common names (March Brown, Pale Morning Dun, Blue-Winged Olive) is just as arduous, and to make this point, the history of the March Brown will be briefly reviewed.

In Europe today, the species name of the mayfly referred to as the March Brown is *Rhithrogena germanica* Eaton (Ephemeroptera: Heptageniidae). This is one of the more famous British mayflies. The brown coloration can vary considerably and they do not all emerge in March, so the common name really does not reflect the phenotype or phenology. The history of the March Brown in fly-fishing literature starts with the Dun Fly from Berners’ TSA. Skues (1921) believes that this is the March Brown and Thomason (2010) agrees with him, although Hills (1921) believes it represents a stonefly; however, we will probably never know with certainty what insect served as the model for the Dun Fly.

The name March Brown does not appear again in the literature until centuries later (Chetham 1681). Both Bowlk-ers (1746) and Ronalds (1836) refer to the March Brown, but Ronalds gives it a different species name, confusing it with *Baetis longicauda* Stephens. He also refers to it as the Cob Fly and the Dun Drake. Mosley (1921) corrects the species name to *R. haarupi*, and that has subsequently been synonymized with *R. germanica* ([\[b2n629m\]\(http://tinyurl.com/b2n629m\)\) \(For a thorough account of these corrections, see Mosley 1921; Herd 2011\). When Halford sent a selection of his dry flies to Gordon in the U.S., it seems reasonable that the March Brown was among them.](http://tinyurl.com/</p></div><div data-bbox=)

Given that there was little overlap between aquatic insect species in the eastern U.S. and the U.K., Gordon began tying his own flies to better mimic insect activity on the streams in the Catskills. However, as noted by Hafele (www.laughingrivers.com/rick-marchbrowns.html), some eastern hatches were similar in appearance to those in England. Thus, an insect with similar size and color characteristics as one from England was often given the same common name without regard to scientific classification. The crux of the problem was that the common name of the insect was derived from the common name of the fly, even though there might be completely different species involved.

As anglers slowly moved west, they took with them the same approach to naming insect hatches—if they looked the same they must be the same. This was not only true for the March Brown, but also for common names like the Green Drake, Pale Morning Dun, Blue-Winged Olive, and many others. As noted by Hafele, entomologists have been battling this common name confusion ever since, and much confusion still exists among anglers today. Based on current classification (www.entm.purdue.edu/mayfly/naspecies-list.php), *Maccaffertium vicarium* (Walker), found in eastern and central North America, is generally referred to as the American March Brown. But that depends on where you look (<http://tinyurl.com/asvabe3>)—it is also referred to as the March Brown, the Grey Fox, the Dark Cahill, the Great Red Spinner, the Sand Drake, the American Brown Dun, and the Ginger Quill Spinner. In the western U.S., *Rithrogena morrisoni* (Banks) is commonly referred to as the Western March Brown, but it is also called the Western Black Quill and the Black Quill.

This pattern of naming is not restricted to flies out of antiquity. The mimic of *Ephemerella subvaria* (McDunnough) (Ephemeroptera: Ephemerillidae), a common species in the Beaverkill River in the Catskills, was first tied by Roy Steenrod, who named it the Hendrickson after his best friend and fly-fishing companion A. E. Hendrickson (Van Put 2007). However, the name only refers to the female of this species. The adult male has prominent red eyes, and so is commonly referred to as the Red Quill. Further confounding the issue is that the name “Hendrickson” is associated with many insects in the genus *Empherella* (Thomason 2010).

Perhaps the history, folklore, and charm of fly fishing are enhanced by the common names given to aquatic insects by fly fishers. This is likely true, provided the fly fisher does not insist on a connection between the common name and the species of the insect mimic. Most knowledgeable fly fishers recognize that Blue-Winged Olives, Pale Morning Duns, March Browns, and other common names actually refer to a complex of mayfly species. It is perfectly acceptable to refer to almost any light-colored, medium-sized mayfly as a Pale Morning Dun, as long as it is recognized that the exact identity is unknown to the observer. However, Herd (2011) noted that there is concern that the growing school of exact imitationists will ignore the mistakes of the past and again name their creations after what they believe to be the correct species.

Scientific vs. Common Names (from Bosik 1997)

In Zoology, the formation of a scientific name for an organism follows a strict set of rules governed by the International Commission of Zoological Nomenclature (<http://iczn.org/>). This serves to promote the stability, accuracy, and universality of an organism's scientific name. However, scientific names are not always stable. As advances in understanding of a particular taxon occur (including at the molecular level), scientific names will change. In contrast, common names of organisms are not governed by such strict rules and remain more stable than scientific names. In common names, which often originate from repeated usage by workers in a particular area (e.g., fly fishing), the lack of standardization may result in one organism being known by several different common names. This is not necessarily a bad thing, but it could have negative consequences when dealing with a serious crop pest, a potentially damaging invasive species, or a vector of human pathogens. In these situations, making sure there is a tight connection between the common name and the species is very important.

The importance of correctly identifying an organism to a non-scientific audience, as well as to fellow researchers, made it apparent that standardizing common names would allow everyone to know what organism was being discussed in a particular locality. In 1903, the American Association of Economic Entomologists (AAEA) formed a committee to assure the uniformity of common names. The first list was published in 1908 and included 142 common names. Today, the list has grown to more than 2,000 common names (www.entsoc.org/pubs/common_names). Authors of manuscripts submitted for publications in one of the journals administered by the Entomological Society of America can only use a common name if it is an "officially" approved common name. It is interesting that there are no mayflies, caddisflies, or stoneflies on the list.

In an effort to alleviate the great confusion and inconsistent usage of mayfly common names, McCafferty (1981) undertook the formidable task of trying to make some sense of existing mayfly common names and attempting to correlate them with existing scientific classification. This publication is now out of print, but it stands alone as the only text to attempt this in a thorough and comprehensive way. The Web site Mayfly Central (www.entm.purdue.edu/mayfly/) provides up-to-date species names and distribution, but it does not list any common names. As noted in the introduction to the Web site, fly fishers are among its target users. Perhaps with such an exhaustive and thorough listing made available to all, mistakes made with common and species names will no longer be a problem.

Although not as important to fly fishers in a classic sense, Web sites devoted to species lists of the Trichoptera (<http://tinyurl.com/a8q9nhe>) and Plecoptera (<http://tinyurl.com/av68c8x>) also exist and can provide helpful information for fly fishers. Interestingly, the latter site (USGS: Stoneflies of the United States) has taken the opposite approach and provides a common name for each of the species listed. By linking a common name to the species name, there is less chance of a fly fisher confusing things in the future.

There appear to be two types of fly fishers, and both contribute in their own way to the problem of common and species names. Herd (2011) notes that the "obsessive-compulsive school" of fly tying, with a growing number of devotees, delights in the tying of "ultra-realistic" imitations. These individuals must link their creation to a species name, and herein lies the problem. On the other end of the spectrum are the fly fishers who consider Latinized scientific names confusing and snobbish, and who prefer the common names made familiar by tradition. Cutter (2005) expands on this by suggesting that fishing is a centuries-old tradition unhampered by progress, and that these traditionalists should "liberate" themselves and start using some Latin and Greek.

Today most artificial flies are marketed in a way that is a compromise between the two extremes (<http://tinyurl.com/bdary94>). Flies are often given descriptive common names and are grouped into basic functional categories (dry flies, emergers, nymphs, etc.). By clicking on the picture of a particular fly online, you can often learn what (if anything) it is intended to mimic, down to the general complex of flies (e.g., Pale Morning Duns) and sometimes to the genus level (e.g., *Baetis*, *Hexagenia*, etc.).

From a fly-fishing perspective, the idea of trying to standardize common names is moot. Herd (2011) noted that for three quarters of a century (across one of the most crucial periods in the development of fly fishing), fly fishers had been imitating the wrong insect (with respect to the March Brown) and it had not made a bit of difference. Although this mistake might have been considered dreadful from an entomological point of view, it was irrelevant as far as fly fishers were concerned because the two insects in question were so similar that their imitations were unlikely to be separated by feeding trout.

Roosevelt (1865) finished his treatise on fly fishing with the following:

"It is very desirable that fly fisherman should, for their own sakes and for the sake of science, pay more attention to the habits and peculiarities of insects. The study of nature in its minute productions is wonderful; the observations of individuals combined is of great value, and adds immensely to the general store of knowledge...every one can note the peculiarities heretofore mentioned, can even readily preserve a specimen and mark the times and manner of their appearance and the length of their duration, and though he may fail to obtain the scientific name, can...ascertain the habits of a few members of the most wonderful, intricate and interesting portion of the creation."

There are approximately 18.2 million people in the U.S. who fly fish, but only 2.9 million are enthusiasts (<http://tinyurl.com/3xkdhkr>). Rosenbauer (2007) indicates that fly fishing has the highest drop-out rate of any sport, probably due to the steep learning curve associated with understanding the methods and mechanics of the sport (e.g., fly line, reels, rods, leaders, tippets, and the physical act of casting). For the non-biologically inclined who endeavor to take up fly fishing, the entomology that is so germane to the sport can be intimidating as well. Someone who ties ultra-realistic imitations and who spouts

off species names is likely to be a turnoff to a novice. At the same time, ignorance of the insects being imitated in fly fishing can be a detriment to success in the sport. The answer lies somewhere in between. Leonard (1950) (from Usinger 1971) summarizes why a fly fisher needs to know about entomology:

“The fisherman with a knowledge of aquatic insects and the important relationship they bear to the fish he wants to catch is better equipped with a single fly than is the man who knows nothing of such things though he sports a jacket full of fly-boxes stuffed with crisp, unmouthed flies of every description. The man with an understanding of aquatic life knows how and where to place his casts, fishing those places his knowledge tells him suit the lure and the fish, whereas the other fellow will cast at random, forever changing flies, fondly hoping that eventually he will discover a fly of some sort that will catch a fish. The fly-dresser in particular is obliged to know as much as he possibly can about the life cycles of the insects his flies are designed to represent. The more he knows about their aquatic and aerial stages, the more intelligently he will design, balance and dress the copies.”

Final Thoughts

The connection between entomology and fly fishing is addressed in literally hundreds of publications produced after Berners' *TFA*. While it is impossible to cover them all, many of these publications are discussed in the works of fly-fishing historians such as Hills (1921), Law (2003), and Herd (2011). One cannot write a book about fly fishing without some connection to entomology. However, when only those individuals who recognized the importance of entomology to fly fishing and who advanced both in their publications are considered, the field narrows dramatically. It is remarkable that some gifted naturalists and amateur entomologists were able to associate fly fishing and entomology, even when the science of entomology was just developing. As the discipline of entomology evolved, those authors who worked closely with professional taxonomists made lasting contributions in the literature. Those who did not and who chose to go it alone added to the volume of literature, but their work is much less meaningful in the long term. Furthermore, many of these individuals added to the confusion associated with common and species names, and this confusion persists to this day.

The volume of literature available on fly fishing is overwhelming: Amazon.com offers more than 11,000 books related to fly fishing. It is gratifying to see that most of the recent publications recognize the significance of entomology to the sport of fly fishing, and take correct identification and the use of species and common names very seriously. Thus mistakes from the past are not perpetuated, and both fly fishing and aquatic entomology move forward as a result.

For those who might be intimidated by the sport of fly fishing, consider these few sentences from the *Angler's Almanac* (Brown 1851): “Those brothers of the angle who have never cast a fly are advised to pluck up courage and

at once do so; it will greatly add to their enjoyment. Take our word for it, less skill is necessary to success than is generally imagined and pretended by fly fishers.”

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