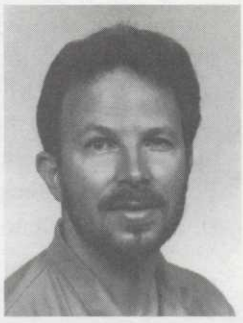
Why do the names of fungi change?

A taxonomic history of Dreschlera and Pyrenophora

by Dr. Eric B. Nelson



Before we begin to talk about fungal classification, It is important to explain how fungi are classified. Traditionally, they have been classified by their reproductive structures. These structures include spore size, shape, germination mode, and pigmentation as well as the size, shape and function of the structures that bear those spores. Reproductive structures in fungi include both sexual reproductive structures and asexual reproductive structures. The definitive classification of all fungi has been, and still is, based on the morphology, or shape and form, of the sexual reproductive structures. Occasionally, taxonomists (people who classify biological things) may also use the color, pigmentation, and growth rates of the fungal colony.

Straightforward classification doesn't work

There are problems with this system of classification. First, there are fungi that don't seem to produce any sexual reproductive structures. These fungi have been placed in a separate group and the classification within that group is based primarily on the morphology of the asexual reproductive structures. A further problem occurs because some of the fungi within this classification group don't produce any discernible asexual reproductive structures either. These fungi that do not produce sexual reproductive structures or asexual reproductive structures are then lumped into yet another classification grab bag of fungal genera.

To top off an already complicated classification scheme, the fungi, initially classified according to their **asexual** spores, may, at a later time or under conditions different from those of the original classification study, produce **sexual** reproductive structures. In fact, many fungi that have been reclassified, have been so, because our knowledge of that reclassified fungus has advanced to the point where we now understand how to induce sexual reproduction in these species. Also, in cases where the sexual structures had never been observed in nature, persistent searching eventually reveals the presence of these structures. In nearly all cases of newly discovered sexual reproduction in fungi, these sexually produced reproductive structures are very similar, if not identical, to fungi classified in yet another genus.

What to do, what to do!

Since normal classification procedures dictate that the fungi be reclassified into the group of sexual reproducing fungi that they most closely resemble, there should be little or no problems in this renaming. But what do we do about the old name?

Often fungal taxonomists argue about where certain fungi should be classified or reclassified. Then opposing camps develop. Usually one camp of taxonomists will refuse to accept the classification proposed by members of an opponent's camp. The majority of members of the scientific community will usually side with one or the other of the proposed taxonomic classifications. Despite this general acceptance, some taxonomists refuse to concur with the proposed classification. The result: two names for the same fungus appear in scientifically published papers.

The arguments between the opposing camps of taxonomists may go on for years. The arguments usually stop when a young fungal taxonomist proves, through the application of a new, more sophisticated molecular taxonomic tool, that, either both camps were wrong and a new genus should be established, or, that one of the previous taxonomists was right and the fungi should be reclassified there.

Practically, though, some classification names have been used for so long that those who are not taxonomists don't really care to know the "proper" classification and remain content using the old, outdated name. This is the situation that turfgrass leaf-spotting fungi in the former genus *Helminthosporium* have found themselves.

Dreschler works on leaf-spotting pathogens

In the early 1920's Charles Dreschler described many of the pathogens that attack cereals and grasses in the United States. Many of the leaf spotting pathogens of turfgrasses were placed in the genus *Helminthosporium*, a genus that had been established in 1809 and was well known to plant pathologists. The genus *Helminthosporium* contained species of fungi that were commonly associated with leaf spots, leaf blights, foot rots, and other syndromes on both wild and cultivated plants within the *Poaceae* (the family containing cool-season turfgrasses). The pathogens that we know today as *Dreschlera* and *Pyrenophora* were originally placed in the genus *Helminthosporium* because they shared many of the same characteristics of spore morphology as others grouped in that genus. However, Dreschler failed to notice that there were some clear differences between his grass pathogens and the original *Helminthosporium* fungus used to describe the new genus in 1809. As subsequent pathologists began to examine the morphology of these grass pathogens, it became clear that they did not belong in the genus *Helminthosporium.* In 1930, the genus *Dreschlera* was created to accommodate

those grass-infecting fungi that clearly didn't belong in the *Helminthosporium* genus, but had to be placed somewhere. Thus, *Helminthosporium vagans, H. siccans, H. dictyoides,* and *H. erythrospilum* became *Dreschlera poae, D. siccans, D. dictyoides,* and *D. erythrospila*, respectively.

Distinctions were made

The genus *Pyrenophora* was also well known at that time. It contained fungi that were placed there based on the morphology of their sexual reproductive structures. When the genus *Dreschlera* was created, it was known that there were associations between it and the genus *Pyrenophora,* but there were enough dissimilarities to keep it as a distinct genus. Furthermore, not all of the *Dreschlera s*pecies so classified produced sexual structures and, because of taxonomic custom, could thus not be properly classified as *Pyrenophora.* It wasn't until much later that the *Dreschlera* species such as *D. dactyoides, D. erythrospilum,* and *D. tritici-repentis,* among others, were reclassified as species of genus *Pyrenophora,* once the sexual reproductive structures were found or induced and compared with those of other species of *Pyrenophora.*

Classification arguments continue

To this day, taxonomists still argue about the classification of these as well as other fungi that are important pathogens of turfgrasses. In fact, the genus *Dreschlera* and the genus *Pyrenophora,* have not been accepted universally as the proper genus for the former grass-infecting, leaf-spotting *Helminthosporium* species. Nonetheless, the majority of plant pathologists accept this genus as an appropriate one for these fungi.

Are there effects on warm-season turf?

The reclassification of the *Helminthosporium* group of fungi may be important from a practical point of view. It turns out that all of the species of *Dreschlera* cause diseases only on cool-season grasses, unlike other genera split out of the original *Helminthosporium* grouping that can also cause diseases on warm-season grasses. This has definite repercussions from the turfgrass manager's point of view.

Warm-season turf managers will better understand this group of diseases so they can avoid using the management criteria commonly linked to the *Dreschlera* genus when devising their own control strategies. Additionally, because newer fungicides are designed to control a limited number of fungal pathogens, understanding which pathogen is causing a problem becomes very important.

Hopefully, the taxonomic placement of species of *Dreschlera* and *Pyrenophora* is stable for the future and turfgrass managers can spend their time doing what they do best: managing turf. However, we should not be surprised to find these fungi have undergone yet another name change by the next issue of *Turf Grass Trends.* ■

role of seed infections in disease development is unknown. Under severe disease conditions, roots and crowns are also infected, similar to disease caused by other related pathogens. Increased nitrogen fertilization will generally enhance the severity of red leaf spot. Most creeping bentgrass varieties are susceptible to red leaf spot. 'Toronto' creeping bentgrass is especially susceptible to *D. catenaria.* Other control measures are the same as for the other *Dreschlera* and *Pyrenophora* diseases.

Glazed looks

Although heavy doses of scientific names often lead to glazed looks in eyes of readers of articles like this, it is important that turfgrass managers have a good working knowledge of the various species that have been and still are causing a considerable amount of damage of turfgrass sites.

Often untreated infections by members of these fungal species leave the turf plants weakened and vulnerable to opportunistic summer diseases, ranging from "red thread" and "dollar spot" to "summer patch" and "brown patch".

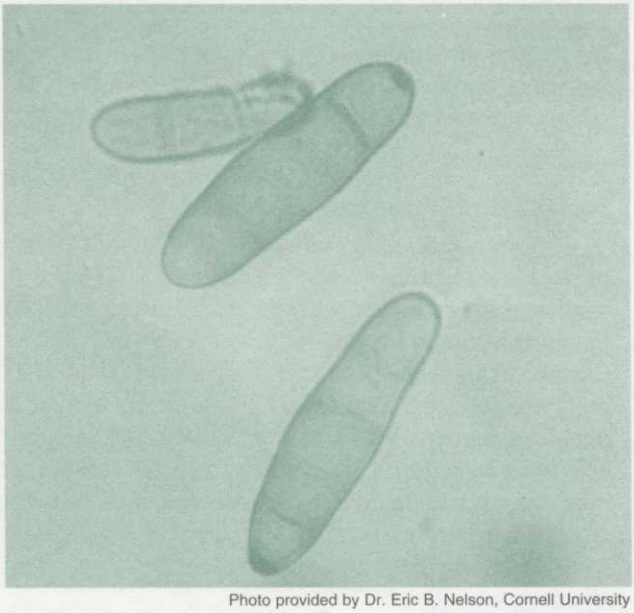


Photo provided by Dr. Eric B. Nelson, Cornell University

Conidia of *Pyrenophora erythrospila*

Understanding the biology and optimum growth periods of these fungi can lead to actions that preclude the appearance of the disease symptoms. The actions, particularly cultural practices, that reduce symptoms of the leaf spotting diseases often have beneficial carryover effects that produce substantially fewer summer diseases on the treated areas.

Success in managing these important diseases leads to a healthy, dense turf that is better able to withstand heat and drought stress, weed infestation and attacks by insects and other diseases. Failure to manage these diseases leaves the turfgrass manager in a hole that is often impossible to get out of. ■