Agropyron by Any Other Name is Still a Wheatgrass

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It seems that every few months now we are confronted with the unwanted news that members of our flora have "new" scientific names. "Which of the several scientific names should I be using" is a refrain often heard. Actually, it is often the case that many of these new names were proposed decades ago. Regardless, it wasn't easy learning all those Linnaean binomials, and few appreciate having to repeat the effort. In our first plant taxonomy courses we were told that scientific names were essential because they were stable and universal, while common names varied depending on region and generation. These days it seems that the common names are more stable; *Elymus spicatus*, *Agropyron spicatum* and *Pseudoroegneria spicata* are all currently used scientific names for bluebunch wheatgrass. So why are we burdened with all this nomenclatural instability?

To explore this question we must first recall the history of biological naming. Our modern system was developed by Carl von Linnaeus, a Swedish biologist in the middle of the 18th Century. He proposed the binomial system in which each species is identified by a unique Latinized epithet and a generic epithet shared by other similar species. Linnaeus primarily used stamen characters to assign degree of similarity. He developed this system before Darwin and Wallace introduced the ideas of natural selection and the evolution of species. Once it was accepted that newer species evolved from older species, taxonomists strove to construct classifications based on principles of Darwinian evolution. Thus, taxonomic nomenclature came to serve two functions: (1) providing standardized names to facilitate communication and (2) reflecting evolutionary relationships. Unfortunately, serving two functions often causes conflict.

Reasons for the current round of scientific name changes relate to one or the other of taxonomy's functions. A perennial cause of nomenclatural instability centers around the debate over what delineates a species. In plant taxonomy the issue has turned as much on opinion as data. "Splitters" believe there is merit in recognizing small but consistent variation at the species level, while "lumpers" prefer to emphasize the close relationship among variants. In the first half of the last century Kenneth Mackenzie and others recognized many different species of similar-appearing sedges. Then Arthur Cronquist, who authored floras for much of North America in the latter part of the century, lumped many of these sedge species together. Now sedge experts are more inclined to be splitters, and many of the species recognized during Mackenzie's time have been resurrected in the new Flora of North America treatment. What's old is new again, and those of us who cut our teeth on Cronquist's treatments will be learning a lot of new old names. This seems like the most arbitrary reason for nomenclatural instability, but it will probably continue as long as taxonomists remain human.

The most understandable reason for nomenclatural revisions has to do with standardization. A great many botanical names were generated during the latter part of the 19th and early part of the 20th centuries. These names were published in journals and books that had limited geographic distribution at the time. Presl described *Poa secunda* as new to science in an obscure European publication in 1830 based on a collection from Chile. More than 60 years later Vasey described the same species as *Poa sandbergii* in the *Contributions to the U.S. National Herbarium*, apparently unaware of Presl's description. All this began to change when communication and travel increased dramatically following World War II. Museum specimens and literature were exchanged freely, and Elizabeth Kellogg, working at Harvard, realized that these two bluegrass species were the same. International rules of nomenclature specify that the earliest published name takes precedence, so the correct scientific name for Sandberg bluegrass became *Poa secunda*, both in South America and here. It's the globalization of botany.

Many recent name changes at the level of genus and family are due to new insights on evolutionary relationships. For example, there is now unequivocal evidence that tall fescue (*Festuca arundinacea*) and meadow fescue (*F. pratensis*), two tame hay meadow grasses, are more closely related to species of ryegrass (*Lolium spp.*) than they are to other fescues. Indeed, hybrids between meadow fescue and other ryegrasses are often used in lawn seed mixes. So these former fescue grasses have been transferred to *Lolium*. There is good evidence that some members of the goldenweed genus (*Haplopappus*) are more closely related to goldenrods (*Solidago*), while others are closer to rabbitbrush (*Chrysothamnus*). Some of these insights come from new analytical methods made possible by computers. Others can be traced to recent advances in molecular biology. Up until about 50 years ago, plant taxonomy relied entirely on morphological characters such as fruit shape, number of stamens, type of hairs, etc. Chemical and chromosomal traits became important in the middle of the last century. Shared traits can be an unreliable indication of close relationship because they can also evolve in unrelated groups as a result of convergent natural selection. For example, many species of cushion plants occur on windswept alpine ridges. They superficially resemble each other because they suffer the same harsh conditions, but they come from many different and unrelated plant families. Modern plant systematists are using portions of DNA and computers that can analyze lots of data to uncover past misunderstandings in evolutionary relationships made using earlier morphological methods. Although molecular characters and analytical methods have advanced the field of biological taxonomy, these approaches may not always yield a definitive answer. Analyzing two different regions of DNA sometimes fails to give congruent classifications, and phylogenetic analysis yields only the most likely classification. Nonetheless, plant systematists are constructing classifications that better reflect the course of past evolution, and they are changing the nomenclature to reflect their new understanding.

Unfortunately for users of scientific names, many recently proposed name changes are based more on opinion than sound scientific evidence. There may be preliminary evidence suggesting that the traditional scientific names don't accurately reflect evolutionary relationships. However, there is often not enough genetic or morphological evidence yet available to determine how the names should be changed to remedy the problem. New Linnaean binomials derived from inadequate, preliminary evidence will often prove no better than the names in current use. In many cases it would be a good idea to continue using traditional names until enough solid evidence compels us to change.

There are often several synonyms for a particular species, but few of us have the time or skill to evaluate all the evidence buried in the scientific literature. How should we choose the name to use? There are a couple of good websites that provide synonyms for scientific names. These include Tropicos at the Missouri Botanical Garden website (http://mobot.org/W3T/Search/vast.html) and the International Plant Names Index (http://www.ipni.org/index.html). The U.S. Department of Agriculture "Plants" website (http://plants.usda.gov/index.html) even suggests which names to accept. However, there is no such thing as a botanical nomenclature arbitration committee to decide which name should be in use. We agree with Wayne Ferren and Robert Haller, former editors for the California Botanical Society. Confusion can be minimized by adopting the nomenclature presented in a credible regional or local flora and reporting that source when you use scientific names.

Most plant systematists are students of evolution, and having classifications that reflect evolutionary processes is, in the long run, a valuable goal. Unfortunately, in the short term this goal is at odds with the other function of taxonomic nomenclature—stability and standardization. Like it or not, we're in for a period of nomenclatural revolution, but we hope to know more about the workings of nature in the process. We just wish our memories were as good as when we were twenty.

Additional Reading:

Dorn, R. 2003. What Happened to all the lilies? *Kelseya* 16 (2): 6.

Ferren, W. R. and J. R. Haller. 1986. Editorial. *Madrono* 33: 83. Published in *Kelseya* Vol. 17 #2