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Nomenclature: The Game of the Name

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INTRODUCTION

First things first: I'm an English major dropout with no formal horticultural training. I began my horticulture career in 1979 as a truck driver for the erstwhile Green Leaf Enterprises. I wasn't a stranger to green things; I had a garden, and houseplants on every available horizontal surface, as everyone did in the 1970s. That helped. And my English/writing background helped as my responsibilities evolved. By the mid-1980s I was representing the company at trade shows, writing catalogs and newsletters, and speaking at various events.

Most of what I know about nomenclature I've learned by trying to get the names right for catalogs. I like to think I've succeeded; I've had this marketing gig with two large propagators, naming and describing hundreds of different taxa. I've chaired the Perennial Plant Association's Nomenclature Committee and served on their Board, including two terms as President.

At both companies, customers told us they used our catalog as a reference work. Which is flattering, but also very wrong: A catalog is a sales tool. Decisions on arranging and naming are based on your customers' needs first, taxonomical precision second.

You probably know someone who hates Latin names—like my late neighbor John, a crusty old guy who asked what he should plant on a bank near the road. I replied, well, there's *Hemerocallis*, or *Ceratostigma plumbaginoides*—and he got this scornful, pained look and made a hand-waving gesture. If you had seen us but weren't close enough to hear our conversation, you'd have thought I'd farted, and he was fanning away the stink.

I said, "John, you know what a *Begonia* is, and a *Geranium*, right? Well, those are Latin names!" It didn't help. So instead of *Hemerocallis* and *Ceratostigma* we talked about daylilies and leadwort, and he was happy.

John died a couple of years ago of liver cancer. I can just picture him when the doctor said, "John, I have bad news: You have *Hepatocellular carcinoma*." I wasn't there, of course, but I'll bet John scrunched up his face and fanned the Latin away.

If you know someone like John, please, be kind. Latin names can be difficult. Even professionals make mistakes: I've seen a sign at a very good garden center identifying their English ivy as "*Hendra helix"*. Obviously, it should say *Hedera*. I should know, I've sold hundreds of thousands of *H. helix*, God forgive me.

Some seemingly simple names, even abbreviated, are just difficult for some. In New Jersey I passed a farm market with a wagonload of "muns" for sale.

So please, be gentle with civilians (i.e., non-plants folk), because some of them seem to need all the help they can get, dealing with our products. My favorite picture from the 2018 Philadelphia Flower Show is of a big, viciously spiny gold barrel cactus labeled, "Please Do Not Sit" (Figure 1).

Figure 1. Big, viciously-spiny gold barrel cactus.

ROOTS OF MODERN NOMENCLATURE

Like my neighbor John, unlike everyone reading this, many people find Latin names confusing. What they don't realize is that the two-part Latin names we know represent a dramatic simplification compared to how botanists used to name plants. The Swedish genius Carolus Linnaeus (1701-1778), born Carl von Linne, gave us two revolutionary concepts: He perfected binomials, and he organized plant groups based on the number and arrangements of reproductive organs. This was pretty radical, even scandalous in the 18th century.

The binomial system, which we've all used for 300 years, was brilliant and, compared to what came before it, very simple. Example: the common carnation. Linnaeus called it *Dianthus caryophyllus*, and the name still stands. It's still not an easy mouthful for a non-plantsperson, but before Linnaeus, that lovely flower was known as *Dianthus floribus solitariis, corollis lacero-partitis, squamis calycinis ovatis acutis*. Names weren't just names, they were descriptions. That string means, roughly, "The *Dianthus* with one flower, fringed petals, and round, pointed sepals." In Latin, it even works as Gregorian chant.

Plant names and inebriated marsupials

The cascade of life as Linnaeus drew it up goes:

Kingdom
Phyllum
Class
Order
Family
Genus
Species

Around 1990, "Domain" was added above Kingdom. This is one of those scientific lists where you make up a mnemonic device to help you remember it, like "HOMES" for the Great Lakes, or "My Very Elegant Mother Just Served Us Nine Potatoes" to help remember our solar system's planets in order, from the sun out to poor defrocked Pluto.

There are several phrases that'll help you recall this list, but my favorite is "Drunken Kangaroos Punch Children On Family Game Shows." That I can remember.

Schizachyrium phylogeny

Let's apply that list to a real live plant introduced by North Creek Nurseries - *Schizachyrium scoparium* 'Standing Ovation'

Domain: *Eukaryota*

Kingdom: *Plantae*

Phylum: *Tracheophyta*

Class: *Liliopsida* (syn. *Monocotyledon*)

Order: *Cyperales*

Family: *Poaceae* (formerly *Gramineae*)

Genus: *Schizachyrium* (formerly *Andropogon*)

Species: *scoparium* (formerly *A. scoparius*)

Cultivar: 'Standing Ovation'

None of this is chiseled in stone: Some taxonomists replace the word "Domain" with "Superkingdom." Others divide Kingdom into Infrakingdoms and Sub-kingdoms. Some use "Branch" or "ramus" between Subkingdom and Infrakingdom. And of course, there are Clades; this is also known as cladistic nomenclature. Rhymes with sadistic.

There are also tribes, subtribes and supertribes. Take grasses: The USDA says there are 337 genera of grasses in the world. Modern taxonomy recognizes 771, distributed among 12 subfamilies, 6 super-tribes, 51 tribes, and 80 subtribes.

So much for the belief that "Latin names never change!" I heard a speaker tell that old lie back in spring—not at a plant talk, but at a birding conference. He was explaining how "common" names like Cooper's hawk and Lincoln's sparrow can be confusing because they're not common everywhere. But I digress.

And as long as I'm digressing, here's something that bugs me: "Genus" and "genera." I especially hear "genera" misused a lot, sometimes from a podium. They're not interchangeable, they're singular and plural. "Genuses" is not a word, and there's no such thing as "a genera." Genus / genera = mouse / mice. It really is that simple. Thanks, I feel better now.

Domains: Bacteria, Archaea, and Eukaryota

These are the three domains that encompass every known living thing in the Tree of Life, as defined by American microbiologist Carl Woese. The first two domains are all microorganisms; Eukaryota

covers everything else, from lichen to blue whales and giant redwoods and *Homo sapiens*. We've segued from Linnaeus to Darwin in our plant organizing schemes. The new taxonomy is organized along theoretical evolutionary lines, and the science itself is still evolving.

In the 1950s German entomologist Willi Hennig developed a mathematical approach, Phylogenetics, to determining the most likely family tree of a group of organisms based on characteristics. It was a perfect fit when the revolution in DNA studies and genome mapping arrived, because DNA gives scientists a whole new world of characteristics to study—far beyond what the naked eye or even the microscope can detect.

Tree of Life: Plantae

I think Linnaeus could find his way around a modern chart of the Kingdom *Plantae*, but I doubt strongly that he'd recognize one important word: "bootstrap." I learned, while preparing for this talk, that I'm not as smart as I thought, at least in some ways. If you've had kids, they've probably had one of those toys that teach shapes. It's either a ball or a bench, with differently-shaped holes. There are little blocks – squares, triangles, ovals, stars – and each block will fit through just one opening. When I try to wrap my mind around modern taxonomy, I feel like one of those toys. I'm trying to stuff information into my brain, and the holes in my head don't match the shape of the pieces of data I'm trying to insert.

I get it that a "clade" is a single branch on the tree of life, i.e., a monophyletic group of closely related organisms. But other terms have me utterly stumped. Synapomorphies? Grex? What the heck is a grex? I'm stumped by these and numerous other terms. Give me drunken kangaroos any day.

I also learned that I'd misinterpreted the term "bootstrapping," which I thought meant "guessing," basically, as in the old saying, "Pick yourself up by your bootstraps," i.e., starting from scratch.

A high bootstrapping percentage indicates a high level of confidence that a plant is correctly placed in a phylogeny. It means they've run the numbers repeatedly, or tested a hypothesis from different directions, and arrived at the same result. Mea culpa.

Ch-Ch-Changes we've seen

Remember when *Tritoma* became *Kniphofia*? No, you don't. Taxonomists settled on that switch in 1938. But many of us didn't change our catalogs until the 1980s.

Remember when *Chrysanthemum* was changed to *Dendranthema*, and then back to *Chrysanthemum*? The first change happened in 1961, based on a study published by a Russian taxonomist, but the crap didn't hit the fan until 1989 when the RHS adopted the new name. It went back to *Chrysanthemum* in 1995 by popular demand, sort of, but not everybody liked that change either. Dutch taxonomists especially preferred *Dendranthema*.

Eupatorium* and *Gaura

RHS, MoBoT, and the Naamlijst don't show *Gaura* as having changed to *Oenothera*; nor does GRIN. PhytoKeys, a new one to me, says *Gaura* is "deeply nested within one of two major clades of *Oenothera*."

Some sources treat *Eupatorium* and *Eutrochium* as synonyms; others say it's now *Eutrochium* (formerly *Eupatorium*.) Not every species has left *Eupatorium*, but the one most in the trade, *E. purpureum*, Joe Pye weed, is now considered (by some) as a *Eutrochium*.

***Banksia* and *Dryandra*: more name changes**

We in the industry can be slow to accept change. In rare cases, new discoveries may lead to a sort of simplification, but still cause confusion. Example: Two Australian

genera, *Banksia* and *Dryandra*, are now all *Banksia*. This change was proposed in 2011 by two taxonomists, one Australian and one American. It appears to be mostly, though not universally, accepted already. That's pretty fast—but there's been pushback.

Alex George is another Australian botanist who has researched and published widely in those two genera, and he argues strongly against the change. He complained, "They have changed the names of 100 species (and subspecies and varieties) and…confused, upset and inconvenienced many people including the public, scientists and the nursery trade, and all their…day-to-day activities that involve using the names of these plants."

He continued, "Biologists around the world are increasingly critical of taxonomic results that are dominated by molecular data. DNA is but one component of a biological organism's physical form…"

Linnaeus wrote, "In natural science, the basics of truths must be confirmed by observations." Sorry, Carl, we don't live that way anymore. Today's "truths" are arrived at via algorithms running on supercomputers analyzing DNA sequences—things that cannot be "observed" in the literal sense. After the IPPS meeting in Delaware, I had lunch with program chair Ron Strasko and fellow speakers Dr. Darrel Apps, Sinclair Adam, and Dale Hendricks. Dr. Apps told us, "I get so mad at taxonomists! Linne said, 'We must make things simple so that people can communicate.' And here they are doing the exact opposite!"

Eponymous grasses

I recently did a talk on grasses, with a section on "eponymous grasses" as a sort of category—i.e., genera named for people. *Muhlenbergia*, for example, honors Gotthilf Heinrich Ernst Muhlenberg, sort of a home-boy for me; he was a minister and naturalist in Lancaster, Pennsylvania. *Deschampsia* is named for a French surgeon, Unlucky Louis Deschamp. *Banksia hookeri* honors two legendary scientists: Sir Joseph Banks, the first European to collect this plant in Australia; and Sir William Hooker, an English botanist, director of Kew and also a plant explorer. But that's another talk for another time.

The taxonomist who did the *Banksia*/*Dryandra* work talks about "classifying organisms in a way that reflects their evolutionary relationships." I hope that doesn't mean choosing names that have no meaning in the real world, because the human element is a wonderful way to name a plant and to honor a human being simultaneously.

Stachys hummelo

This is the Perennial Plant Association's Perennial Plant of the Year for 2019 (Figure 2). The consensus seems to be that the proper name for this one is *Stachys officinalis*. In my catalog, it's listed (for now) as *Stachys monieri* because that's what the Naamlijst calls it and the Naamlijst is still the Perennial Plant Association's bible.

Figure 2. Is it *Stachys monieri*, *Stachys officinalis*, or *Betonica officinalis*? Depends on the authority.

Ibuprofen

Got a headache yet? We apparently need a new Linnaeus. Meanwhile, I propose a new drug-related nomenclature model, at least for commerce, which allows different people to discuss the same thing using different terms to suit different needs. Let's take a common pain reliever. Microbiologists can draw schematics of its molecular structure, which to me looks like something built by a plumber on LSD, or they can discuss $C_{13}H_{18}O_2$**.** Chemists can call it Isobutylpheol propanoic acid. Pharmacists rely on its generic name, Ibuprofen, and a guy with a headache goes looking for it by its trade name, Advil—or, in England, Arthrofen, and in Austria, Brufen, not unlike the colloquial names we assign plants.

***Ptilotus exaltatus* Joey® pink mulla mulla**

A green parallel, in reverse order: To a marketer—and therefore to a gardener, this Australian annual is "Joey." That was Benary Seed's sales pitch: "Just call it Joey." To Aussies, it's pink mulla-mulla. To a grower, it's *Ptilotus exaltatus*. To a taxonomist, it's found in the Angiosperm and Eudicot clades, in the Order Caryophyllales and the Family Amaranthaceae—useless information to most of us.

An interesting sideline about this plant: Two friends, both in the industry, told me—completely independently—that they were in the market for a new home. Both said that one of their criteria for choosing a house is—apologies to the squeamish, this is a tad indelicate—they had to have enough privacy to pee outdoors, right off the deck. It's a guy thing.

One friend unfortunately ended up with close neighbors, really close. He planted screening, so no one could actually see him urinating outdoors, but he had a bat-eared nosy old neighbor who could hear what he was up to, and she'd yell at him.

The solution? He planted Joey. When you tinkle on your pink mulla-mulla, it makes no sound. Because with *Ptilotus*, the P is silent.

ICBN vs. USPTO

Trademarks present a nomenclatural conundrum. It annoyed me at first, but I'm at peace with it now. It actually keeps things cleaner than some other games people can play.

What Conard-Pyle did with the Knock Out Rose "family" was ingenious. They patented the individual plants under cultivar names like 'Radrazz' and 'Radral', in single quotes as God and Linnaeus intended. "Rad" is short for William Radler, the breeder. Such code names are all but useless in commerce. Simultaneously, they trademarked a group of names under the Knock Out umbrella—attractive, memorable, marketable names.

For years, the International Code for Botanical Nomenclature and the International Code of Nomenclature for Cultivated Plants (ICBN and ICNCP) forbade giving codes and other "nonsense names" to plants, but the rule was ignored so often that the registrars deleted it.

A patent protects a plant's "inventor" for 20 years. A trademark lasts 10 years but can be renewed indefinitely. So, when the patent on the original red Knock Out® Rose expires in January 2019, anybody can propagate it and sell it as *Rosa* 'Radrazz' (Figure 3), without paying a royalty. That's a cultivar name, free for anyone to use as per ICNCP. But if you want to sell it as Red Knock Out®, the name people ask for at the garden center, that'll cost you a marketing fee. Conard-Pyle created a good name, trademarked it, and have rigorously policed their trademark to keep it from becoming a generic name.

Figure 3. *Rosa* 'Radrazz'.

The ICBN and the ICNCP are sort of gentlemen's agreements, with no force of law behind them. Patent and Trademark law are exactly that: enforceable law. And the United States Patent & Trademark Office (USPTO) doesn't care about the ICNCP. Ergo, alphanumeric codes, punctuation marks—that's all OK now, which is kind of a shame but there it is.

This is true of nearly every plant category. Mums, roses, perennials, shade trees, fruit trees, raspberries, and more are often patented with cultivar names that would have been deemed improper in the past.

There are lots of patented plants, over 29,000 as of late 2018, but there really aren't a lot of perennials so good that a trademark (TM) will be a big deal after the patent runs out. The Knock Out rose is one such plant; *Geranium* 'Rozanne' and *Pennisetum* 'Fireworks' are two others. Those of you who deal in woody plants can no doubt name a very different list. When I look at a lot of other TMs out there in perennials, I can't help but think that something better will come along.

CONCLUSION (RELUCTANT)

Nomenclature assigns a plant a place in the world. When our understanding of a plant increases, sometimes it's clear that it was misplaced, and has to move. Molecular studies and supercomputers aren't going away. Genies are notoriously reluctant to go back into their bottles.

Kevin Thiele, the Australian who decided *Dryandra* is really *Banksia*, said, "No science should reject new understanding simply because we're comfortable with the old." I can't argue with that. The term "settled science" is practically an oxymoron.

Much has changed in this field, and there are many more shoes to drop, but my advice remains the same: Choose an authority, and stick with it—until it fails, which it will. When that happens, consult the others and use your best judgement.

SOURCES

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