A Perspective on Taxonomy

Cornus canadensis
1:1

"The study of the origin of cultivated plants is a field where there are few rules to begin with; one doesn't know ahead of time where even the partial answers lie; it is an adventure in apparent chaos."

Taxonomy is the common language of botany, a necessary tool that fortifies our ability to identify and finally specify plant material. Taxonomic classification is typically the first step towards the acquisition of knowledge or familiarity with a plant. The status of each plant name is authoritatively detailed through binomial labels that systematize with little exception. Naming and labeling support our encyclopedic knowledge of plants; a global scholarship of the natural world and an indispensible method of comparison, necessary when making evident distinctions between species. Taxonomy is a branch of science that has contributed to a rich botanical history filled with stories of adventure and discovery. Each excursion into the plant world is equally a struggle to generate predictability and pattern. These stories pull us into the realm of scholarship that reflects a longstanding desire to organize the processes of life. The history of classification informs our capacity to appreciate the natural world—as the exploits of cataloguing have greatly informed our understanding—but the ambition is rarely questioned for its cultural value. Practices of design habitually manipulate, shape, and influence environments, but seldom interrogate the established doctrines that describe the exceptional circumstances under consideration. Manipulating the location, aspect, and form of an individual plant is a known practice, but its classification is rarely offered as a mutable characteristic. When confronted with modern taxonomy, designers tend to digress into botanical laymen, accepting the influence of science as an expertise that lies outside their field of knowledge. Perhaps this tendency has also facilitated a distancing between design and botany, delaying the advancement of a critical agenda on the design of and with plant life. Outside of their exterior form or classificatory status, perhaps the enjoyment of plants in time and space, as live organisms with particular behaviors, is the territory of the landscape architect.

Taxonomists are classifiers by profession. Taxonomy is a vast science that encompasses the identification and nomenclature of individual samples by affixing a Latin binomial to a determined categorization. While the field of taxonomy is generally associated with its founder, the Swedish botanist Carl von Linné or Linnaeus (1707–1778), important advances were made leading up to the establishment of the plant as a binomial label.[1] Theophrastus (370–285 B.C.), a pupil of Aristotle, advanced his teacher's work on the botanical aspect of biology. From this lineage, biological terminology was first acquired from zoological study, including flesh (plant pulp), backbone (leaf rib), heart (pith wood), etc. Theophrastus was the first true botanist or plant scientist,

1 For further consideration of the expansion of plant classification systems, see also Cesalpino, De plantis libri XVI (1583); Bauhin, Pinax theatri botanici (1623); Ray, Methodus planatrum nova (1682); and, de Tournefort, Elements de botanique (1694).

Previous page, quote taken from: Edgar Anderson "Adventures in Chaos" in *Plants, Man, and Life*", (Boston: Little and Brown, 1952) 207.

often called "the father of botany,"[2] as his *Enquiry into Plants* or *Historia Plantarum (*c. 350 BC and c. 287 BC) is well known as the oldest botanical work in existence. Little was added to the knowledge of plants between the time of Theophrastus and the sixteenth century. One critical achievement of *Enquiry into Plants* is the clear distinction made between cultivated and "wild" plants, using a simple method of comparison between growth, form, habit, and the way in which plants originate, reiterate or reproduce. With this terminology, Theophrastus was alluding to what we now call "a weedy habit," referring to plants that do not require as much tending as they propagate or seed freely, and most often flourish beyond desired limits. This association between habit and form contributed to a closer understanding of the particularities of plants as having specific discriminations.[3] Essentially, *Enquiry into Plants* was the first endeavor towards an ordering of plant life, which incites the reader to take into consideration (1) the parts of plants; (2) their qualities; (3) the way in which their life originates; and, (4) the course their life follows. Theophrastus mapped the basic outlines of early plant taxonomy, not for scientific particularities or economic motives, but as an inquiry or curiosity, for the sake of increasing general knowledge. This difference between wonder and discovery on the one hand, and practicality or material progress on the other forms two distinct origins of natural classification.

Two thousand years later, Linnaeus developed a particular form of nomenclature that would revolutionize the study of the natural world, consequently modernizing plantst. Common knowledge of global fauna and flora was advancing in this period due to the rise of scientific exploration, an enterprise that transported, traded, and uprooted thousands of species and millions of plants throughout the 17th and 18th centuries, creating both an international market and a new economy. But Linnaeus did not seek first-hand experience or adventure; he was a scholar, who began his studies with an interest in herbals (medicinal plant use) and developed an enthusiasm for biological specimens. Eventually, his knowledge was sustained at his desk in Uppsala, Sweden, where specimens were received by post and through exchange with a broad network of botanical gardens and collectors. In 1753 alone, Linnaeus claims to have counted over 8,000 new species.[4] At the time, a new system was desperately needed to replace the "phrase names," which were becoming too lengthy due to disputes in syntax and authorship. Linnaeus developed a binomial system of classification that would simplify and abridge the labels of

2 Gundersen, Alfred. "A *Sketch Of Plant Classification From Theophrastus To The Present*." Torreya 18.11 (1918): 213-19. Web.

3 For a more complete discussion of the history of botanical thought and the role of Theophrastus see Arber, Agnes. *The Natural Philosophy of Plant Form*. (Cambridge: University Press, 1950) 9-14.

4 William T. Stearn, "Botanical Exploration to the Time of Linnaeus," Proceedings of the Linnaean Society of London 169 (1958) 173–196.

plant life; for each species an epithet was designed that could be used together with a genus name. The system offered a desirable level of control, as the wild behaviors of plant development could be dried, arrested, and documented as evidence. The binomial format would forever revolutionize the plant world.

Despite its implicit suggestion, Latin binomials are typically composed of three parts. For example, if we take a common plant from the understory of the boreal forest in Quebec, *Cornus canadensis* L., the first name represents the generic name, shared by all other *Cornus* in the genus of dogwoods in the family Cornaceae, which consists of over fifty species of mostly woody plants. Linnaeus aggregated species into groups called genera. A genus is basically a similar group that may have any number of species, from one to hundreds. The second name in the sequence is the species name, which in this case denotes a strong association with the plant's first discovery in Canada. However, *Cornus canadensis* L. is also indigenous to Japan, the U.S., and Eastern Russia; the nomenclature solidifying only its strict systematic contribution, not its actual range. Finally, L. references Linnaeus, a space in the label that helps affirm the scientist who confirmed the taxonomy; it is in this position that remarkable botanists live on as acronyms such as A. Gray, Ait., Fernald, Hook., and so on. The binomial tell us that *Cornus canadensis* L. was collected in Canada and labeled in Sweden. Upon further study into the plant, it would certainly seem reasonable to assume it was a Canadian dogwood, a tree particular to Northern climates with a potentially unique bark. Instead, and despite its classification, we discover that it is actually a small herbaceous groundcover found globally and in vast quantities across North America as well as Russia and China. It is commonly called Bunchberry, Canadian dwarf cornel, Quatre-temps, Cornouiller du Canada, Crackerberry, and Creeping dogwood. The designation remains fixed, while our knowledge of its spread, range, and habitat has matured.

Binomial classification was published at the start of Linnaeus' career, with the publication of his *Systema Naturae* in 1735. In this categorical account, species were presented using a system of organization that found common features in stamens and pistils within groups of plants. Binomial labeling was not just limited to the scientific community, it proffered an accessible language and a novel system. Despite it seeming preposterous to many, the genius of classification was its simplification, as plant knowledge became accessible to the general public.[5] Linnaeus profited from the interest of everyday enthusiasts who could access botany by memorizing simple binomial labels. But the binomial system was soon to be exposed as both overly artificial and without

5 For example, Comte de Buffon (1707–1788) was one of the early botanical scientists to emerge in opposition of Linnaeus. He proclaimed it incorrect and immoral to impose an artificial system on the natural world.

rule, premised upon the notion that plants were growing unchanged by their circumstances. Cataloged specimens did not require further contemplation other than a subjective consideration of their most observable features. It would be over a hundred years before Darwin would publish his evolutionary theories, which would have a profound impact on botanical taxonomy. Evolutionary theory forced the project of the plant catalog to adapt, shed its fixity, and recognize plants throughout stages of development.

Building on the economic achievements of plant trade, taxonomy has dedicated itself to the classification of found or acquired specimens; therefore, cultivated plants were mostly neglected.[6] As a result, common plants have not traditionally been considered worthy of study—a dispute that has slowly resolved with the rise of horticulture and the arrival of an expanded description of botany. These seminal works include L.H Bailey's *Manual of Cultivated Plants* (1923), Edgar Anderson's *Plants, Man and Life* (1952), Edward Salisbury's *Weeds and Aliens* (1961). In his inspiring text on plant domestication, Anderson expresses particular concern for taxonomy's general lack of progress: "*The great paradox that our commonest plants (weeds and domesticated plants) are the least known, has given rise to an even greater paradox that this perilous situation is very generally unsuspected*."[7]

Building on the work of his peers, Anderson explores this deficiency through his particular scholarship on maize (*Zea mays*), making clear that the distinction between wild and cultivated plants in taxonomy has limited taxonomy as a science that can contribute effectively to the cultivated landscape. Anderson underscores the requisite for taxonomy varieties of wild maize, yet reproaches taxonomists for their "stagnation" and general attitude of indifference for the most commonly found plants. A contemporary paradigm of the same cultural disdain is exemplified in the discourse surrounding "native" and "non-native"plants.[8] Traditionally, horticulturists and gardeners welcomed exotic imports and wild introductions into their gardens as a celebration of contrast and a expression of beauty. The practice was scientifically justified as taxonomists offered labels and binomials to each imported or non-native species.

The description of taxonomy is manifest through the herbaria sample. As empirical evidence, the herbaria sample is also a live dataset that can be understood as a mapping between different conditions, which may yield alternate classifications. As both technique and methodology, each pressing enables study at various scales, working directly from source material. The herbarium is a collection of standardized specimens, which effectively industrialized plant collecting, infusing regularity on the disorder of the natural

6 Edgar Anderson, "The Greater Paradox," in *Plants, Man and Life* (Boston: Little, Brown, 1952) 31–49.
7 Ibid., 31
8 Peter Del Tredici, "Brave New Ecology," *Landscape Architecture* 96 (February 2006) 46–52.

world. The binomial system facilitated herbaria samples, so that specimens could be bought and sold, traded and shipped in convenient units that would also conform to the dimensions of cabinet drawers.[9] As with any desire to accumulate things, the number of samples gradually became a source of pride for collectors, as university libraries swelled to accommodate the new science of taxonomy. Herbaria samples furthered Linnaean methods, offering an easily observable, real-time duplicate of a plant outside of its habitat and the unpredictable atmosphere of its context. When faced with a herbaria specimen, it is impossible not to feel a sense of loss, as organic life is seemingly obliterated in the sheets and pages of each manuscript. Within design fields such as gardening, horticulture, and landscape architecture, the significance of plants is rarely economic or taxonomic; plants are appreciated instead as a cultural asset. Despite this organic dessication, there is no better tool than the herbaria specimen, for elucidating the details of a particular species, while establishing a reservoir of information.

Flows of time carry life forward. Plants emerge in space and time and offer designers an opportunity to create experiences within developmental sequences. While taxonomy offers a window into a rich and wide-ranging history of knowledge, the herbaria specimen has gradually expired as a useful tool for expressing the more behavioral and mutable characteristics of plant life. The history of exploitation and classification has shaped the way we use and specify plants in the living environment. But as the challenges become more and more complex, no single narrative will suffice. The larger story of plant life, forms the subject of how and why we plant plants, a story that deserves to be thoughtfully considered. Further, it asks how the plant grows or advances, rather than simply reflecting on how it appears or what it provides. If the classification project is complete, then the question of how we will increase and exchange plant knowledge remains to be seen. The possibility of re-engaging live specimens offers one approach to observing and imparting botanical knowledge. The garden itself is a scale of experimentation that attends to plants as live matter.

How can plants reengage with their cultural and scientific histories, while increasing capacity to apprehend and describe the natural environment? The ingenuity of taxonomy is found in its medium, the herbaria sample. Each specimen is at once a tool of science and a lasting artifact of commodification. Yet, what is less discernible is its embedded narrative, as each sample tells the story of the isolated plant, of its discovery, its use and abuse, as a conquest that extracted the plant from the environments in which it was collected. The plant becomes a specimen. These stories are an invisible and remarkable

9 The Linnean Society of London holds the personal library and herbarium of Linneaus, where his entire collection has been kept in its original state. http://www.linnean.org.

part of each pressing, another shoot or stalk in a life history that deserves to be told and shared in order to develop a stronger connection to the life of the plant under consideration. If plant life is to be reconsidered by landscape architecture, then information outside of the plant itself offers a cultural narrative to every species that we deploy to cease erosion, cover barren soil, absorb toxins, and provide shade. The plants we plant are individuals with deep histories, and we are misled as a profession if we digress into a method that continues to deploy plants for human advantage alone.

The methods proffered by taxonomy were implicit to its success and sensation as a science, it developed a new language (Latin binomial) and a beautiful artifact (herbaria). Together, universal access was achieved. In its inception, the science of taxonomy was a flexible and popular entry into scientific speculation. However, taxonomy evolved into a strict code, whose rules are adhered to for the sake of maintaining the established order. What if classification was an experiential science? Can taxonomy reinvent its language to include time and space? The future of classification can become a dialogue accessible to designers, as reaches the limits of Linnaeun nomenclature, and herbaria samples are no longer a popular artifact to treasure and trade. Taxonomy is quickly becoming a system less reliant on rank-based nomenclature (such as genus, family, etc.), and more dependent on the innovation of PhyloCode.[10] These emerging forms of delineation are contingent upon statistical and historical databases, which propose complex branching diagrams built through computational methods. If the future of taxonomy lies in a complex arrangement of code, it may only further the loss of familiarity with the plant itself, in favor of a highly specific and inaccessible logic—the technical over the phenomenal.

"*I was bearing witness to the only sure thing that was in me (however naïve it might be): a desperate resistance to any reductive system.*[11]" When Roland Barthes reflected on photography in *Camera Lucida* (1980); at the heart of his critical language was a desire to understand photography as both an artifact and an act, finally proposing that there might be "a science for each object." Barthes persisted in defining photography through its indefinable elements—its ability to record, disarm, and signify—across ranges achieved by the capacity of the lens. Embedded in his argument is a beautiful admiration of a well-defined practice. Barthes was not a photographer, and freely conceded that he was neither interested nor sufficiently patient enough to become a photographer. But as a cultural critic, he was compelled to add to the discourse on photography through a discourse on the art of reproduction.

10 A controversial new system of classification, that is less reliant on rank. See International Society for Phylogenetic Nomenclature, http://phylonames.org.
11 Roland Barthes "The Photograph Unclassifiable" in *Camera Lucida* Trans. Richard Howard (New York: Hill & Wang, 1980) 4.

In much the same way, landscape architects may question or contribute to botanical classifications proliferated by taxonomists, especially as the field becomes more digitized and plants continue to evade standards. Escalating environmental transformations are now speeding up the inherent challenges of classification, while plant life is advancing, migrating and adapting to these novel transformations. We have all listened to taxonomists argue, heard botanists disagree passionately, and experienced the dreaded reality of a favorite plant changing names, knowing that common names are both more evocative and more picturesque.[12] Just as Barthes resolves to unpack the evocations of the photograph, the plant escapes us, resisting order through its implicit nature as process manifest through formation. Plants undergo transformations across time and in space that resist reproduction. Creating an altered taxonomy is not a science; it is a design investigation that relates traits that are rarely amalgamated, quite outside of taxonomic debates. Plants are the unit of study in the landscape, altering the landscape. Despite the great disorder of nature, design seeks to elucidate the experiential ambiguities of plants. Unfortunately, this has been achieved though an inheritance of formal attributes, handed down by the sciences that classify and trade. Landscape architecture as a field of design is torn between two languages: the expressive and the scientific. Thus, isolating and presenting live specimens is one way to emphasize the individual within the myriad of distractions that limit our capacity to observe the changing cycles of the day, irregular bloom or bud periods, and active tropisms of each plant. A heightened awareness of plant formation might enrich the study of plant life and advance our understanding of their unique position in the world, as living organisms.

While taxonomy has expanded the number of plants that can be counted, listed and related, it does little to advance the relationship between plants or between a plant and its environment. As both artifact and language, its essential offerings can become an inspiration for future communication and scholarship. Thus, the field of taxonomy attends to the botanical scales that are a critical consideration in the field of landscape architecture. As environmental risk becomes the new norm for sites, novel and experimental directions in planting design are required. Direct experience, observation, and tactility cannot be replaced through augmented scales, just as a systematic classification cannot reveal character. It would seem plausible that design could re-animate taxonomy, without trespassing on its ongoing contributions to scientific study. Against the backdrop of environmental concern, it might turn out that taxonomy unify ecological considerations, coalescing professions under the conviction that the plant itself is the common and most essential scale of study.

12 "When we wish to refer to garden plants, the use of the Latin names which the botanist employs has several advantages, which it is well to realize, though, if regarded as mere labels, they are in no way superior to the English equivalents, and are often far less picturesque." E. J. Salisbury, "Plant Names" in *The Living Garden.* (New York: Macmillan, 1936) 295.