

# The Game of the Name: Nomenclatural Instability in the History of Botanical Informatics

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## Abstract

Botanical nomenclature of vascular plants dates back to the first edition of *Linnaeus* in 1753. Since then a series of attempts have been made to deal with the problem of name stability—how to ensure that a given species will have the same name all over the world and over time. In the 1820s the Kew rule was developed out of Kew Gardens to deal with priority in generic names; in the 1860s George Bentham worked on two large projects to stabilize systematics. In the 1890s the Berlin rule (limited priority for names that had either fallen into disuse or never been accepted) came into conflict with the Philadelphia rule (according to which priority was absolute). Throughout the past century a series of international conferences have dealt with issues arising from these controversies.

The principal issues are twofold. On the one hand, it is highly desirable to be able to change the names of plants when new scientific insights come into place. On the other hand, it is extremely difficult and costly to change the names of plants. In this paper I explore the developing positions with respect to name stability, first, with respect to the nature of scientific cooperation (here in the form of the establishment of international conferences to deal with questions surrounding the issues and the development of agreements about which scientific journals could carry new names), and second, with respect to the development of information technology (computer technology, for example, makes name flexibility in some ways easier to propagate). I argue that the issue of name stability has been the site of a series of significant discussions about the nature and storage of scientific information. This premise forms the basis for a recent work of mine about the history of classification systems in medicine (Bowker & Star, forthcoming), in which I have argued that work done at the deep infrastructural level of classification and nomenclature systems is closely tied to both information technology developments and organizational histories (the organization of the profession of medicine or botany in these cases). I also argue in this paper that it is impossible not to encode deeply into the information infrastructure some specific readings of the state of knowledge and of the state of relations between often competing professional groups (systematists, botanists, farmers) and that this has had significant consequences both for knowledge production and organizational change.

## Introduction

A banner headline in the *Independent* for 23 November 1998 reads “Scientists Reclassify All Plants.” The headline is wildly inaccurate: Reclassification is a long, slow process, and there is no simple path from the molecular sequencing techniques referred to in the body of the article to the development of new plant classifications. Further, even in the world of electronic databases we are moving into, no touch of a button would allow us to usher in a new system. On the contrary, when a given database of plants, of the ecology of a given area, of paleontology, and so forth is designed, it necessarily draws on a contemporary classification and will rarely be updated (and will be difficult to update) should the classification change. The result is a tower of Babel, where numerous outdated classifications present themselves to the scientific researcher with equal force: Indeed they must be used if the associated data is to have any value. In this paper I look at the two-century-old effort to establish and stabilize scientific names for plants and argue that the attempts have been so difficult to make work because precise boundaries for priority (who first named the plant), publication (where the name is published), and reach (who has the authority to name) are integral questions about the organization of work in systematics and about the scientific features of a given plant. I will draw attention to issues that have arisen with the need for long-term, wide-scale information storage and retrieval (cf Bowker & Star, 1994, forthcoming) and will discuss the range of solutions that have been worked

out over time—and how these affect the ordering of knowledge in the field of botany.

Diana Crane (1972, p. 8) claims that in scientific literature “the ‘life’ of a paper is very short, with the exception of a few classics. Papers published five years ago are ‘old.’ Papers published more than fifteen years ago are almost useless in many scientific fields.” In this paper I will examine a field of science in which this is emphatically not the case—the field of botanical nomenclature. I will discuss the issues that have arisen over the past 250 years as botanists have tried to develop universal, standard names for plants. The practice of botanical nomenclature is not fully aligned with the practice of botanical classification: Although in principle Linnaeus’s system is both classificatory and nomenclatural, in practice many names are retained beyond their classificatory currency.

Crane’s model works best in physics, where no assumption is made that information collected in the early nineteenth century will still be of interest to the current generation of field theorists. There is the assumption (Poincaré, 1905, for example) that new theories will reorder knowledge in the domain effectively and efficiently. And since Kuhn (1957), most would accept that a major paradigm change in the understanding of gravity, for example, renders previous work on incline planes literally incommensurable, not to mention technical improvements making the older work too imprecise. Chemists have somewhat more need to delve into older material (but certainly not in the issue of naming chemicals—the procedure has been internationally standardized since the mid-nineteenth century). Astronomers trawl back further in time, seeking traces of supernovae in ancient manuscripts. But they are just as likely to look at monastery records as at Tycho Brahe’s original data.

In order to name plants, botanical taxonomists consistently need regular reference to scientific literature dating back to the mid-eighteenth century. Botanical nomenclature of vascular plants dates back to the first edition of Linnaeus’s code in 1753. Since then a series of attempts have been made to deal with the problem of name stability: how to ensure that a given species will have the same name all over the world and over time. In the 1820s the Kew rule was developed out of Kew Gardens to deal with priority in generic names; in the 1860s George Bentham worked on two large projects to stabilize systematics. In the 1890s the Berlin rule (limiting priority for names that had either fallen into disuse or never been accepted) came into conflict with the Philadelphia rule (according to which priority was absolute).

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The principal problems are twofold. On the one hand, it is highly desirable to be able to change the names of plants when new scientific insights are developed. On the other hand, it is extremely difficult and costly to change the names of plants. Consider the common tomato. Recent systematics research has suggested that its genus *Lycopersicon* should lose its status and that the plant should be accreted once more into the genus *Solanum*. At the time a recent book on nomenclatural stability (Hawksworth, 1991) was produced, the International Seed Trade Association was protecting the old name until the systematics debates were completed. But within the Botanical Code (affecting scientific publications, for example) the name could change during such discussion (Brandenburg, 1991). Changes in name introduced as taxonomic theory develops can have large-scale economic consequences: It could cost tens of millions of dollars to relabel packets of tomato seeds, revisit regulations, and so forth. One commentator noted that “single name changes can cost the horticultural trade millions of dollars, and . . . nurserymen would go out of business if they took the matter seriously” (p. 30). Brandenburg asks:

Have you ever tried to explain to a nurseryman, a plant trader, or a customs officer which name he should use for the tomato? Can you imagine the reaction if such a name has to be changed three times in ten years? If you have done so, you have a perfect explanation for the unpopularity of plant taxonomy amongst those in any work related to agriculture, horticulture, and silviculture: the inability of plant taxonomy itself to settle discussions with only a nomenclatural background. (P. 24)

Anderson’s (1991, p. 96) account raises the problem that even if a decision is made, the confusion will remain:

Accumulating evidence suggests that *Lycopersicon* may not stand as a genus distinct from *Solanum*. If they are combined there is no chance that *Solanum* will be dumped for *Lycopersicon*, so even though the name *L. esculentum* has been conserved, if the tomato is treated as a *Solanum* its name will become *S. lycopersicum*, which will provoke howls of anguish from agriculturalists and other non-taxonomists. We could conserve the name *S. esculentum*, which would go halfway toward solving the problem, but that would still leave our critics rabid. And there will be no escape, because that name-change will be essential to reflect accurately that opinion about the

relationships of the tomato. Worse, because reasonable people may differ in this matter, some taxonomists will continue to use *L. esculentum*, some will use *S. lycopersicum*, and the matter could continue unresolved for many years.

The issue of different interests between the person in the field or in the marketplace and the systematist who ultimately arrogates the right to name appears again in the case of the Douglas fir:

Proposals to establish a list of *nomina specifica conservanda* have been presented at several successive congresses. Such lists tend to be favoured especially by foresters and agronomists, who are not much concerned with formal taxonomy. I can understand the outrage of foresters at the change of the name of Douglas fir from *Pseudotsuga taxifolia* to *P. menziesii*, all because of some bibliographic digging by a man who knew little about the tree. (Cronquist, 1991, p. 302)

In the case of tomatoes we have differences between the scientist who knew too much and the practical field person; here we have anger directed at the armchair scientist who knows too little. The language is extremely strong in both cases, with words like *outrage* and *anguish* being used as well as reference to “rabid” critics. The authority to name clearly is an issue that touches some raw nerves among those who feel that names are being pushed upon them. All this century—since the Vienna Botanical Congress of 1905—some names have been preserved against the ravages of the taxonomist.

What is happening here in informational terms applies over a range of disciplines and can be expressed simply—even if over one hundred years of international meetings have not come close to settling the problem. In order to keep track of results in the sciences, you need to be sure of what you are dealing with—a rose should be a rose should be a rose, whether in seventeenth-century Leipzig or twentieth-century Pesotum. So the first principle is creation of as much name stability as possible. New understandings of plants, however, can lead to rearrangements of taxonomy: Two genera seen as historically distinct—the Chinese cabbage and the European turnip, for example—might now be seen as one (Chauvet, 1991). Both vegetables are of considerable economic importance, so it would be very difficult to change the name. Further, it would require painstaking indexing work to track the losing genus through the literature (it is akin to the problem in history of following women through name changes on marriage). This merg-

ing and splitting work is done at every level—from the species up to the kingdom (at which level the disputes between the Zoological and Botanical Codes about who gets to name, say, candidates for the kingdom of Protista [in which the members can be considered plants or animals] are called ambiregnal problems). But if the names are not changed, then the naming system loses its connection with theory and becomes more of an arbitrary mapping of the world, which militates against the whole point of producing names in the first place. To make matters worse, this area is far more intense in its demands than some others. In medicine, where exactly the same theoretical issues arise with the International Classification of Diseases—actually a statistical classification and a nomenclature (Bowker & Star, forthcoming)—we are dealing with far fewer entities than the number of plant and animal species.

### The Time of the Name: Priority

Over time the botanical community has developed a set of strictly defined bureaucratic procedures for dealing with naming. One of the basic principles is priority—often a bugbear in scientific communities but here a particularly difficult issue. The problem is that in a widely distributed literature—across all continents and a number of disciplines each with their own sets of journals—a rule is needed to decide which name should be standardized on. Priority has its own meta-priority as the solution of choice to such problems: This can lead, however, to standardizing to a name that is in minority use and thus losing an almost universal name.

The principle of priority is rooted in the work of Linnaeus, who invented the binomial naming system, which provides a consistent mode of naming all plants. In general, it has operated on the principle that a plant name be recognized if it “has been given after 1753; is in accord with the Linnaean system (a thorny issue since many non-Linnaean in the early nineteenth century gave names that nevertheless can be interpreted as of binomial genus-species form); and is not invalid according to the current rules of botanical nomenclature” (IRBN, 1935).

A plant’s full name evokes a detailed history, after the binomial giving an abbreviated reference to the author of the work where the name first occurred and a reference to the site of the publication.

This apparently simple set of criteria is notoriously hard to carry out in practice. One needs rules that are rigid enough to allow an unambiguous determination of difficult cases, yet flexible enough to accept publications

that do not strictly follow the rules but even so have led to a universally accepted name. The first rule that was developed to standardize naming was the so-called Kew rule, applied by botanists at Kew Gardens in London in the 1820s. According to this rule:

Only epithets that are already associated with a generic name are considered from the point of view of priority when that genus is being revised—this is the so-called Kew Rule. Priority dates from the time that the specific epithet is first associated with the generic name. Hence epithets that may be older, but which have only been associated with species placed in other genera, can be ignored, and when genera are combined, well-established names are less likely to be changed. The major issue in the Kew Rule is how priority is interpreted when genera are combined, a minor, but associated issue is that of whose names are to be cited when a plant name is transferred. (Stevens, 1991, p. 157)

The epithet here is the distinguishing name for a species, often describing one of its features. Thus the epithet “*esculentum*” in *L. esculentum* (the old name for the tomato) means “edible.” The major effect of the Kew rule was to give botanists some flexibility in renaming; if a plant was given a name under what was now believed to be the wrong genus, then that name did not have priority. Priority only accrued if genus and species remained constant.

In the 1860s there were two large-scale projects to standardize naming: George Bentham’s *Genera plantarum* and Alphonse de Candolle’s *Laws of Botanical Nomenclature* (Stevens, 1991). Bentham strongly defended the Kew rule and argued that there should be room in the canon for names that were not strictly correct in Linnaean terms but that were nevertheless widely accepted (Stevens, 1991, p. 162).

De Candolle’s work included lengthy discussions on the nature of priority, which drew particular attention to the tension between the name as history and the name as signifier. His laws formed the kernel of the current rules of nomenclature, which were maintained through a series of international biological congresses held throughout this century. He drew attention to issues of just how much history could be wrapped up in a name. Thus he cited Friedrich Kirschleger’s discussion of *Mulgedium alpinum* L. sp. 117 (*sub: sonchus*), *Less. Syn* 142. The “L.” here refers to Linnaeus, who was not the namer of the genus *Mulgedium*—in fact the epithet *alpinum* was Linnaean and the full name came from Christian Lessing—named after the first parenthesis.

De Candolle pointed out that this long and complex name would frequently be shortened in card catalogs or other lists to *Mulgedium alpinum* L., which would give a false history but would still be an effective, unambiguous name. He argued in two ways that the history wrapped into the name did not serve the purpose of providing glory, but was rather a simple convenience for arriving at an identifier:

When one wants to pay homage to a botanist, one dedicates a genus to him. When you want to speak about his merits or demerits on the subject of a given species or genus, one adumbrates and discusses his opinions either in the text of a description or by some parenthesis in a synonymy—however the citing of a name or names in a plant name does not in itself express either merit or demerit. It is the statement of a fact—that is to say that such and such an author was the first to give such and such a name to a genus, or that he was the first to attach this species to that genre. (De Candolle, 1867, p. 47)

He argued that “the name is what counts most. . . . You might change whatever you want in your description of the genus *Xerotes*, Br.; but one thing is fixed and certain and that is that Brown, in 1810, designated a genus with this name” (p. 53). He pointed out that the traveler who first picked the plant should perhaps be rewarded—but that priority in publication was the naming rule (p. 54). De Candolle even looked forward to a future day when the current set of names might drop out—once science had succeeded in describing definitively what plants there were on the face of the earth, then the current “scaffolding,” which contained many local exceptions to strict rules, might fall away. This, however, was not for the immediate future (p. 7). Here he is echoing Auguste Comte on scientific classifications, and indeed the French revolutionary calendar on the dating of events: When scientific precision is introduced, the history can drop away.

The flexibility advocated by Bentham and de Candolle enraged Otto Kuntze. In 1891 he produced a list of thirty thousand names that would have to be changed under a strict application of the laws of priority, and he wanted these changes to be effected (Briquet, 1906, p. 5). He excoriated proponents of the Kew rule, and called Bentham in particular “a great sinner in nomenclature” (Stevens, 1991, p. 162). Though many admired his work in principle, its root and branch changes were considered impractical in general. They led directly to the Berlin rule, according to which generic names not in general use fifty years after their publication could be

abandoned. In 1906 Kuntze stormed out of the International Botanical Congress in disgust, claiming that his protests were not being taken seriously enough (Briquet, 1906, p. 112).

Jean Briquet was a prime mover at the International Botanical Congress in Paris in 1900, and he headed the commission set up by that congress to determine a new code of botanical nomenclature. Priority remained central, but it was palliated by the conservation of certain names that lacked priority but had universal acceptance. Needham commented in 1910 on the work of the commission:

We have accepted the alteration of hundreds of well-known names that are root-names of many more genera within their respective groups: and such derived names, once of great assistance to the memory, have, so to speak, the props knocked from under them.

Finally, and most lamentably of all, by our hasty and profitless abandonment of even the best-known family names we have broken with our best traditions . . .

The pursuit of stability through rules of priority that has led to all this is surely one of the most singular of contemporary psychological phenomena. (1910, p. 296)

We shall return to Needham's reference to memory in the section on euphony below. What is significant here is that priority is seen by Needham as an unnecessary principle indicative of, if anything, psychological disorder:

Why should it [the international commission] determine merely whether a certain forgotten name, abandoned by its author and never used, is really eligible for use under the rules of the code? It grieves me to see fifteen big brainy men, capable of doing something rational, put into a hole where they are expected to do only such little sinful things as this. (1910, p. 296)

The word *sinful* is evocative of the passion of the priority debate, echoing as it does Kuntze's charge against Bentham.

Throughout this century the International Congresses have ever further refined in parallel the application of the rules and the granting of exceptions to them. A typical entry in a relatively recent (1965) proposal for the conservation of a name gives some idea of the kind of work—at once botanical and bibliographical—that is involved in the maintenance or breach of priority. B. Verdcourt from Kew proposed conserving the generic name *Warburgia* Engl., 1895 against *Chibaca* Bertol. F., 1853 (Cannellaceae). He argued that *Chibica* was con-

sidered invalid soon after its publication and that Bentham and Hooker had added it to their “genera ramanent indefinita et nomina delanda” (genera that remain undefined and deleted names). In an Italian journal in 1937 Emilio Chiovenda suggested that *Chibica* was a member of the family Canellaceae and was identical with *Warburgia breyeri* Pott. Chiovenda had not actually seen any *Warburgia*-type specimens, however, so Verdcourt held fire. Then in 1964, while he was passing through Bologna, Verdcourt searched for Chiovenda's type specimen. But it could not be found. German troops lodging at a farmhouse near the herbarium had burned the collection. Verdcourt went back to the literature with his interest piqued and determined that *Chibica* was *Warburgia* but that the latter should be conserved since the former name “is virtually unknown and has never been used in any flora or paper other than that by Chiovenda” (Nomina Conservanda, 1965, pp. 27–28). Thus, in order to effectively breach the principle of priority, Verdcourt had to prove that priority should apply according to the rules of nomenclature and then make the argument that in this case it would cause unnecessary problems to actually apply it. Equally, when the rule is applied, it is often necessary to do intense bibliographical work. Galtier (1986, p. 6) notes that it was necessary now to get down to the day and month of publication in many cases.

Priority, then, has been seen by some as everything from a pure naming convention (De Candolle's position) to a matter of grave importance (Kuntze). The list of botanical names willy-nilly serves as both an honor roll (and in so doing necessarily contains a highly formalized and abbreviated account of the history of each name) and as a set of arbitrary identifiers (since everything must be called something). There was a short-lived attempt to introduce the concept of “numericulture” (giving each taxon a universal number rather than a name), but it did not gain many adherents (Little, 1964). Names are taken much more seriously by scientists and by the general public than numbers or arbitrary identifiers, so that rather than solving the problem of naming it would merely have added another layer to its complexities (cf Bowker & Star, forthcoming, Chapter 2 on alternative naming schemes for viruses).

### The Space of the Name: Effective Publication

The issue with priority is who came first; the issue with publication is from which publication did they come? In the early nineteenth century, when there were fewer scientific journals, the most general problem was dealing

with works not in English, French, or German. Over time the number of journals has increased dramatically, and so the amount of bibliographical work that must be done to locate and propagate a name has risen in conjunction (Kirk & Cannon, 1991, pp. 279–280).

De Candolle's first principle of botanical nomenclature, accepted by Briquet into the International Code and still in place is that "Natural History can make no progress without a regular system of nomenclature, which is recognized and used by the great majority of naturalists in all countries" (De Candolle, 1867, p. 13; Briquet, 1906). He discussed the problem of referencing publications within plant names. With that passion for system that characterizes much work in this field, he discussed the problem of author abbreviations in botanical names, and enumerated some forty-seven vowel and diphthong combinations that could hide in between the "h" and the "k" in "Hkr:" and then pointed out that the same forty-seven could hide between the "k" and the "r," leading to 2,209 possible names (De Candolle, 1867, p. 56). Just as he argued that the name of the plant was just a name and not an attribution of glory, so he argued that the publication of a name was just a publication and was not something still owned by its author:

Can an author who regrets having published a name change it? Yes, but only in the those cases where the names could be changed by any botanist. In effect the publication of a name is a *fact* that the author cannot revoke. (De Candolle, 1867, p. 57)

De Candolle did not, however, discuss just what a publication was.

By the time of the Paris Congress in 1905, the definition of *publication* had become an important issue—complicated of course by the fact that the further one went back in time the less well defined was the field of scientific publication. (I note in passing that many of the rules adopted by botanists with respect to nomenclature can be read as an attempt to apply retrospectively whatever the current canons of scientific publication were to previous generations. This inevitably led to distortions of the historical material and so to a kind of active reading in science that would only be developed in literary criticism in the mid-twentieth century—a movement countered, for example, by De Candolle's enunciation of the principle of "never making an author say what he has not said" [Stevens, 1991, p. 159].) Briquet's commission proposed the definition that "Publication is effected by the sale or public distribution of

printed matter or indelible autographs. Communication of new names at a public meeting, or the placing of names in collection or gardens open to the public, do not constitute publication" (Briquet, 1906, p. 53).

Equally thorny at that period was the question of whether "diagnoses" (formal descriptions) of plants had to remain in Latin. This problem was raised by the Spanish delegates, who wanted their language accepted alongside French, German, English, and Italian as legitimate languages for a diagnosis (International Botanical Congress, 1906, p. 131). They lost the battle, on arguments such as that by Professor Maire that

The principle of an obligatory Latin diagnosis . . . is the only means of conserving at present an international language, which language is an immense privilege for systematic botany. If we admit diagnoses in three modern languages, then everyone else will want to join in: after the Chinese there will be no reason to refuse the Papuans, the American Indians and all peoples who may one day accede to scientific life. Systematic botany would become a veritable Tower of Babel. (Fifth International Botanical Congress, 1931, p. 583)

There is an element of irony in the enforcement of Latin in the interests of internationalism, but it is unclear what alternatives existed. Many botanists were concerned about the discovery of plant descriptions in valid form in Russian, for example, supplanting (to coin a phrase) current names in Western Europe. This could be particularly difficult if different philosophies of naming were in operation. It has been suggested, for example, that in Marxist Russia there were no infraspecific categories because these were not acceptable to dialectical materialism's insistence on the irreducibility of species (Heywood, 1991, p. 54; cf Graham, 1972).

Over the course of this century the issue of how many journals to look in has been problematic. At Kew Gardens currently some seven hundred journals "are regularly scanned, as well as monographs, floras and other works in which new names might be found" (Lock, 1991, p. 287). Each new discipline that has grown up has spawned new journals. Fossil species have long presented difficulties. For example, the *Journal of the Geological Society of London* is only rarely read by neobotanists (those concerned with current flora), and yet paleobotanists have proposed new fossil genera in it (Boulter, Chaloner, & Holmes, 1991, p. 238). From 1 January 2000 "the names of newly described botanical (including fungal) species will have to be registered in order to be validly published," and the Clearing House Mechanism is

being adapted to coordinate this on an international basis (Heywood, 1991, p. 57).

The issue with publication therefore has been how to be sufficiently universal so as to accept all scientific work done throughout the world and yet sufficiently restrictive so as to make the information management problem tractable. The latter criterion has been frequently met by regularly underrepresenting work not in English or some other major European language and ignoring work not in an ill-defined set of central journals.

### The Sound of the Name: Euphony

Euphony has been a surprisingly resilient problem in the history of the naming of plants. Linnaeus has as one of his basic recommendations that plants, in order to be easy to remember—all botanists must know and remember all the genera (Cain, 1958, p. 144)—should be easy to pronounce. That is, they should be euphonious. George Bentham observed in 1838 that “names that seemed very difficult for an Englishman to pronounce might be easy for a Pole, Russian or German, and vice versa” (Stevens, 1991, p. 160). By the next century, however, euphony was back on the agenda. In the 1905 Vienna Congress (one of the turning points in the history of botanical nomenclature), Linnaeus’s recommendation might be seen to be echoed in the following:

- V. Botanists who are publishing generic names show judgement and taste by attending to the following recommendations: . . .
- c) Not to dedicate genera to persons who are in all respects strangers to botany, or at least to natural science, nor to persons quite unknown.
  - d) Not to take names from barbarous tongues, unless those names are frequently quoted in books of travel, and have an agreeable form that is readily adapted to the Latin tongue and to the tongues of civilized countries. (Briquet, 1906, p. 39)

Each line requires a little elaboration. The “judgement and taste” phrasing is there to emphasize that this is a recommendation and not a requirement; the congress was attempting to deal with the problem of consistently naming all taxa worldwide for all time, and so wanted to keep requirements to a minimum. I have included point “c,” which is not a principle of euphony but does give an indication of the company that euphony kept: adjurations to civilized behavior in contemporary terms and ways of excluding the outsider and the underdeveloped in more recent coinage. As late as 1971 a new bo-

tanical nomenclature (NBN) was proposed that would preserve euphony in similarly ethnocentric fashion. The NBN uses Esperanto, where “the words are pleasing to the ear, there is enormous flexibility in word-formation, etc.” (De Smet, 1991, p. 180).

Thus one person’s euphony is another’s cacophony, and yet, as with priority and publication, it is a *prima facie* reasonable requirement. The problems have arisen—again as with the others—when you try to turn a set of precepts that have worked for a loosely defined club of largely Western European natural philosophers into a system that can work universally.

### The Reach of the Name: Organizational Dimensions

The naming system in botany has served as a means of demarcating professional and research communities one from the other. De Candolle in 1867 made clear the distinction between botany and zoology:

[Linnaeus’s system] has often been cited in philosophy courses. It has been considered superior to chemical nomenclature, because it lends itself better to changes necessitated by progress. Botanists professed a veritable cult for the system. They prided themselves on having better understood and developed it than the zoologists. (P. 3)

Indeed his first principle of botanical nomenclature, taken up in the first international code and still the first principle to this day, was that “Botanical nomenclature is independent of zoological nomenclature, in the sense that the name of a plant must not be rejected merely because it is identical with the name of an animal.” (ICBN, 1956, p. 12).

This distinction has led to a series of border disputes concerning just what should or should not be included in the nomenclature. One thorny issue has been ambireginal species—species that might equally well be designated plant or animal. This problem has been on the rise with new phylogenetic work “increasing the number of major new inherently ambireginal clusters of autotrophic (plant-like) and heterotrophic (animal-like) protists” (Patterson & Larsen, 1991, pp. 197–198). Most believe that generating a single code is just not going to happen, but that arbitrarily assigning protists to one code or the other is equally problematic (p. 201).

A dispute erupted with bacteriologists in the Fifth Botanical Congress. The bacteriologists, led by R. E. Buchanan, wanted an exemption from the need to use Latin in their diagnoses of specimens. Botanist Thomas Haumann came back with the argument that what

“bacteriologists, doctors and chemists call a ‘description’ ” is not what botanists would call one. He argues that “the bacteriologists have not yet reached the stage of development which would permit the establishment of an accord between their still rudimentary systematics and a rational systematics.” Buchanan responded that bacteriologists were doing serious and rational work and that “if the congress cannot accept my motion, the bacteriologists will separate themselves from the botanists and will develop their own rules” (Fifth International Botanical Congress, 1931, pp. 588–590). And the bacteriologists subsequently did break off from the botanists—underscoring the move with a decision in the 1960s to abandon priority and free “themselves of the burden of past names and literature by adopting a list of all bacterial names in use, removing from nomenclature all names not listed, and adopting a process of registering all new names proposed henceforth” (Ride, 1991, p. 106). This is not an isolated instance in scientific communities. Indeed, a similar dispute occurred this century between plant and animal virologists and was exacerbated by the discovery that some viruses could jump between plants and animals. The disagreement led to an enforced merger of two fiercely different codes, with the proponents of zoological and botanical nomenclature thundering dismissals of the others’ system (Matthews, 1983; Bowker & Star, forthcoming).

Currently there is a whole apparatus of name protection that echoes the apparatus of species protection. Thus, when a plant goes from being a weed to a useful variety, its name goes from being changeable to being fixed:

In cases where names of economically important species are involved, the Code provides for conservation in order to preserve current usage. Judging from the success of past species conservation or rejection proposals, it is not always clear as to what constitutes an economically important species. Some weeds of significant agricultural importance have not qualified for name conservation. With the expanding potential of gene transfer for crop improvement involving more distantly related taxa, more species will become useful to agriculture. Communication about such species depends on a stable nomenclature. (Gunn, Wiersema, & Kirkbride, 1991, p. 18)

In general, two options are open for a given name: It can be “conserved,” which means that it is protected indefinitely against the ravages of taxonomy and nomenclatural reasoning, or it can be “stabilized,” which means that it will be protected for a given period of time while

debate proceeds. As indicated in the introduction, serious economic consequences can flow from decisions made by taxonomists. The problem of cultivars (cultivated varieties) and their naming has been a constant one: It has been remarked that botanical “snobbery” has meant the overlooking of “substantial horticultural works of the late nineteenth and early twentieth century” (Hawksworth, 1991, p. 106) as published sources for priority purposes.

Not only the farmers and nurserymen have problems with the current politics of naming. Consider the fossil, that apparently most useful of traces of the past, which is currently being massively underused partly because of naming problems:

The use of fossils has in recent years come to be regarded as cumbersome and unproductive; the work is said to abound with unimaginative complacency, with the obscurity of esoteric terminology, and with lack of compatibility of treatment of different groups including even that between the fossils of plants and animals. As a result, much effort has been directed by geologists in solving their stratal problems towards employing any other available physical or chemical phenomena, and thus to avoiding altogether the “expensive” and supposedly ineffective use of paleontologists and their fossils.

Paleontologists, who almost all continue to believe that their fossils and the distribution of these form the only viable method of discriminating diverse and confusing strata, are striving to present their fossils more ingeniously and to win back the confidence of the geologists. (Hughes, 1991, p. 39)

This has led to a situation where geologists from some petroleum companies have abandoned the scientific literature and developed their own coding for fossil remains. Even when the agreed-upon naming procedure is followed, the fossil genera might be buried in, say, the *Journal of the Geological Society of London* (p. 238), where no database manager or neobotanist would look for a new genus. There is a set of difficulties associated with fossil use that compounds these problems. As one author notes, there are just too many conflicting uses for them: “Many of the difficulties in palaeobotany and its sub-discipline, palynology, occur as a result of the sometimes conflicting aims of botanical and geological researchers handling these data” (Boulter, Chaloner, & Holmes, 1991, p. 232). Further, fossil plants are rarely complete so that different parts of a plant will be classified differently; and the mode of fossilization—permineralization or compression are two main modes—often

gives rise to different classifications, unless a linkage can be made through a contingent Rosetta stone (Galtier, 1986).

The situation today is in some ways much the same as it has been over the past two hundred years. A recent author (Klemm, 1990) noted that

For any given conserved tropical wildland we are confronted with a problem roughly analogous to receiving an enormous library with no call numbers, no card catalogue, and no librarians—and the library being in a society that is only minimally literate and not even certain that reading has much to offer. The library is hardly more than highly flammable kindling in such a scenario. (P. 23)

Indeed renaming in this context can be highly problematic. When subspecies or varieties are elevated to full species rank,

This may have very unfortunate consequences from a legal point of view when the species to which the subspecies or variety belonged before the nomenclatural change is listed as a protected species, the result of the split is that the new species loses its protected status unless the legislation is amended to add it to the list. (P. 33)

The move to register all names, to agree on model data structures and formats for biological databases in order to facilitate biodiversity management (Heywood, 1997, p. 12) is just as urgent and just as overly optimistic as the calls of De Candolle for a rational system of nomenclature.

### Conclusion: What's in a Name?

In this paper I have endeavored to show that the production of consistent names for all plants is a very rich organizational and intellectual process. Over time it has involved setting up rules for the reading of documents—and indeed producing an understanding of just what kind of activity reading is; deciding just what kind of a thing a publication is; endeavoring to find a name with a pleasing, memorable sound (and to deal with cross-cultural issues in deciding euphony); and negotiating with other scientific groups (zoologists, bacteriologists) and with commercial and regulatory bodies (horticulturists, nurserymen, government agencies).

This set of issues is matched by other bodies (for example, epidemiologists) who try to maintain datasets for extended historical periods and geographical sweep. They are issues that each generation has generally ig-

nored as the new set of information technologies is brought into play along with its particular dream of a common language (Rich, 1978).

Naming is a difficult thing to do. It is a site of important decisions for the organization of knowledge and for the organization of scientific work, and it is an activity with political and economic consequences. These dimensions should be fully factored into the development of new information systems to deal with the burgeoning huge datasets that are a necessary adjunct to biodiversity management.

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