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TAXONOMIC PROPERTY

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INTELLECTUAL property law has been dealing with botanical innovations in a sustained way for over a century. Over this period, a number of different types of intellectual property have been used to protect new plants including trade marks, plant patents, plant variety rights, and, more recently, (utility) patents.[1] One of the things that has become apparent over the last century or so is that these various areas of law – which I will collectively refer to as plant intellectual property – occupy an awkward position within intellectual property law; they have been treated as outsiders that are begrudgingly tolerated, but not liked. This is reflected in the idea that plant breeder's rights and plant patents are sui generis, that is, that while they may share certain features in common with mainstream intellectual property, they are sufficiently different to be categorised separately. The non-conformist image is reinforced by the fact that most plant related intellectual property regimes are managed by departments of agriculture rather than, as is the case with other forms of intellectual property, departments of trade or commerce. The idea that plant intellectual property is outside the mainstream is reinforced in the way that the international conventions are organised. The ambiguous standing of plant intellectual property is also reflected in the fact that the provision within the TRIPS Agreement dealing with plants, namely Article 27(b), is one of the two provisions where the Member States were unable to reach agreement about the way in which the subject matter was to be protected.[2]

These doubts about the standing of plant intellectual property have resurfaced recently in arguments that the law in this area is out-of-date, outmoded, and obsolete. In some cases, this has been promoted by concerns that aspects of the law, such as the breeder's exemption or the right to save seed in plant variety rights legislation, have been rendered obsolete by changes in the way that breeding is funded. In other cases commentators have argued that the sui generis and technologically specific laws have not kept pace with advances in

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[1] Throughout the paper, "plant variety rights" will include "plant breeder's rights".
[2] Another perceived oddity is that many of the plant intellectual property regimes, notably the US 1930 *Plant Patent Act*, began as attempts to protect plant names within trade mark law. As will become clear, the early connection made between naming and plant intellectual property was not as odd as it may first appear.

science and technology; that, for example, while science has shifted its attention from phenotype to genotype – or from the surface to subsurface -- the law is either unable or unwilling to make the changes necessary to accommodate these developments. It has also been argued that the patenting of seeds and plants is inappropriate and immoral and, as such, that it should not be allowed or tolerated. Given the economic importance of plant breeding and the time and effort that has been invested in plant intellectual property, it is not surprising that a number of commentators have attempted to defend the law from such criticisms.

In this article I wish to engage with these debates about the currency of plant intellectual property, and the role that these different forms of protection might play in the future. While I do not necessarily wish to defend plant intellectual property, I do want to argue that these discussions have been restricted as a consequence of the way that they approach their subject. More specifically they have been restricted both as a result of the way that they look at the plant invention and also as a consequence of the way that they think about the nature of the relationship between law and science. While recent discussions about plant intellectual property transverse a number of different topics, in this article I want to focus on one specific issue: namely, the question of how the plant invention is described.

Both patent and plant variety rights protection rest upon the possibility of describing a new plant variety so that it can be identified and distinguished. This is important both when deciding whether intellectual property rights should be granted and also when deciding whether these rights have been infringed. Another reason why it is necessary to be able to describe a plant innovation is because of the requirement that the plant invention must be able to be described so that it can be reproduced by third parties (variously known as the requirements of sufficiency, enabling disclosure, and fair basis). Although the question of how a plant innovation is to be described so that it can replicated by a third party is an important one, it is not one that I will pursue here. Instead I will focus on the way that a plant is described for the purposes of ascertaining what the invention is.

Despite what some recent literature might have us believe, one of the most consistent objections to the patenting of plants throughout the twentieth century was not the ethical argument that they were living "products of nature". Rather it was the more pragmatic complaint that plants could not be adequately defined and distinguished.[3] For example, one of the concerns that was raised about the

[3] Joseph Rossman, "The Preparation and Prosecution of Plant Patent Applications" (1935) 17 Journal of the Patent Office Society 632, 635–638. Harry C. Robb, "Plant Patents" (1933) Journal of the Patent Office Society 752, 753. Robert Starr Allyn, *The First Plant Patents: A Discussion on the New Law and Patent Office Practice* (New York 1944), 18.

proposed extension of patent law to plants at the beginning of the twentieth century was that breeders would not be able to describe plant inventions with the specificity and detail demanded by patent law. For the most part, the task of describing mechanical artefacts and chemical compounds was relatively straightforward. Applicants were able to provide a description that married structural and functional descriptions in a way that enabled inventions to be recognised. This was not believed to be possible, however, with plant inventions. One reason for this was the belief that applicants were unable to provide "the botanical finger prints by which the plant may be identified and distinguished from other varieties".[4] The problem of how a plant was to be described was thought to be particularly acute where the novel characteristics of the plant lay in its odour, flavour, or taste.[5] As one commentator asked "How do you describe in words what a violet smells like or a Jonathan apple tastes like?".[6] "Pray tell me, what does an onion taste like? Please describe the odour of the rose[7] which you purchased on the 15th day of June 1932? … The possibilities of humour as to the 'flowers that bloom in spring' are quite unlimited".[8]

The concerns about whether plant inventions could be described with the specificity required by patent law were exacerbated by the tendency for plants to change depending on where they are grown.[9] While a lever was always a lever, a cam was always a cam, and even a complex chemical compound stays the same in molecular structure, this was not so with plants which change depending on the environment in which they are grown.[10] The fear that breeders would be unable to describe plant inventions in the manner required by intellectual property law was heightened by the fact that sexually reproduced plants do not reproduce true-to-type. While the characteristics of an asexually reproduced plant, that is a plant which has been propagated clonally from buds or cuttings, remain constant,

[4] Rossman, "Preparation and Prosecution of Plant Patent Applications", 640–1. This was because "botanists have not been completely successful in evolving accurate verbal diagnosis of species differences. Since this botanical experiment in plant description has been going on with varying success since Linnaeus' time, it may be that a valid definition of varieties differing only in a few rather variable characters may be virtually impossible". Robert Cook, "Editors Note" (1936) 27 Journal of Heredity 478 (written in response to Keith Barrons, "A Defense of Basic Plant Patents: From the Plant Breeder's Point of View" (1936) 27 Journal of Heredity 475).

[5] Allyn, *The First Plant Patents*, 46.

[6] Joseph Rossman. "Plant Patents" (1931) Journal of the Patent Office Society 7, 15.

[7] Allyn, *The First Plant Patents*, 46.

[8] Robert Starr Allyn, "Plant Patent Queries" (1933) Journal of the Patent Office Society 180, 185.

[9] "Change the conditions and the plant changes. For example … the Washington navel orange, which was the basis of the Californian orange industry, was practically worthless in Florida. The conditions are different and the plant is different". Robert Cook, "Patents for New Plants" (1932) 27 The American Mercury 66.

[10] "A machine, once made, stays put: it cannot grow or change. But it is impossible to determine whether a Baldwin apple is like the original Baldwins that grew on the first tree of that variety when it was discovered in 1793". Rossman, "Plant Patents", 15.

there is no guarantee that the characteristics of a sexually reproduced plant will remain the same from generation to generation:[11] a fact that was thought to make patent protection difficult, if not impossible.[12]

Faced with these problems, commentators fantasised about the possibility of using genetic mapping as a way of describing new varieties. As the editor of the Journal of Heredity and Eugenics wrote in 1930, while maize was the only plant in which provisional chromosome maps had then been made, he predicted that "in time others will follow, and the use of such descriptions in a patent will place the patenting of plants on a status very similar to that of the patenting of chemical compounds".[13] Confronted with the realisation that it may have been some time before science was able to provide the quick-fix that many hoped for, the proponents of plant intellectual property argued that the existing legal rules and procedures needed to be modified to ensure that they could accommodate plant inventions.[14] While this met with some resistance, particularly from lawyers and patent attorneys, these arguments were accepted by policy makers and legislators in many countries. For example, in 1930 the United States Congress responded to concerns that plant inventions could not be described with the detail and specificity demanded by patent law by adding a rider to the section of the US Patent Act that required applicants to accurately describe their invention that said: "no plant patent shall be declared invalid for non-compliance with this section if the description is as complete as is reasonably possible".[15] The US Congress also responded to the concern that sexually reproduced plants might not be able to be identified because they do not necessarily reproduce true-to-type by limiting the scope of plant patent protection to plants that were reproduced asexually. When the scope of protection was extended in the middle part of the twentieth century

[11] Cook, "Patents for New Plants", 66–7. Thus "a verbal patent description, and even accurate coloured illustrations are not likely to prove altogether satisfactory in describing new plants". *Ibid.*

[12] See, for example, (US) H. Rep. 1129 71st Congress 2d. Sess. (1930), 4; (US) S. Rep. 315, 71st Congress 2d. Sess (1930), 3; Peter Forbes Langrock, "Plant Patents: Biological Necessities in Infringement Suits" (1959) 41 Journal of the Patent Office Society 787, 788.

[13] Robert Cook, "The Plant Patent Law" (1930) 21 Journal of Heredity 319, 362. Rossman said that when the Senate discussed the proposed plant patent regime in 1930 that it failed to mention the use of genes and chromosomes in identifying new varieties. This was said to be "probably the only accurate and scientific method which can be used, for it is conceivable that the same plant under different soil, weather and other environmental conditions might change to such an extent as to be hardly recognisable by mere external description … The new law … does not exclude this method of plant identification". Rossman, "Plant Patents", 15.

[14] Commentators at the time suggested that the fact that plants were by their very nature so different from other patentable subject matter that there needed to be dramatic changes to the existing procedures. See, for example, Robert Cook, "The Administration of the Plant Patent Law from the Breeder's Point of View" (1933) 5 Journal of the Patent Office Society 275; Robert Cook, "The Plant Patent Law" (1930) 21 Journal of Heredity 319, 362.

[15] See 35 USC sec 162. This is often referred to as the "saving clause". See, for example, *Application of Le Grice* (1962) 49 CCPA 1124, 301 F2d 929, 133 USPQ 365.

to include plants that reproduce sexually, special rules were also developed to ensure that new plants could be identified. Notably, the requirements of distinctiveness, uniformity and stability, which are a cornerstone of plant variety rights protection, were introduced to ensure that the protected subject matter was stable enough to be identified and demarcated. These rules were reinforced by the requirement that has been adopted in many jurisdictions that applicants must deposit a physical copy of the protected plant in a recognised depositary. While this is primarily designed to deal with problems of enabling disclosure, it also helps to identify the protected plant post-registration.

Although policy makers, scientists and lawyers are still grappling with the question of how botanical innovations should be described and identified,[16] the introduction of these tailored rules seemed to overcome the concern that plant innovations could not be described in a way that would have satisfied the requirements for protection. While the relaxation of the normal rules may have enabled plant innovations to be subsumed within intellectual property law,[17] it also helped to perpetuate the idea that plant intellectual property is not only different to mainstream intellectual property, but that it is also inferior, that it is the "Neanderthal of intellectual property"[18] that is begrudgingly tolerated, but not condoned and certainty not applauded or championed. It also helped to perpetuate the idea that the mode of description used in plant intellectual property was unsophisticated and lax,[19] and that it lacked the precision and rigour normally attributed to the regimes that protect industrial inventions.[20] The complaints about the unsophisticated nature of plant intellectual property have resurfaced in recent comments that the law in this area has been rendered obsolete by the wonders of molecular biology which have served to highlight the antiquated and redundant nature of the existing regimes. In some cases the state of scientific knowledge at the turn of

[16] For recent examples see the Advisory Council on Intellectual Property (ACIP), *A Review of Enforcement of Plant Breeder's Rights: Discussion Paper* (Canberra 2007); Charles Lawson, "Depositing Seeds to Comply with the Patents Act 1990 (Cth): The Adequacy of Definition and Description?" (2004) 23(1) University of Tasmania Law Review 69; Tim Roberts, "Plant Variety Rights: the Breeder's Exemption", *WIPO-UPOV Symposium on the Co-existence of Patents and Plant Breeders' Rights in the Promotion of Biotechnological Developments* (3 Oct. 2002) WIPO-UPOV/SYM/02/3, 2. ("The process of breeding is rarely reproducible, depending on chance events: a variety may be reproducible (indeed must be, to qualify for protection) but the process by which it is first produced generally is not").

[17] See, for example, the US Supreme Court in *Diamond* v. *Chacrabarty* 447 U.S. 303 (1980), at 312 (US Sup. Ct.).

[18] Cary Fowler, *Unnatural Selection: Technology, Politics and Plant Evolution* (Yverdon 1994), 152.

[19] Speaking of the 1930 Plant Patent Act, Fowler said that it "allowed lax descriptions of the invention, a liberal policy regarding discoveries, and no clear indication that the new plant variety constituted an improvement over existing ones". Fowler, *Unnatural Selection*, 93.

[20] Daniel Kevles, "A History of Patenting Life in the United Sates with Comparative Attention to Europe and Canada" (12 Jan. 2002) *Report to the European Group on Ethics in Science and New Technologies*, 13.

the century was seen to be the reason why plant inventions could not be adequately described for legal purposes. This is reflected in the comment that "in 1930, before the discovery of DNA and the accompanying realisation that living subject matter could be conceptualized in terms of biochemical compositions, it would be understandable for Congress to assume that plants could never be described with the precision expected under the utility patent regime".[21]

The problem with these arguments is that they are based on a narrow reading of plant intellectual property. One of the reasons for this is that they build upon an image of the plant invention as a physical entity that is isolated and removed from the environment in which it was produced. In many ways, it does not come as a surprise that this image of the invention has been used, given that it corresponds with the way that the patented invention functions within modern intellectual property law. Indeed one of the defining features of modern patent law is that the invention is able to be treated as a separate and distinct object which is unconnected to the environment where it was produced.[22] Importantly, it is this decontextualisation of the invention that enables patents to circulate so freely and quickly, for them to become part of the commercial currency, to appear on the balance sheets of companies, and to be traded around the world.

While the ability to decontextualise the invention may be one of the reasons why modern intellectual property has been so successful, there is no reason why we should adopt this particular image of the invention when we are thinking about intellectual property; not least because in so doing we lose sight of some of the more interesting and important aspects of plant intellectual property. Instead of seeing plants as discrete objects that are isolated from the environment in which they were created, in this paper I wish to look at plant inventions as "informed materials", that is as objects that are constituted in relation to the informational and material environments in which they are generated.[23] Importantly, this environment is not something that is simply external to the object. Instead the environment enters into the constitution of the entity: it is folded into and becomes part of the object in question. One of the consequences of seeing plant inventions in this manner is that it reminds us that

[21] Mark D. Janis and Jay P. Kesan, "Weed-Free IP: the Supreme Court, Intellectual Property Interfaces and the Problems of Plants" (Nov. 2001) Paper 7 *Illinios Public Law and Legal Theory Research Papers Series*, 21.

[22] This refers to the operation of the patent as an object of exchange (post-grant). It does not apply in relation to the obviousness inquiry; where the place and manner of creation may be important.

[23] See generally: I. Stengers, *Power and Invention: Situating Science* (Minneapolis 1997); A. N. Whitehead, *Process and Reality* (New York 1978); A.N. Whitehead, *Science and the Modern World* (London 1985); Andrew Barry, "Pharmaceutical Matters: The Invention of Informed Materials" (2005) 22 Theory Culture Society 51.

breeders do not produce bare plants which have been isolated from their environment. Rather, by the time that a plant invention is presented for registration, it will have been subject to an array of tests and trials that generate a wealth of information about the plant. Perhaps most importantly of all, the new plant will have been classified, ordered and given a name, as it is subsumed within the most venerable of sciences, taxonomy.

II

Botanical taxonomy and nomenclature, which are concerned with the classification and naming of plants, have a long and complex history. While herbalists, medical practitioners, and cooks have long had a need to identify and distinguish different plants, the greatest impetus to sort, describe and organise plants into a rational and ordered system came in the eighteenth and nineteenth centuries with the rapid expansion in the movement of plants around the world.[24] As plant numbers proliferated, so too did the problems in nomenclature: individual plants were given different names and the same name was applied to different plants. The chaos created by the flood of plants increased calls for the development of a general science of order, a regime that would ensure that when "confronted with the same individual entity, everyone will give the same description, and inversely, given such a description everyone will be able to recognise the individual entities that correspond to it".[25] Over the last two centuries, botanists have responded to these calls by developing a sophisticated set of rules and procedures that govern the naming and classification of plants. While aspects of taxonomy and nomenclature are still unsettled, they have helped "to transform local knowledge of plants, critical to the survival of indigenous people anywhere, into a comprehensive system of naming, of ordering and classifying, which now embraces every known plant in the world".[26]

One of the factors that contributed to the remarkable success of taxonomy and nomenclature was that the rules and procedures were accepted and adopted by botanists around the world. Notably, the international botanical congress held in Paris in 1867 adopted the *International Code of Botanical Nomenclature* (1867) as the global

[24] Anna Pavord, *The Naming of Names: The Search for Order in the World of Plants* (London 2005), 26.

[25] Michael Foucault, *The Order of Things* (London 1970), 134.

[26] David Gledhill, *The Names of Plants*, 3rd ed. (Cambridge 2002), 4. As Müller-Wille argues, gardens, and particularly botanic gardens, played an important role in standardising the naming of plants: "to fulfil the tasks of a taxonomist – classification and denomination – it is necessary to have empirical access to plants … [T]he instrument to overcome this problem is the garden (with access to libraries and the necessary technology and staff". S. Müller-Wille, "Gardens of Paradise" (2001) 25(2) Endeavour 49.

standard by which plants were to be classified and named.. The Code has been updated regularly: the latest version being the Vienna Code, which was adopted at the seventeenth International Botanical Congress in 2005.

In essence, taxonomy consists of three related activities; identification (referring a plant to a previously classified and named group), classification (ordering plants into groups based on perceived similarities and differences) and nomenclature (naming groups of plants according to rules developed for the process).[27] The classificatory scheme used by taxonomists consists of a hierarchical series of categories -- or taxon – that operate, in effect, like a "box-within-a box".[28] Under this scheme, the basic hierarchy of the plant world is divided, in descending order, into Divisions; Classes; Orders; Families, Genera (genus), and Species.[29] While there is agreement about the way that the taxonomic categories are arranged above the species level, there is a less agreement about how plants sub-species are to be dealt with.[30] Over time, a number of different names have been given to taxon below the rank of species, including subspecies, varieties, subvarieties, forma, sub-forma, and cultivars. In part, this is a product of the fact that cultivated plants have never fitted comfortably within botanical taxonomy.[31] Indeed, the process of naming and classifying cultivated plants is so different from the taxonomy of naturally occurring plants that it has its own separate body of rules and procedures, as well as its own international regime, namely the *International Code of Nomenclature for Cultivated Plants*. As we will see, this has had important ramifications for plant intellectual property.

The process of placing plants into the appropriate taxonomic category requires the taxonomist to order plants into groups based on perceived similarities and differences.[32] For much its history, "the identity of each plant was assured by the positive mark which they all bore – each being bore a mark, and the species was measured by the extent of the common emblem. Each species identified itself by itself,

[27] Judith Winston, *Describing Species: Practical Taxonomic Procedures for Biologists* (New York 1999), 9.

[28] J. McNeill, "Nomenclature of Cultivated Plants: A Historical Botanical Standpoint" (2004) 634 Acta Horticulturae 29, 31.

[29] While all of these categories are important, the species plays a special role in that it acts as "the empirical or basic unit of classification". C. Jeffrey, *An Introduction to Plant Taxonomy* (London 1968), 17.

[30] For example, the introduction to a 1986 collection for the Systematics Association said that one of the aims of the book was to ask "whether classifications below the species were useful, informative and scientifically valid? To which the answer was: in most instances yes, but it largely depends on the plant groups under discussion". See J. Hawkes, "Infraspecific Classification: the Problems" in B. Sykes (ed.), *Infraspecific Classification of Wild and Cultivated Plants* (Oxford 1986), 1.

[31] Jeffrey, *Introduction to Plant Taxonomy*, 91.

[32] For many years taxonomic novelty was a subjective process: what was new for one collector or botanical garden was not the same for another. While private collectors and gardens still operate in this manner, one of the triumphs of the International Code was that it introduced the idea of absolute (world-wide) novelty.

independently of all others".[33] From the seventeenth century, however, the method and manner of classifying plants changed from an analysis of signs or marks, to an analysis of representations according to identities and differences. "To know what properly appertains to one individual is to have before one the classification – or the possibility of classifying – all others. Identity and what marks it are defined by the differences that remain. An animal or a plant is not what is indicated – or betrayed – by the stigma that is to be found imprinted upon it: it is what the others are not: its exists in itself only in so far as it is bounded by what is distinguishable from it".[34] Since the time of Linnaeus, taxonomists have focused on morphological or physical similarities and differences as the basis on which plants are distinguished and thus classified. While this has been supplemented by information from anatomy, biochemistry, developmental biology, genetics, and physiology, nonetheless physical differences remain the primary criteria used to classify plants.

Botanical nomenclature, the system of naming plants, aims to ensure that every plant has a name that is unambiguous, that only refers to that particular kind of plant, and is understood globally. Botanical names are assigned or reassigned according to the rules set out in the *International Code of Botanical Nomenclature*.[35] The Code provides detailed rules that need to be complied with for a name to be "validly published". Although the rules of the *International Code of Botanical Nomenclature* are, as taxonomists often complain, written in legal language,[36] there is no agency to enforce them.[37] While a name may be validly published, it will only become the name by which a plant is known when it is accepted and used by botanists.

One of the key principles of the *International Code of Botanical Nomenclature* is the rule of priority, namely that if a plant has two names, the name which is valid is the earliest one to be published (after 1753).[38] In order to be validly published, a name of a taxon must appear in a recognised scientific publication.[39] As well as controlling

[33] Foucault, *The Order of Things*, 144–45.
[34] *Ibid.*
[35] Gledhill, *Names of Plants*, 25.
[36] Alphonse de Candolle, whose *Lois de la Nomenclature* (1862) formed the basis of the *International Code for Botanical Plant Nomenclature* was a legally trained botanist. See W. Stern, "Historical Survey of the Naming of Cultivated Plants" (1986) 182 Acta Horticulturae 19, 22.
[37] Winston, *Describing Species*, 9.
[38] Alphonse de Candolle began to advocate for the application of the priority principle in the middle of the nineteenth century. This was adopted at the 1867 International Botanical Congress in Paris, and has remained a component of all subsequent botanical codes.
[39] *International Code for Botanical Plant Nomenclature* (2000), Art. 32.1(a). ("Publication is effected, under this *Code*, only by distribution of printed matter (through sale, exchange, or gift) to the general public or at least to botanical institutions with libraries accessible to botanists generally. It is not effected by communication of new names at a public meeting, by the placing of names in collections or gardens open to the public, by the issue of microfilm made from manuscripts, typescripts or other unpublished material, by publication online, or by dissemination of distributable electronic media").

where a name is to be published, the Code also regulates the form that a name must take for it to be valid.[40] To this end the Code provides a range of detailed rules that regulate issues from spelling and punctuation through to gender and grammar. The Code also requires that the name be published in Latin. One of the more important rules that guides the formation of plant names is that they must comply with the binomial system of nomenclature that was popularised by Linnaeus in the eighteenth century. This provides that each species is to be given a binomial name: the first word of each binomial is the name of the genus to which the species belongs (common noun) and the second word is a specific (trivial) epithet (adjective or possessive noun).[41] Prior to the introduction of the binomial system, plant names often included epithets that set out the descriptive features of the species (*Nomen specificum legitmum*). Under the pre-binomial system whenever a species was added to a genus or there was a change in the way that a plant was characterised, the name of the plant also changed.[42] While this may have been manageable when plant numbers were relatively small and stable, as plant numbers increased, the system became unmanageable. The scheme promoted by Linnaeus helped to overcome this problem in so far as the binomial name designated rather than described the plant in question. The genius of the binomial system was that it separated the naming of plants from the process of classifying them, that is it separated taxonomy from nomenclature. This meant that a name would remain the same even when the way that a plant was characterised changed. In so doing, the binomial system played an important role in helping to stabilize plant names.

The *International Code of Botanical Nomenclature* also specifies that the publication should include descriptive information about the plant. Normally, this will include the botanical name of the plant, as well as where and when the plant was discovered, and the name of the discoverer. It will also include ecological information such as distribution, habitat preference, reproductive season, seasonal changes and so on. The description will also include the main taxonomic traits of the plant and a "diagnosis" that highlights the "distinctive

[40] *International Code for Botanical Plant Nomenclature* (2000), Art. 16 – 27.

[41] *International Code for Botanical Plant Nomenclature* (2000), Art. 23.1. "The name of a species is a binary combination consisting of the name of the genus followed by a single specific epithet in the form of an adjective, a noun in the genitive, or a word in apposition, or several words, but not a phrase name of one or more descriptive nouns and associated adjectives in the ablative (see Art. 23.6(a)), nor certain other irregularly formed designations (see Art. 23.6(c)). If an epithet consists of two or more words, these are to be united or hyphenated. An epithet not so joined when originally published is not to be rejected but, when used, is to be united or hyphenated, as specified in Art. 60.9".

[42] McNeill, "Nomenclature of Cultivated Plants", 30.

morphological features''[43] that distinguishes the plant from taxonomically related plants.[44]

Another important principal that underpins the *International Code of Botanical Nomenclature* is the use of the ''type method''. Under the type method, a name is permanently attached to its nomenclatural type, which is the element on which the description validating the publication of a name is based.[45] The type acts as a fixed reference point which helps to determine how the name is to be used in the future.[46] The type is a nomenclatural device which fixes a botanical name to a particular taxon. It does this by requiring taxonomists to attach a name for a new species to a single individual representing that species, the so-called type specimen. For a name to be valid, the publication must include the name of the type and the institution (herbarium) where the type is deposited.[47] For the name of a family, the representative characteristics which the name implies are those embodied in one of its genera, which is called the type genus. In turn, the type for the name of a genus is the type species of that genus. For the name of a species, the type is a physical specimen lodged in an herbarium or, in certain cases, a drawing of the plant.[48]

These rules and procedures, which are accepted and applied by botanists around the world, have ensured that botanical names are unique, stable and used universally. They have also ensured that a botanical name only refers to one plant and that the name is unique to that ''particular plant the world over''. In so doing, taxonomy ensured that botanical names operate as generic names: they are *the name* by which a plant species is known, at least by those professionals who commonly work with plants. The standardisation of plant names played an important role in facilitating the circulation of plants as objects of exchange. Indeed as Linnaeus wrote in 1737, the ''generic name has the same value on the market of botany, as the coin has in the commonwealth, which is accepted as a certain price – without necessitating a metallurgic examination – and is received by others on a daily basis, as long as it becomes known in the commonwealth''.[49]

[43] *International Code of Botanical Nomenclature* (2000), Art. 39.1.
[44] *International Code of Botanical Nomenclature* (2000), Art. 32.2. The type method was initially adopted by American botanists in the early part of the twentieth century and subsequently adopted at the fifth International Botanical Congress held in Cambridge in 1930.
[45] Clive Stace, *Plant Taxonomy and Biosystematics*, 2nd ed. (New York 1989), 213.
[46] The type method has been described by taxonomists as ''as a legal device to provide the correct name for a taxon''. Samuel Jones and Arlene Luchsinger, *Plant Systematics*, 2nd ed. (New York 1986), 45.
[47] *International Code of Botanical Nomenclature (2000)*, Art. 37– 38. Gledhill, *Names of Plants*, 27.
[48] In many cases, the type name of a species is the herbarium specimen from which the original description validating the name was drawn up.
[49] C. Linnaues, *Critica Botanica* (1737), 204 (cited in S. Müller-Wille, ''Nature as Marketplace: The Political Economy of Linnaean Botany'' (2003) 35 History of Political Economy 154, 158).

To ensure that botanical names are able to function as descriptive names, it is important that there are no restrictions on when and how the name can be used (other than those that ensure that the name remains stable). Under the *International Code of Botanical Nomenclature*, this is reflected in the principle that the name must be universally available for use.[50] Within intellectual property law, it is reflected in the UPOV rule that after a variety denomination is registered, no rights for that designation shall hamper its free use in connection with the variety.[51] It is also reflected in the long-standing rule that botanical names, as distinct to trade or fancy names, cannot be registered as trade marks.[52] A number of reasons have been given to justify the exclusion of botanical names from trade mark registration.[53] These include the fact that varietal names do not function as indicators of source and that registration would cause confusion.[54] It has also been said that if someone was allowed to obtain trade mark protection for a generic name that it would grant the owner of the mark an unfair monopoly, since it would make it very difficult for competitors to describe their goods.[55]

Given that intellectual property law treats generic names as part of the public domain where they are free to be used by anyone, it might be reasonable to expect that this was the point at which the law's interest and involvement with botanical names ended. The public domain is, after all, usually seen as the antithesis of intellectual property protection. While botanical names may not be able to be registered as trade marks, this does not mean that they have not played an important role in plant intellectual property. The reason for this is that in naming and classifying a new plant "natural history does not

[50] *International Code of Nomenclature for Cultivated Plants* (2004), Art. 28.3.

[51] UPOV (1991), Art. 13.

[52] *Dixie Rose Nursery* v. *Coe* 131 F. 2d 446 (DC Cir. 1942), Cert denied, 318 US 782 (1943) (application for trade mark registration rejected on the basis that it was the name of a variety of rose and therefore merely descriptive and not of a particular product). The long-standing precedent and policy of treating a varietal name as generic was upheld by the US Court of Appeals in the decision of *In re Pennington Seed* (19th Oct. 2006) (Serial No. 76/289,621: US Court of Appeals Federal Circuit). For a general discussion see V. Gioia "Using and Registering plant names as trademarks" (1995) Acta Horticulturae 19; Allyn, *First Plant Patents*, 40.

[53] As a recent decision noted, varietal names are generic *ab initio*: there is no need for there to be evidence that a name has lost its trade mark significance. *In re Pennington Seed* (19th Oct 2006) (Serial No. 76/289,621: US Court of Appeals Federal Circuit), 11–12. Where a name is registered as a trade mark, the subsequent use of the name as a variety denomination may transform the trademark into a generic name. In such cases the trademark may become liable for cancellation. UPOV, *Explanatory Notes on variety denominations under the UPOV Convention*, UPOV/INF/12/1 (19 Oct. 2006), Explanatory Notes, para 1, (1.2), 3.

[54] IP Australia, *Plant Trade Mark Information*. It has been suggested that in Germany, the breeder is able to have the same designation registered as a trademark and as a variety denomination, but stipulate that the breeder cannot use the trademark to prohibit the use of the variety denomination by other persons. See H. Mast, "The naming of plants under the UPOV Convention" in B.T. Styles (ed.), *Infraspecific Classification of Wild and Cultivated Plants* (Oxford 1986), 404.

[55] *In re Merrill Lynch, Pierce, Fenner and Smith 828 F. 2d 1567, 1569 (Fed. Cir. 1987)*.

have to establish a system of names based upon representations that are difficult to analyse''. Instead, it only has to ''derive it from a language that has already been unfolded in the process of description. The process of naming will be based, not upon what one sees, but upon elements that have already been introduced into discourse by structure''.[56] The pre-existing rules and procedures, along with the hundreds of thousands of plant species that have already been analysed, named and catalogued ''reduces the whole area of the visible to a system of variables all of whose values can be designated, if not by quantity, at least by a … clear and always finite description''.[57]

Although botanical names may no longer describe the plant in question, nonetheless the *process* of being given a name carries with it certain consequences. This is because by the time a plant is christened with a name, the taxonomist (or in some cases a systematic biologist) will have described the plant's characteristics, assigned the plant a place within a family, explained its kinship with other plants of the same family, and shown how through some minute distinction, perhaps the veining on the leaf, the hairs on the stem, or habit of growth how the plant differs from other plants.[58] The taxonomist will also have undertaken a literature review to show that the plant and the name are novel. The fact that a plant is given a name means that it will have already been scrutinised and observed, examined and analysed, it will have been compared with known plants, its distinctive traits highlighted and described. The information will also have been reviewed and assessed by experts in the field. In naming and classifying a new plant, the taxonomist will have described the plant with precision and accuracy. It is this that enables the plant to be identified by botanists. The same is true for intellectual property law; albeit that it is one step removed from the process of naming and classifying.

The problem with those accounts of plant intellectual property which suggest that the process of describing plant inventions within intellectual property law are lax and imprecise is that they look at the plant invention as an object that is not only removed from, but also unaffected by, the environment in which it was generated. When we broaden our conception of the plant invention, we see that the plant that is presented to the law embodies the various taxonomic practices that were outlined above. Rather than being an object that needs to be described, the plant invention will already have been described in detail. One of the consequences of this is that rather than being lax and unsophisticated, the process of describing a plant within plant

[56] Foucault, *The Order of Things*, 131.
[57] *Ibid.*, at p. 136.
[58] Pavord, *Naming of Names*, 4.

intellectual property, which draws upon the skill and expertise of taxonomy and nomenclature, is rigorous and precise.

The impact that taxonomy has on intellectual property law extends beyond the task of identifying plant inventions in a number of important ways. This is because the tasks that are undertaken in naming and classifying a new plant means that many of the legal questions that will be asked of it will already have been answered by the time the plant invention is presented to the law. For example, taxonomy plays an important role in helping to decide whether an application includes the appropriate subject matter needed to qualify for protection. The importance attached to the process of being given a new name in determining whether the subject matter threshold has been met was highlighted in the decision of *Fruit Growers v Brodex* where the US Supreme Court said that the fact that an orange that had been dipped in borax had *not* been given a new name was indicative of the fact that it was not an invention. As there "was no change in the *name*, appearance, or general character of the fruit. It remains a fresh orange fit only for the same beneficial uses as theretofore".[59] Taxonomy also plays an important role in determining the subject matter that is protected by plant variety rights law. This is reflected in the fact that a "variety" is defined in UPOV as "a plant grouping within a single botanical taxon of the lowest known rank";[60] that is, variety is defined taxonomically.[61] The impact that taxonomy has on intellectual property is also reflected in the fact that in many countries the subject matter that is protected by plant variety rights legislation is limited to specific taxonomically defined classes of plants.[62]

The fact that a plant has been given a new name means that a decision has already been made that the plant is distinctive. While this decision may not have been made in what would ordinarily be seen as a legal context, nonetheless it is still important not least because the decision will have been made by parties who, in intellectual property terms, are skilled in the art. The rules of publication ensure that a plant will only be given a new name if it has been shown to be

[59] 283 US 1 (1931), 11–12 (italics added). *In re Ewald*, 129 F. 2d 340, 342 (CCPA 1942) (a cored pear was held not to be a manufacture because it did not possess a new name, character or use). See generally Donald W. Strickland, "Recent Decisions" (1978–9) 47George Washington Law Review 242, 245–6.

[60] UPOV (1991) Art. 1 (vi). It also shaped the way that sports, buds, and mutations were defined. As Rossman said: "A sport (or bud sport) arose when a plant, or part of a plant, suddenly took on a new appearance or characteristic distinct from that which *normally* characterises the variety or species of the same class. In turn, a mutant was a new variety of plant that appeared among seedlings that was perpetuated by asexual methods". Rossman, "Plant Patents", 13.

[61] In some situations, courts have decided *not* to follow scientific definitions. For example *In re Arzberge (Cus & Pat App 1940, 112 F 2d 834, 27 CCPA 1315)* the court said that "plant" should be construed in its common, ordinary meaning of the word, not its scientific meaning (thus it did not include bacteria).

[62] UPOV (1961/1978), Art. 4(3)(a).

distinctive, both in a botanical and legal sense. This is because in describing the plant, the taxonomist will have highlighted the features that distinguish the plant from taxonomically related plants. While an applicant for a patent or plant variety rights protection bears the burden of clearly and precisely describing those characteristics which define the new variety, as well as disclosing sufficient information to show that those characteristics are present in the plant and not in any other,[63] this will already have been performed as a part of the process of naming the plant.[64] The rules of name formation, particularly the rule of priority, also ensure that a plant with a new name is novel in a legal sense (although this will only be useful to the extent that the regime operates a system of international novelty).[65] The fact that a plant has been given a new name acts, in effect, as proof that the plant is distinctive and novel.

While there may be doubts about the botanical literacy of our legislators,[66] it is clear that taxonomy and nomenclature play a key role in those areas of intellectual property law that were introduced to protect and promote botanical innovations. By the time the plant invention is presented to the law, the plant will already have been described and its distinguishing features highlighted. In this sense, taxonomy and nomenclature provide intellectual property law with an accurate and reliable way of identifying plant inventions. In addition, taxonomy will also have answered many of the legal questions that will be asked of the new plant, such as subject matter, distinctiveness, and novelty.

Although taxonomy plays an important role in plant intellectual property law, this does not mean, however, that the law is merely a passive recipient of taxonomic practices or that the law has

[63] The type also acts as a version of the patent model and its modern equivalent: the sample deposit.

[64] The way that plants were named also (effectively) provided a moral right of attribution to the discoverer of the new plant. This is reflected in the fact that underpinning the exchange of botanical materials that proliferated in the course of the 17th and 18th centuries was the idea that the person who discovered a plant retained some kind of "intellectual ownership" to the plant, even when the plant was gifted to another collector, or a botanical garden. See S. Müller-Wille, "Nature as Marketplace: The Political Economy of Linnaean Botany" (2003) 35 History of Political Economy 154. It was also reflected in the practice of naming a new plant after its discoverer which is now a requirement under Art. 4 of the *International Code of Botanical Nomenclature* (2004): "the author's name shall be cited, after the name of the plant, in order to establish the sense in which the name is used and its priority over other names"). See Gledhill, *Names of Plants*, 25.

[65] In so far as the US Patent Office regularly gave plant patent applications to the US Department of Agriculture (USDA) to examine, a similar role was performed by the USDA in relation to plant patents. As Allyn complained, "Patent Office practice was to grant a patent whenever the Department of Agriculture gives a favourable opinion as to novelty without further regard to any yardstick of improvement or distinction" Robert Starr Allyn, "Patentable Yardsticks" (1943) 25 Journal of Patent Office Society 791, 816. See also Edward Hayman, "Botanical Plant Patent Law" (1962) 11 Cleveland-Marshall Law Review 430, 432.

[66] Allyn said that there was nothing "to suggest that the Congress was botanically minded" when they passed the 1930 *Plant Patent Act*. Allyn, *First Plant* Patents, 29.

relinquished control over plant intellectual property. In thinking about the nature of the relationship between taxonomy and intellectual property, it important that we do not assume, as often happens, that the law simply follows science; that the law's destiny is simply to lag behind and respond to scientific and technological changes. Indeed, one of the notable things about the development of both plant intellectual property and the taxonomy of cultivated plants over the twentieth century is the way in which they interacted with and influenced each other.

So far, I have spoken about plant taxonomy as if it was a unified discipline. It is important to note that the classification and naming of wild plants – which is the focus of botanical taxonomy – is very different to the classification and naming of cultivated plants.[67] In part this reflects the distinction that has long been drawn between botany and horticulture[68] (and between wild and cultivated plants): a distinction that is reflected in law in the product of nature doctrine. The difference between botany and horticulture was highlighted in the distinction that Linnaeus drew between "true" and "amateur" botanists. As Linnaeus said, "amateurs do not deal with names, as true botanists do, but with the attributes of plants".[69] In part this distinction followed from Linnaeus' classification of the sciences. While Linnaeus treated horticulture as a part of "oeconomia" – the science of teaching the application of the elements (earth, water, air and fire) to natural bodies in serving our needs, in contrast he considered botany as a natural science – as the science teaching the knowledge of natural bodies and providing the foundation for oeconomia.[70] While horticulture was primarily concerned with changing plants to enhance their economic value, botany was more concerned with ensuring that plants were stabile.[71] The different approach taken towards plants was reflected in the way that plants were classified. More specifically it was reflected in the fact that botanical taxonomy only "recognises those components of the overall variation of plants that are reasonably discrete, eschewing any attempt to name formally minutiae of infraspecific variation".[72] One of the

[67] The preamble to the International Code leaves the regulation of the "use and formation of names for special plants categories in agricultural, forestry and horticultural nomenclature" to the *International Code of Nomenclature for Cultivated Plants*. See McNeill, "Nomenclature of Cultivated Plants", 31.

[68] Forestry and agriculture are also treated in a similar way to horticulture.

[69] Müller-Wille, "Nature as Marketplace", 157.

[70] Müller-Wille, "Nature as Marketplace", 156.

[71] The distinction between wild and cultivated nature also had an impact on the way that plants was organised in botanic gardens. As Müller-Wille said, it "results in an organisation of the botanical gardens in which the various plants "forms" represented by specimens on neatly arranged and isolated beds of the garden do indeed "produce more, but always similar forms" … the only development allowed for is one of endlessly repeated, identical reproductions of certain plant forms". Müller-Wille, "Gardens of Paradise", 52.

[72] McNeill, "Nomenclature of Cultivated Plants", 32.

consequences of this is that cultivated plants largely fall outside the scope of botanical taxonomy.[73]

At the end of the nineteenth century, when the law began to grapple with the question of whether or not and if so how botanical innovations were to be protected, the distinction between botany and horticulture was already well entrenched. Moreover, while botanical taxonomy had been able to stabilize the use of botanic names, this was not the case with the taxonomy of cultivated plants which, as many commentators noted at the time, was virtually nonexistent. The taxonomic vacuum that existed at the beginning of the twentieth century created a number of problems, particularly for nursery operators. In many ways the problems facing the horticultural industries at the end of the nineteenth century were similar to those that had arisen within botany in the seventeenth and eighteenth centuries. Notably the same name was used for different plants and the same plant was known by different names. As a British commentator wrote in the 1920s, "in the case of vegetables it is probable that the orgy of synonyms is more marked than in any other group of plants. Of the thousands of names of peas at present on the market there are probably less than 100 varieties, and these in turn include probably less than 20 types. Cabbages, turnip, and beans also suffer from a multitude of unnecessary names".[74] While the correct naming of plants was important for buyers and sellers generally, it was particularly important in the nursery industry given that the sale of nursery stock that was untrue-to-name (especially fruit trees) opened nurseries up to the threat of litigation.[75]

By the end of the twentieth century, many of these problems had been resolved. Horticulturists had not only agreed to observe the international rules of botanical nomenclature, they had also formulated additional rules for the naming of cultivated plants.[76] An important turning point in the standardisation of horticultural nomenclature occurred with the adoption of the *International Code of Nomenclature for Cultivated Plants* in 1953. The primary object of the *Code* was to promote a precise, stable and simple system of naming that could be applied internationally to agricultural, forestry and horticultural cultivars (varieties).[77] To do this, the *International Code*

[73] The exclusion of all variations among plants dues to their ecological or cultural conditions was mirrored in Linnaeus' species definition, "which demanded that those plant forms or "varieties" should be rejected, which place or accident exhibits to be less different". Müller-Wille, "Gardens of Paradise", 52.

[74] American Joint Committee of Horticultural Nomenclature, *Standardized Plant Names: A catalogue of approved scientific and common names of plants in American Commerce*, 2nd ed. (Salem Mass. 1942), preface, xi.

[75] Richard White, *A Century of Service: A History of the Nursery Industry of the United States* (Washington 1975), 124.

[76] Gledhill, *Names of Plants*, 22.

[77] *International Code of Nomenclature for Cultivated Plants* (2004), preamble, para 1.

of Nomenclature for Cultivated Plants sets out detailed rules that control name formation. While many of these rules draw upon botanical nomenclature, they were modified to take account of the special needs of cultivated plants. One important difference is that unlike the case with botanical nomenclature -- where the process of validation is performed through peer review, publication and adoption -- with cultivated plants the process of deciding whether a name is valid is performed by a nominated International Registration Authority.[78] These authorities prepare and maintain registers of cultivar names, register new and acceptable cultivar names, and provide information.[79] The agencies appointed as International Registration Authorities represent a wide range of specialist societies and institutions and are located in many countries around the world.[80] For example, the Royal Horticulture Society is the International Registration Authority for nine groups of cultivated plants, including clematis, conifers, daffodils and dahlia. Similarly, the Australian National Botanic Gardens in Canberra is the International Registration Authority for Australian native plants.

Many of these registration bodies started out in the nineteenth century as private organisations concerned with a particular type of plant. As well as collecting and communicating information about specific plants, these societies also played an important role in regulating the naming of cultivated plants.[81] One of the strategies that these societies used to stabilise plant names was that they produced lists of standardized names that defined both how and when a particular name was to be used.[82] For example, in 1930 the American Gladiolus Society published *Descriptive Gladiolus Nomenclature* which contained a check list of over 7,000 cultivars. Similar lists were produced for many other types of plants.[83] In some cases, specialist

[78] *International Code of Nomenclature for Cultivated Plants* (2004), preamble, principle 8, Art. 10.3. The International Registration Authorities are appointed by the International Society for Horticultural Science on the recommendation of the International Commission for Nomenclature and Registration of the International Society. See A. Leslie, "International Plant Registration" in B.T. Styles (ed.), *Infraspecific Classification of Wild and Cultivated Plants* (Oxford 1986), 359.

[79] C. Brickell, "The International Code of Nomenclature for Cultivated Plants: Its role in stabilizing the nomenclature of cultivated plants" in B.T. Styles (ed.), *Infraspecific Classification of Wild and Cultivated Plants* (Oxford 1986), 331, 352.

[80] These include the UK, France, Germany, North America, China, India, Singapore, Australia, New Zealand, South Africa and Puerto Rico.

[81] For example, the American Pomological Society adopted a code for the naming of plants in 1867. See Stern, "Historical Survey", 22.

[82] For background see J. Kempton, "What's in a Plant Name?" (1942) 33 Journal of Heredity 133.

[83] In 1923, the American Joint Committee on Horticultural Nomenclature published the *Official Catalogue of Standardized Plant Names*. This was a "carefully prepared and complete list of existing varieties" in the United States. In creating the list of plants names the Committee decided that the only practical remedy was "to agree arbitrarily upon some one name for each plant, by which name it can be designated for a definite term of years". American Joint Committee of Horticultural Nomenclature, *Standardized Plant Names*, vi. For comments see C. Shear, "The Failure of the Principle of Priority to Secure Uniformity and Stability in Botanical Nomenclature" (19 Sep. 1924) 60 (1551) Science: New Series 254, 257–58.

plant societies also established formal registries of varieties.[84] For example, the American Rose Society initiated its rose name registration in 1913 and began publishing registration lists in the *American Rose Annual* from 1916.[85] The American Peony Society, which was founded in 1904 to "attack the difficult question of peony nomenclature and to bring order out of the confusion which then reigned",[86] established a registration system in the 1920s. In light of the fact that the problems of nomenclature were less prevalent where there was an authoritative registration mechanism, the American Joint Committee on Horticultural Nomenclature recommended that horticultural names be registered (along with a type species, illustrations and descriptions).[87] Similar practices also occurred in many other countries. For example, after the Daffodil Conference in London in 1884, the Royal Horticultural Society began a register of the names of daffodils. The success of this venture led the subcommittee to recommend the formation of international registration authorities for other horticultural important genera.[88] Eventually, this idea was adopted in the *International Code of Nomenclature for Cultivated Plants* in 1953. While many of the Registration Authorities are poorly funded, nonetheless they still play an important role in regulating the nomenclature of cultivated plants.[89]

The process of naming a cultivated plant plays a similar role within intellectual property law as it does within botanical nomenclature. In particular, it provides intellectual property law with an accurate and reliable way of identifying plant inventions. Over time, many of the techniques used to identify plant inventions have been subsumed within the legal processes. This is particularly notable in relation to the

[84] P. Meredith, "National Horticultural Council and Patent Law" (May 1930) Better Fruit 6. Suggesting that the Council should "record names and exchange them with other countries to prevent old names coming before the public under a new name".

[85] The possibility of an international rose register was discussed at the international horticultural conventions held in Luxemburg in 1911 and in London in 1912. J. Horace McFarland began to compile information on roses, which was published in 1930 as *Modern Roses*. This was an alphabetical check list of 2511 entries with classification, originator, year of origin, parentage, and a brief description. Freek Vrugtman, "The History of Cultivar Name Registration in North America" (1986) 182 Acta Horticulturae 225. A check list for irises first appeared in 1922 in Bulletin No. 4 of the American Iris Society. This was reprinted in the 1923 *Standardized Plant Names*, 210–249.

[86] Vrugtman, "History of Cultivar Name Registration" (citing A. Saunders, *History of the American Peony Society*). This was achieved, in part, as a result of the work of John Craig at Cornell who assembled together a collection of herbaceous garden peonies for the specific purpose of eliminating duplicates, to establish correct nomenclature, and to write accurate descriptions for these varieties. The resulting publication contained a list of 750 Peony descriptions; with new names and descriptions being published in issues of the Bulletin of Peony News.

[87] American Joint Committee on Horticultural Nomenclature, *Official Catalogue of Standardized Plant Names*, xiii.

[88] Stern, "Historical Survey", 27.

[89] For a discussion of some of the problems facing the Registration Authorities see "Panel Discussion: Taxonomy of Cultivated Plants" (1986) 182 Acta Horticulturae 427.

technical guidelines developed by UPOV to help determine distinctiveness, uniformity and stability for many different plant species.[90] For example the test guidelines for perennial chrysanthemums list 63 characteristics that are to be used when testing for the distinctiveness of chrysanthemum varieties. These include information about plant height, stem characteristics (including strength, brittleness and colour – which is defined in terms of the Royal Horticultural Society Colour Chart), leaf characters (including width, ratio length/width, thickness, texture and colour), and characters relating to flower head and constituent organs. "Slowly as you go down the list, recording against each character … the pertinent detail disclosed by your variety, an identity for the chrysanthemum under observation emerges".[91] The nature of the relationship between law and horticulture was reinforced by the fact that in certain situations these "legal" arrangements (which are themselves drawn from horticulture) have been (re)adopted by horticultural bodies. For example, the UK Brussels Sprout Cultivar Collection uses UPOV characters as the basis for testing for registration under the National List (which regulates the marketing of new varieties of the main agricultural species in the UK).[92] It has also been suggested that breeders should take account of the UPOV (technical) guidelines for determining distinctiveness when selecting plants for breeding.[93]

The processes that a cultivated plant must undergo in order for it to be given a new name also ensures that many of the legal questions that will be asked of it, such as subject matter, distinctiveness, and novelty, will already have been answered.[94] There is also a sense in which the requirements that must be satisfied to name a cultivated plant may be

[90] Since UPOV came into being, "a determined effort has been made to consult authorities on cultivated species and draw up guidelines on characters to be recorded. These are issues for use in the registration of new cultivars. Usually there is a full list of characters given with a subset of compulsory ones which must always be used for registration". P. Parker, "The Classification of Cultivated Plants: Problems and Perspectives" in B.T. Styles (ed.), *Infraspecific Classification of Wild and Cultivated Plants* (Oxford 1986), 106 (citing UPOV, *Guidelines for the Conduct of Tests for Distinctness, Homogeneity and Stability* (1976)).

[91] N. Byrne, "The Agro-technical Criteria in Plant Breeder's Rights Law" (1983) 22 *Industrial Property* 293, 298. (This is based on UPOV TG/26/4).

[92] C. Thomson, "Classification of Brussels Sprout Cultivars in the UK" in *Taxonomy of Cultivated Plants: Third International Symposium of Cultivated Plants* (Kew 1999), 439. This is also the case with DUS testing for turnips where the UPOV Guidelines and character tests are employed. See G. Campbell, "The Development of New Uniformity Standards for Turnip Rape in UK Distinctness, Uniformity and Stability Tests" in *Taxonomy of Cultivated Plants*, 457.

[93] F. Schneider, "The Concept of Distinctness in Plant Breeders' Rights Control of Plant Variety Rights" in B.T. Styles (ed.), *Infraspecific Classification of Wild and Cultivated Plants* (Oxford 1986), 395.

[94] All applications for new indigenous varieties at the Australian Plant Breeder's Rights Office are submitted to the Australian Cultivar Registration Authority to assess whether they are novel. While the International Society for Horticultural Science continually states that they are "not responsible for assessing the distinctiveness of the plant in question" and that the system does not confer any legal protection over the name of the plant, nonetheless they require applicants to provide details about plant (including a basic description which highlights its distinctive features), which acts as a de facto legal process.

taken to mean that the plant is uniform and stable (which is a prerequisite for plant variety rights protection). This is reflected in the fact that a cultivar is defined in the *International Code of Nomenclature for Cultivated Plants* as "an assemblage of plants that has been selected for a particular attribute or combination of attributes, and that it is clearly distinct, uniform and stable in its characteristics and that, when propagated by appropriate means, retains those characteristics".[95] While this could be taken to mean that a cultivated plant that has been given a new name was, from a legal perspective, uniform and stable, in practice it seems that this is not adhered to (or at least in a way that would satisfy the legal requirements). Despite this, it is clear that cultivated plant taxonomy plays an important role in plant intellectual property. Indeed, as the chair of the International Commission for the Nomenclature of Cultivated Plants wrote in the preface to the 1969 version of the Code, "in December 1961, the International Convention for Protection of New Varieties of Plants [UPOV] was signed in Paris and is now in force in several of the signatory countries. The implementation of the measures depends on the correct naming of cultivars (varieties). The International Commission of the Nomenclature of Cultivated Plants is glad to record that the provisions under the 1961 Code have, to a great extent, guided legislation in which cultivar (variety) names are involved".[96]

The nature of the relationship between horticulture and plant intellectual property is similar to that which exists between botany and the law: taxonomic practices play an important role both in identifying the protected subject matter and in deciding whether that subject matter should be protected. Here, the law is merely a passive recipient of science. Where the nature of the relationship differs, however, is in terms of the impact that the law has on science. While there is little to suggest that the law had much of an impact on botanical taxonomy, this is not the case with horticulture. Indeed one of the notable features of the development of cultivated plant taxonomy over the twentieth century is the way that it was shaped by plant intellectual property law. This can be seen in the way in which plant intellectual property acted as a catalyst for the standardisation and clarification of plant names. In some cases, the existence of legal protection for cultivated plants was used to justify the very existence of cultivated plant taxonomy. For example, the 1923 publication of the *Official Catalogue of Standardized Plant Names* by the American Joint

[95] *International Code of Nomenclature for Cultivated Plants* (2004), Art. 2.2. Art. 2.1 says that "a cultivar is the primary category of cultivated plants whose nomenclature is governed by the Code".

[96] *International Code of Nomenclature for Cultivated Plants* (1961), preface, 7. Art. 13 UPOV (1961) (which deals with naming) was "originally made on the basic principles of the ICNP". U. Loscher, "Variety Denomination according to Plant Breeders' Rights" (1986) 182 Acta Horticulturae 59.

Committee on Horticultural Nomenclature – which was a "carefully prepared and complete list of existing varieties" in the United States -- was said to be the logical and first step in the protection of new plant productions by patents.[97] A similar sentiment was raised by William Stern, who wrote the first draft of the *International Code of Nomenclature for Cultivated Plants*, when he said that stable nomenclature was "highly relevant to plant patent legislation and the rights of plant breeders".[98] The existence of plant breeder's rights legislation was also used to justify the need to update and revise taxonomic practices.[99] It was also used to argue for better funding of taxonomy and nomenclature.

Plant intellectual property, and this is particularly the case with plant variety rights protection, also plays a role in the *process* of standardizing plant names. One of the conditions for grant of plant variety rights protection is that the application must include a denomination for the new variety.[100] Importantly, when a name is registered, plant variety rights law requires that the name *must* be used as the generic name for the plant.[101] Unlike the case with botanical taxonomy, where the name is adopted and maintained through usage, with cultivated plants the name is able to be protected through legal mechanisms. While the rights granted to breeders are of limited duration, the name that is given to a plant is perpetual. In addition, while the rights are primarily intended to benefit the breeder, the name that is given to a new plant variety serves the interests of all breeders. The international treaties also attempt to ensure that the name that is adopted in one Member State is also used in other Member States. In this sense, the act of obtaining plant variety rights protection plays an important role in standardising and stabilizing plant names. The impact of plant intellectual property on cultivated plant taxonomy is reinforced by the fact that plant variety rights authorities are recognised under the *International Code of Nomenclature for Cultivated Plants* as defacto registration authorities.[102] This means

[97] Anon, "A New Catalog of Plant Names" (Feb 1922) 13 Journal of Heredity 96. This supported the "widespread feeling on the part of plant breeders that new plant productions should be protected by patent". Ibid.

[98] Stern, "Historical Survey".

[99] As the Director of the Kew Royal Botanic Gardens said in the preface to the Third International Symposium of Cultivated Plants, it "is good to see this healthy growth in an area that seemed to be on the wane until recently, yet which is so vital as the legal complications of names become more significant and horticulture becomes an ever more popular pursuit" … "The increasing worldwide trade in cultivated plants together with stronger legal protection of new cultivars demands that names be precise, accurate and stable". G. Prance, "Preface" in *Taxonomy of Cultivated Plants: Third International Symposium of Cultivated Plants* (Kew 1999), v. See also Hawkes, "Infraspecific Classification", 6.

[100] UPOV (1991), Art. 20(7).

[101] Since 1987, the US Patent and Trademark Office has required that a cultivar name be included in each plant patent application.

[102] A trial registration system for botanical names, which ran from 1998–99, was abandoned in 1999.

that once a plant variety is registered for plant variety rights protection, the designated name is able to be recognised in the relevant International Cultivar Registration Authority as the definitive name of the plant.[103] In some situations, the relationship between intellectual property law and cultivated plant taxonomy is reinforced by the fact that the work of Registration Authorities and that of Plant Variety Rights Offices have been fused into what is effectively a single process.[104]

Another example of the way in which plant intellectual property impacts upon cultivated plant taxonomy can be seen in the second edition of the *Official Catalogue of Standardized Plant Names* which was published in 1943. As with the first edition, this aimed to provide a definitive list of the names of all the cultivated plants in America. Where the second edition differed from the 1923 publication, however, was that it included a list of all the plant patents that had been granted under the 1930 *Plant Patent Act*. While the editors pointed out that the names given to plant patents were not as consistent as they should have been,[105] nonetheless plant patents were treated as if they were "plants". That is, plant intellectual property became part of the taxonomic landscape. Plant intellectual also entered into the life of many cultivated plants with the decision that registration of a new variety should be recognised as part of the public domain for the purposes of deciding taxonomic priority.[106] This means that the taxonomic novelty of plant names is potentially shaped by prior intellectual property registration. Another example of the way in which intellectual property became part of the taxonomic landscape can be seen in the way in which the documentation held at Patent Offices and Plant Variety Rights Offices is used as a "designated

[103] For example, the Australian Cultivar Registration Authority registers all Australian varieties accepted by the Plant Breeder's Rights Office. In many countries, the checking of variety denomination under UPOV is carried out in conjunction with the lists of the International Registration Authority. Loscher, "Variety Denomination", 61. For a call for closer co-operation see Leslie, "International Plant Registration", 364.

[104] This is the case, for example, with the Protea Registration Authority (based in South Africa), where registration in relation to Plant Breeder's Rights, the Plant Improvement Act (which is similar to the Common Catalogue in Europe) and the International Registration of *Protea* cultivar names work in tandem. See J. Sadie, "Cultivar Registration for Statutory and Non-Statutory Purposes in South Africa", in *Taxonomy of Cultivated Plants: Third International Symposium of Cultivated Plants* (Kew 1999), 101. It is also the case in Poland where all the "activities connected with plant variety testing, the maintenance of the Register of Cultivars and the Register of Plant Breeder's Rights are provided by the Research Centre for Cultivar Testing". Julia Borys, "DUS Testing of Cultivars in Poland" in *Taxonomy of Cultivated Plants: Third International Symposium of Cultivated Plants* (Kew 1999), 199. See also Thomson, "Classification of Brussels Sprout Cultivars", 439.

[105] The Editorial Committee noted that many of the plant patent names could be shortened to comply more nearly to the rules of horticultural nomenclature as adopted by the Horticultural Section of the International Botanic Congress. American Joint Committee of Horticultural Nomenclature, *Standardized Plant Names*, 455.

[106] Gledhill, *Names of Plants*, 27.

standard'' to define a plant, similar to the role played by herbarium specimens deposited in herbaria.[107]

III

While the nature of the relationship between intellectual property and taxonomy differs between plant species and varies from country to country,[108] it is clear that taxonomy plays an important role in intellectual property law. It is also clear that intellectual property law has had an important impact on many aspects of cultivated plant taxonomy. In many ways this is part of a broader story about the impact of intellectual property law on horticulture, agriculture and botany more generally. In the United States, for example, there is a close historical connection between the Patent Office and agriculture.[109] A similar story could also be told about the laws which regulate seed purity and the marketing of new varieties under the so-called National List or Common Catalogue. In many ways these reinforce and further complicate the relationship between law and horticulture. While this is a subject that needs further more detailed work, it is clear that plant intellectual property is a hybrid of law, botany and horticulture: it is, in a sense, a form of taxonomic property.

Recognising the way in which law, botany and horticulture interact has a number of ramifications for the way that we think about plant intellectual property. While it may mean that the decision to characterise plant intellectual property as a sui generis system may be warranted, it does not also necessarily mean that it is unsophisticated or naïve. There is also no reason why plant intellectual property needs to be fixed to a specific form of technological knowledge. Another consequence of recognising the hybrid nature of plant intellectual property is that we need to acknowledge that the

[107] Gledhill, *Names of Plants*, 51. In Australia, the Secretary to the Plant Breeder's Rights Office has designated the National Botanic Gardens (which is also the Australian Cultivar Registration Authority) as a nominated herbarium in accordance with section 44(2) of the 1994 Plant Breeder's Rights Act (which requires applicants for indigenous plants to deposit a specimen plant at a nominated herbarium). In practice this has been integrated with the cultivar collection kept by the Australian Registration Authority (as the International Registration Authority for Australian natives). The cultivar collection is used, in part, to determine the novelty of plant breeder's rights applications.

[108] See Malcom Manners, "Rose Registration: Cultivar Names, Code Names and Selling Names" in *Taxonomy of Cultivated Plants: Third International Symposium of Cultivated Plants* (Kew 1999), 117. "…trademarked rose names are almost always used uniquely to identify an individual rose cultivar … Indeed the industry tends to use the trademark as the actual name of the cultivar instead of the registered cultivar name". *Ibid.*, at 121. Manners also said that there was a move among commercial interests in the rose industry to abandon the use of the International Code of Nomenclature (*Ibid.*, at 123).

[109] The US Department of Agriculture (USDA) was said to have "had its beginnings in the Patent Office Reports." G. P. Clinton, "Botany in Relation to Agriculture" (7 Jan. 1916) Vol 43. No. 1097 Science: New Series 1, 3. During the nineteenth and early part of the twentieth centuries, the US Patent Office acted as a repository for agricultural information and as a seed depository. It also played a prominent role in distributing seeds to farmers.

process of describing a plant invention, as well as deciding whether a plant is distinctive and novel are complex and sophisticated processes. It also means that we need to broaden our conception of the registration process to include the fields, greenhouses and, increasingly, the laboratories where plants are grown, tested and analysed. In changing the way that we think about the registration (and legal) process, we gain a better understanding of plant intellectual property. It helps to explain, for example, why it is that there are comparatively few disputes, at least within the formal legal environment, in relation to plant intellectual property. Recognising the way in which law, botany and horticulture interact also has ramifications for the way that we think about plant intellectual property and its interaction with biotechnology. To return to one of the criticisms made of plant intellectual property that was raised earlier, one of the consequences of seeing plant intellectual property as a hybrid of law, botany and horticulture is that we cannot sensibly talk about a shift from phenotype to genotype, or from surface to sub-surface. The reason for this is that these arguments see science as something which is external to the law; rather than as something that is already embodied within legal practice. As taxonomy embraces biotechnology, which it is doing at a rapid rate,[110] this too will be incorporated into and become part of the legal framework.[111] This is not to deny that biotechnology will have an important impact on the future of plant intellectual property. Rather it is to argue that we need to look at this future differently. Indeed, one of the ironies of the increased use of biotechnology in plant breeding is that it has led to the introduction of non-botanical concepts such as essential derivation into the law.[112] That is, the problem created by plant biotechnology for plant intellectual property is not that it undermines the legal processes, so much as that it renders them more legal.

[110] See, for example, "The Legacy of Linnaeus: Taxonomy in an Age of Transformation" (2007) 446 Nature 231; H. Godfray, "Linnaeus in the Information Age" (2007) 446 Nature 259.

[111] To some extent, this has already happened. See, for example, UPOV, *Progress Report of the Work of the Technical Committee, the Technical Working Parties and the Working Group on Biochemical and Molecular Techniques and DNA Profiling in Particular* (24 Aug. 2006) C/40/10.

[112] Similar problems also occur in relation to the use of criteria of "importance" (which is used to distinguish varieties from each other); an idea which can "explained in botanical terms, or in relation to performance, or identification". Schneider, "Concept of Distinctness", 394. Schneider also suggests that the notion of minimum distance (which is a version of essential derivation) can either be "botanical, treating the minimum distance as a result of morphological or physiological difference. The other way is juridical and considers the minimum distance as the smallest acceptable inventive step". *Ibid.*, at p. 396.