The type method: an introduction

John McNeill

(Royal Botanic Garden, Edinburgh & Royal Ontario Museum, Toronto)

First some history

- The origins of rules of nomenclature
- The adoption of the type method and what preceded it

International rules on plant names

A system of naming plants for scientific communication must be international in scope, and must provide consistency in the application of names. It must also be accepted by most, if not all, members of the scientific community.

These criteria led, almost inevitably, to International Congresses being the venue at which agreement on a system of scientific nomenclature for plants was sought. The first such attempt was at a "Congrès International de Botanique" held by the Societé Botanique de France in Paris in 1867 at which Alphonse de Candolle's* *Lois de la nomenclature botanique* was discussed and adopted.

* "A. DC." (1806–1893), son of "DC." (1778–1841)

Modern rules on plant names: the *International Code of Botanical Nomenclature (ICBN)*

The modern successor to Candolle's *Lois* is the *International Code of Botanical Nomenclature (ICBN)*, the most recent **published edition** of which appeared in 2006 and was based on the decisions taken at the XVII International Botanical Congress held in Vienna, Austria in July 2005.

McNeill, J., Barrie, F.R., Burdet, H.M., Demoulin, V., Hawksworth, D.L., Marhold, K., Nicolson, D.H., Prado, J., Silva, P.C., Skog, J.E., Wiersema, J.H., & Turland, N.J. (eds.) 2006. *International Code of Botanical Nomenclature (Vienna Code) adopted by the Seventeenth International Botanical Congress Vienna, Austria, July 2005*. A.R.G. Gantner Verlag, Ruggell, Liechtenstein. [*Regnum Veg.* 146].

INTERNATIONAL CODE

OF

BOTANICAL NOMENCLATURE

(VIENNA CODE)

2006

International Code of Botanical Nomenclature

(Vienna Code)

adopted by the Seventeenth International Botanical Congress
Vienna, Austria, July 2005

prepared and edited by

J. McNeill, Chairman
F. R. Barrie, H. M. Burdet, V. Demoulin,
D. L. Hawksworth, K. Marhold, D. H. Nicolson,
J. Prado, P. C. Silva, J. E. Skog, J. H. Wiersema, Members
N. J. Turland, Secretary
of the Editorial Committee

2006

G

A.R.G. Gantner Verlag KG

Modern rules on plant names: the *International Code of Nomenclature for algae, fungi, and plants (ICN)*

The XVIII International Botanical Congress held in Melbourne, Australia in July 2011 revised the *Code* and approved a change of name to that above. The printed version of this Code will appear in 2012.

McNeill, J., Barrie, F. R., Buck, W. R., Demoulin, V., Greuter, W., Hawksworth, D. L., Herendeen, P. S., Knapp, S., Marhold, K., Prado, J., Prud'homme van Reine, W. F., Smith, G. F., Wiersema, J. H., & Turland, N. J. (eds.) 2012. *International Code of Nomenclature for algae, fungi, and plants (Melbourne Code) adopted by the Eighteenth International Botanical Congress, Melbourne, Australia, July 2011*. [*Regnum Veg.*].

A brief history of the rules of nomenclature

Since 1867, there have been three main phases in the history of the rules governing the nomenclature of plants.

1) 1867–1905: during this time it became clear that, whereas many of the broad principles of Candolle's *Lois* (e.g. a single correct name and priority of publication in choice between names) were generally accepted, their application in practice was unclear leading to major differences of interpretation and hence disagreement;
2) 1905–1947: the consequent establishment of more detailed *International Rules of Botanical Nomenclature*, the "*American Code*" schism, and its resolution;
3) 1947–present: successive editions (12 to date) of the *International Code of [Botanical] Nomenclature*, revised to a relatively minor degree at each International Botanical Congress.

(for details see Nicolson, D.H. 1991. A history of botanical nomenclature. Ann. Missouri Bot. Gard. 78: 33–56.)

1867–1905: Candolle's *Lois* to *International Rules*

The application, and some of the principles. of the *Lois* formulated by Alphonse de Candolle in 1867 and endorsed as "le meilleur guide à suivre pour la nomenclature botanique" (the best guide to follow for botanical nomenclature), proved controversial, leading both to divergent practice and to the desire for more definitive rules.

For example, the *Lois* said that botanical nomenclature started with Linnaeus, it did not specify a particular date – not a problem for species names, but Linnaeus had been publishing generic names since 1737, and often changed his view between 1737 and 1753..

1905: First *International Rules of Botanical Nomenclature*

This was discussed at the first International Botanical Congress in Paris in 1900 and it was agreed that a special session on Nomenclature be held at the second IBC in Vienna in 1905. This culminated in the acceptance by the Congress of the *International Rules of Botanical Nomenclature*, published in 1906 That Congress declined to accept detailed proposals of the U.S. delegation led by N.L. Britton, involving the introduction of the type method for determining the application of names (as opposed to a circumscriptional method), and so also led to a separate Brittonian Code (the "*American Code*" of 1907).

1905–1947: *International Rules of Botanical Nomenclature*

A second edition of the International Rules was published in 1912 following the Brussels Congress of 1910, but included little change. The third edition however, published in 1935, embodied a major development, the adoption of the type method that was characteristic of the *American Code*. This was accepted by the Cambridge Congress of 1930 and the requirement for Latin descriptions of new taxa, absent from the *American Code*, was deferred to 1935. The schism was healed.

World War II (1939–45) interrupted nomenclatural activity and it was not until 1947 that the unofficial "*Brittonia Rules*" were published, incorporating the changes accepted at the Amsterdam Congress of 1935. By this time Lanjouw, who was to become Rapporteur-général, was setting up preliminary meetings of nomenclaturalists to prepare for the first post-war Congress to be held in Stockholm in 1951.

1947–present: successive editions of the *International Code of [Botanical] Nomenclature*

The VII International Botanical Congress held in Stockholm in 1951 led to the first *International Code of Botanical Nomenclature* and to the founding of the International Association for Plant Taxonomy (IAPT). Successive editions of the Code were published following the Congresses held in Paris (1954), Montreal (1959), Edinburgh (1964), Seattle (1969), Leningrad (1975), Sydney (1981), Berlin (1987), Tokyo (1993), St Louis (1999), Vienna (2005) and Melbourne (2011). Although important decisions were taken at several of these Congresses, most notably the great extension in the provisions for the conservation and rejection of names, starting in Sydney in 1981 and culminating in Tokyo in 1993, and the significant recent changes adopted in Melbourne (2011), involving electronic publication, relaxation of the Latin requirement, and fundamental changes for fungal and fossil nomenclature, particularly the former, **no changes in the basis of the rules have occurred comparable to the introduction of the type method in the *Cambridge Rules* of 1935.** What successive editions of the Code have achieved is much greater precision, particularly in the requirements for valid publication of names.

The type method – important dates

- 1935: publication of the *Cambridge Rules* incorporating the type method for determining the application of names (based on a decision of the V IBC held in Cambridge, England, in 1930).

- 1 January 1958: Introduction of the requirement that for valid publication of a name at the rank of genus and below the type must be “indicated”.

Changes for types of names of new species and infraspecific taxa since 1958

- 1 Jan 1990: A holotype must be designated, i.e. (i) indication of the type must include one of the words “typus” or “holotypus”, or its abbreviation, or its equivalent in a modern language; and (ii) if the type is a specimen or unpublished illustration, the single herbarium or collection or institution in which the type is conserved must be specified.

- 1 Jan 2007: Types must be specimens (no longer illustrations).

Changes for designation of types of previously published names of species and infraspecific taxa since 1958

- 1 Jan 1990: lectotypification or neotypification by a specimen or unpublished illustration is not effected unless the herbarium or institution in which the type is conserved is specified.
- 1 Jan 2001: (i) designation of a lectotype, neotype or epitype is only effective if the typification statement includes the phrase “designated here” (hic designatus) or an equivalent; (ii) lectotypification or neotypification of a name of a species or infraspecific taxon is not effected unless indicated by use of the term “lectotypus” or “neotypus”, its abbreviation, or its equivalent in a modern language.

Life before 1958

Two considerations are relevant

- 1) How authors indicated the basis for their knowledge of a new taxon, and hence what they recognised as the application of the name.
- 2) How later authors interpreted the name and to what they applied it.

Bases of new taxa

- The protologue is generally the only source for determining the basis (specimens, illustrations, or field observations) for a newly named taxon.
- By the 20th century citation of specimens examined was customary, but in the 18th and early 19th century, the information provided was commonly very scanty.

How names were interpreted prior to acceptance of the type method

- By circumscription
- Hence, when a circumscription had been changed in any way, e.g. broadened as is normal as distribution ranges are extended, it became important to refer to these later applications of a name.
- And when with a changed circumscription should there be a different name?

Kukenthal's treatment of *Cyperus esculentus* in Engler, Pflanzenr. IV.20 (Heft. 101). 1935.

53. **C. esculentus** L. Spec. pl. ed. 1. (1753) 45 et ed. 2. (1762) 67; Kunth, l. c. 61; Steud. l. c. 34; Boeck. l. c. 287; Boiss. Fl. orient. V. (1884) 377; C. B. Clarke in Journ. Linn. Soc. XXI. (1884) 178, in Hook. fil. Fl. Brit. Ind. VI. (1893) 616, in Durand et Schinz, Consp. Fl. Afr. V. (1895) 559, in Thiselt.-Dyer, Fl. capens. VII. (1897) 180 et in Thiselt.-Dyer, Fl. trop. Afr. VIII. (1902) 355; Britton in Bull. Torr. bot. Club XIII. (1886) 210; A. Gray, Man. ed. 6. (1890) 571 p. p.; Chapm. Fl. South. Unit. Stat. ed. 3. (1897) 535; Meinsh. in Act. Hort. petrop. XVIII. (1900) 241; Aschers. u. Graebner, Synops. II. 2. (1903) 281; Britton a. Brown, Ill. Fl. North. Unit. St. ed. 2. I. (1913) 304, fig. 741 p. p.; Chevalier, Explor. bot. Afr. occid. Franç. I. (1920) 691; Chermezon in Ann. Mus. colon. Mars. XXX. 3. sér. 10. (1922) 40 et in Arch. Bot. IV. Mém. 7. (1931) 22. — *C. aureus* Ten. Fl. napol. Prodr. I. (1811) VIII et Fl. napol. III. (1824—29) 45, t. 101; Husnot, Descr. et Fig. Cyper. (1906) 76. — *C. melanorrhizus* Del. Ill. Fl. Aeg. (1813) 50; Moggr., Contrib. Fl. Mentone (1871) t. 97. — *C. hydra* H. B. K. Nov. Gen. et Spec. I. (1815) 205, non Michx. — *C. nervosus* Roem. et Schult. Mant. II. (1824) 113. — *C. Tenorii* Presl, Fl. sic. I. (1826) XLIII.; Reichenb. Icon. VIII. (1846) t. CCLXXXI., fig. 670; Steud. l. c. 34. —

Two facets of the rules applicable to types

- The more straightforward is the requirement for valid publication of the name of a new taxon at the rank of species and below, since 1 January 1958 to **indicate** the type and since 1 January 1990 to **designate a** single specimen as **holotype**.
- The more complex is the selection of a type for a name published prior to 1990, and in particular prior to 1958, for which no type currently exists.
- The rules deal with both

Rules on types in the ICN

- Four articles deal with typification as such
- Art. 7 provides the general principles
- Art. 8 establishes what a type, especially a type specimen, is
- Art. 9 deals specifically with typification of names of species and infraspecific taxa
- Art. 10 deals specifically with typification of names of genera and subdivisions of genera, along with that of names above the rank of genus
- In addition Art. 40 (37 in the *Vienna Code*) deals with the requirements for valid publication involving types.

Article 7

- *7.1.* The application of names of taxa of the rank of family or below is determined by means of nomenclatural types (types of names of taxa). The application of names of taxa in the higher ranks is also determined by means of types when the names are ultimately based on generic names (see Art. 10.7).

- *7.2.* A nomenclatural type *(typus)* is that element to which the name of a taxon is permanently attached, whether as a correct name or as a synonym. The nomenclatural type is not necessarily the most typical or representative element of a taxon.

Function of a type

- The sole function of a type is to attach a name to a taxon, and a name is nothing more than a label – a key to information relating to the taxon.

- A type says nothing about the circumscription or relationships of a taxon, which must be discovered through application of the research techniques of plant systematics.

Luella Weresub's aphorism

"A name has a type but no circumscription; a taxon has a circumscription but no type."

Luella Weresub, Mycologist, Ottawa, ca 1972

7.3. A replacement name (Art. 6.11) is typified by the type of the replaced synonym even though it may have been applied erroneously to a taxon now considered not to include that type (but see Art. 41 Note 2 and 48.1).

7.4. A new combination or a name at new rank (Art. 6.10) is typified by the type of the basionym even though it may have been applied erroneously to a taxon now considered not to include that type (but see Art. 48.1).

Ex. 2. *Pinus mertensiana* Bong. was transferred to the genus *Tsuga* by Carrière, who, however, as is evident from his description, erroneously applied the new combination *T. mertensiana* to another species of *Tsuga*, namely *T. heterophylla* (Raf.) Sarg. The combination *T. mertensiana* (Bong.) Carrière must not be applied to *T. heterophylla* but must be retained for *P. mertensiana* when that species is placed in *Tsuga;* the citation in parentheses (under Art. 49) of the name of the original author, Bongard, indicates the basionym, and hence the type, of the name.

7.5. A name that is illegitimate under Art. 52 is typified either by the type of the name that ought to have been adopted under the rules (automatic typification), or by a different type designated or definitely indicated by the author of the illegitimate name. However, if no type was designated or definitely indicated and the type of the earlier name was included (see Art. 52.2) in a subordinate taxon that did not include the evidently intended type of the illegitimate name, typification is not automatic. Automatic typification does not apply to names sanctioned under Art. 15.

7.6. The type of an autonym is the same as that of the name from which it is derived.

7.7. A name of a new taxon validly published solely by reference to a previously and effectively published description or diagnosis (Art. 38.1(a)) is to be typified by an element selected from the entire context of the validating description or diagnosis, unless the validating author has definitely designated a different type, but not by an element explicitly excluded by the validating author (see also Art. 7.8).

7.8. A name of a taxon assigned to a group with a nomenclatural starting-point later than 1 May 1753 (see Art. 13.1) is to be typified by an element selected from the context of its valid publication (Art. 32-45).

Note 1. The typification of names of fossil-taxa (Art. 1.2) and of any other analogous taxa at or below the rank of genus does not differ from that indicated above.

7.9. For purposes of priority (Art. 9.19, 9.20, and 10.5), designation of a type is achieved only by effective publication (Art. 29-31).

7.10. For purposes of priority (Art. 9.19, 9.20, and 10.5), designation of a type is achieved only if the type is definitely accepted as such by the typifying author, if the type element is clearly indicated by direct citation including the term “type” (typus) or an equivalent, and, on or after 1 January 2001, if the typification statement includes the phrase “designated here” (hic designatus) or an equivalent.

Note 2. Art. 7.9 and 7.10 apply only to the designation of lectotypes (and their equivalents under Art. 10), neotypes, and epitypes; for the indication of a holotype see Art. 40.

Article 8

addresses the issue of exactly what constitutes a specimen, for the purposes of typification.

- *8.1.* The type (holotype, lectotype, or neotype) of a name of a species or infraspecific taxon is either a single specimen conserved in one herbarium or other collection or institution, or an illustration[1] (but see Art. 8.5; see also Art. 40.4 and 40.5)
  [1]

- *8.2.* For the purpose of typification a specimen is a gathering, or part of a gathering, of a single species or infraspecific taxon made at one time, disregarding admixtures (see Art. 9.14). It may consist of a single organism, parts of one or several organisms, or of multiple small organisms. A specimen is usually mounted on a single herbarium sheet or in an equivalent preparation, such as a box, packet, jar, or microscope slide.
- *Ex. 1. "Echinocereus sanpedroensis"* (Raudonat & Rischer in Echinocereenfreund 8(4): 91-92. 1995) was based on a "holotype" consisting of a complete plant with roots, a detached branch, an entire flower, a flower cut in halves, and two fruits that, according to the label, were taken from the same cultivated individual at different times and preserved, in alcohol, in a single jar. This material belongs to more than one gathering and cannot be accepted as a type. Raudonat & Rischer's name is not validly published under Art. 40.2.

Specimens and gatherings

- A **specimen** is part of a gathering.
- A **gathering** is a collection of a single taxon made at one time, by one person or group of people. In most cases all parts of a gathering will be given the same collection number.
- An **admixture** would be any material other than the taxon intended to be gathered. In a gathering of a tropical tree species, for example, any attached epiphytes would be admixtures.
- All parts of a gathering must be collected at the same time.

- *8.3.* A specimen may be mounted as more than one preparation, as long as the parts are clearly labelled as being part of that same specimen. Multiple preparations from a single gathering that are not clearly labelled as being part of a single specimen are duplicates, irrespective of whether the source was one organism or more than one (but see Art. 8.5).

- *Ex. 2.* The holotype specimen of *Delissea eleeleensis* H. St. John, *Christensen 261* (BISH), is mounted as two preparations, a herbarium sheet (BISH No. 519675) bearing the annotation "fl. bottled" and an inflorescence preserved in alcohol in a jar labelled "*Cyanea, Christensen 261*". The annotation indicates that the inflorescence is part of the holotype specimen and not a duplicate, nor is it part of the isotype specimen (BISH No. 519676), which is not labelled as including additional material preserved in a separate preparation.

- *8.4.* Type specimens of names of taxa must be preserved permanently and may not be living organisms or cultures. However, cultures of fungi and algae, if preserved in a metabolically inactive state (e.g. by lyophilization or deep-freezing to remain alive in that inactive state), are acceptable as types.
- *8.5.* The type, epitypes (Art. 9.8) excepted, of the name of a fossil-taxon of the rank of species or below is always a specimen (see Art. 9.15). One whole specimen is to be considered as the nomenclatural type (see Rec. 8A.3).

Article 9

- Art. 9 deals specifically with typification of names of species and infraspecific taxa providing definitions of the various kinds of types applicable to such names and the rules for the designation of lectotypes, neotypes and epitypes.
- As, apart from holotype, such types are by definition applicable to previously named taxa, this Article deals primarily with later typification of already published names

- *9.1.* A **holotype** of a name of a species or infraspecific taxon is the one specimen or illustration (but see Art. 40.4) used by the author, or designated by the author as the nomenclatural type. As long as a holotype is extant, it fixes the application of the name concerned (but see Art. 9.15).

- *Note 1.* Any designation made by the original author, if definitely expressed at the time of the original publication of the name of the taxon, is final (but see Art. 9.11 and 9.15). If the author included only one element, it must be accepted as the holotype. If a name of a new taxon is validly published solely by reference to a previously published description or diagnosis, the same considerations apply to material used by the author of that description or diagnosis (see Art. 7.7; but see Art. 7.8).

- *9.2.* A **lectotype** is a specimen or illustration designated from the original material as the nomenclatural type, in conformity with Art. 9.11 and 9.12, if no holotype was indicated at the time of publication, or if the holotype is missing, or if a type is found to belong to more than one taxon (see also Art. 9.14). For sanctioned names, a lectotype may be selected from among elements associated with either or both the protologue and the sanctioning treatment (Art. 9.10).

- *9.3.* For the purposes of this *Code*, **original material** comprises the following elements: *(a)* those specimens and illustrations (both unpublished and published either prior to or together with the protologue) upon which it can be shown that the description or diagnosis validating the name was based; *(b)* the holotype and those specimens which, even if not seen by the author of the description or diagnosis validating the name, were indicated as types (syntypes or paratypes) of the name at its valid publication; and *(c)* the isotypes or isosyntypes of the name irrespective of whether such specimens were seen by either the author of the validating description or diagnosis or the author of the name (but see Art. 7.7, 7.8, and 9.10).

Gatherings, specimens and duplicates (footnote to Art. 9.3 – see also Art. 8.2)

- Here and elsewhere in this *Code*, the word duplicate is given its usual meaning in curatorial practice. A duplicate is part of a single gathering of a single species or infraspecific taxon made by the same collector(s) at one time. The possibility of a mixed gathering must always be considered by an author choosing a lectotype, and corresponding caution used.

Art 9: Original material (qualifications)

- *Note 2.* For names falling under Art. 7.8 [later starting date], only elements from the context of the protologue itself are considered as original material.
- *Note 3.* For names falling under Art. 7.7 [reference to a previously published description], only elements from the context of the validating description are considered as original material, unless the validating author has definitely designated a different type.
- *Note 4.* For names falling under Art. 9.10 [sanctioned names], elements from the context of the protologue are original material and those from the context of the sanctioning work are considered as equivalent to original material.

- *9.4.* An **isotype** is any duplicate of the holotype; it is always a specimen.

- Isotypes may be cited or uncited. For purposes of lectotypification, cited and uncited isotypes have the same status.

- *9.5.* A **syntype** is any specimen cited in the protologue when there is no holotype, or any one of two or more specimens simultaneously designated in the protologue as types (see also Art. 40 Note 1). Reference to an entire gathering, or a part thereof, is considered citation of the included specimens.

- A syntype is always a **specimen cited** in the protologue; uncited duplicates of syntypes are isosyntypes.

- An isosyntype can be designated as a lectotype, if no isotypes or syntypes exist.

- *9.6.* A **paratype** is any specimen cited in the protologue that is neither the holotype nor an isotype, nor one of the syntypes if in the protologue two or more specimens were simultaneously designated as types.
- *Note 5.* In most cases in which no holotype was designated there will also be no paratypes, since all the cited specimens will be syntypes. However, when an author designated two or more specimens as types (Art. 9.5), any remaining cited specimens are paratypes and not syntypes.

- As with syntypes, a paratype is always a specimen cited in the protologue.

- *9.7.* A **neotype** is a specimen or illustration selected to serve as nomenclatural type if no original material is extant, or as long as it is missing (see also Art. 9.16).

- A neotype may be designated only when all original material for a name is missing, or if the extant original material differs taxonomically from the destroyed type (Art. 9.16).

- *9.8.* An **epitype** is a specimen or illustration selected to serve as an interpretative type when the holotype, lectotype, or previously designated neotype, or all original material associated with a validly published name, is demonstrably ambiguous and cannot be critically identified for purposes of the precise application of the name to a taxon. When an epitype is designated, the holotype, lectotype, or neotype that the epitype supports must be explicitly cited (see Art. 9.20).

Epitype example

- *Ex. 7.* The holotype of the name *Vitellaria paradoxa* C. F. Gaertn. (1807) is a seed of unknown provenance (P). It shows the characters of the species but cannot be assigned to either of its two currently recognized subspecies, which differ in characters of foliage and inflorescence. Hall & Hindle (in *Taxon* 44: 410. 1995) designated the type of *Bassia parkii* G. Don (1838), *Park* (BM), as the epitype of *V. paradoxa*. *Bassia parkii* thus becomes a synonym of *V. paradoxa* subsp. *paradoxa*, and the second subspecies retains the name *V. paradoxa* subsp. *nilotica* (Kotschy) A. N. Henry & al. (1983).

- *9.9.* The use of a term defined in the *Code* (Art. 9.1, 9.2, and 9.4-9.8) as denoting a type, in a sense other than that in which it is so defined, is treated as an error to be corrected (for example, the use of the term lectotype to denote what is in fact a neotype).
- *Ex. 10.* Borssum Waalkes (in Blumea 14: 198. 1966) cited Herb. Linnaeus No. 866.7 (LINN) as the holotype of *Sida retusa* L. (1763). However, illustrations in Plukenet (Phytographia: t. 9, fig. 2. 1691) and Rumphius (Herb. Amboin. 6: t. 19. 1750) were cited by Linnaeus in the protologue. Therefore the original material of *S. retusa* comprises three elements (Art. 9.3), and Borssum Waalkes's use of holotype is an error to be corrected to lectotype.

- *Note 6.* A misused term may be corrected only if the requirements of Art. 7.10 (for correction to lectotype, neotype, and epitype) are met and Art. 40.6 (for correction to holotype) does not apply.

- In particular, the requirement that on or after 1 January 2001, the typification statement includes the phrase “designated here” (hic designatus) or an equivalent (Art. 7.10) or for a holotype that words “typus” or “holotypus”, or its abbreviation, be used (Art. 40.6).

Misuse of “holotype” after 2000

- Prior to 2001, if a specimen of an existing name was designated as the “holotype” and there were in fact duplicates of that specimen, it could nevertheless be treated as an effective lectotypification under Art. 9.9, but this does not normally apply now, as the words “designated here’ are very unlikely to be used for a specimen thought to be a holotype.

- It is, therefore, now not uncommon for authors who are doubtful as to whether or not a particular specimen in one herbarium is the holotype to cite it as: “Lectotype, designated here (or perhaps holotype):”

- *9.10.* The type of a name of a species or infraspecific taxon adopted in one of the works specified in Art. 13.1(d), and thereby sanctioned (Art. 15), may be selected from among the elements associated with the name in the protologue and/or the sanctioning treatment.

- Art. 13.1(d) refers to the starting date for the names of Fungi which is 1 May 1753. However, names published in three publications, one by Persoon (*Synopsis Methodologica fungorum*, 1801) and two by Fries (*Systema Mycologica*, vols. 1-3 and Index, 1821-1832, and *Elenchus fungorum* vols. 1-2) have been given special protection by sanctioning (Art. 15), analogous to conservation.

- *9.11.* If no holotype was indicated by the author of a name of a species or infraspecific taxon, or when the holotype or previously designated lectotype has been lost or destroyed, or when the material designated as type is found to belong to more than one taxon, a lectotype or, if permissible (Art. 9.7), a neotype as a substitute for it may be designated (Art. 7.9 and 7.10).

- *9.12.* In lectotype designation, an isotype must be chosen if such exists, or otherwise a syntype if such exists. If no isotype, syntype or isosyntype (duplicate of syntype) is extant, the lectotype must be chosen from among the paratypes if such exist. If no cited specimens exist, the lectotype must be chosen from among the uncited specimens and cited and uncited illustrations that comprise the remaining original material, if such exist.

Precedence in lectotypification

- Art. 9.12 gives the order of precedence for the different kinds of original material, to be followed when designating a lectotype. In descending order, they are :
  - 1) Isotypes;
  - 2) Syntypes:
  - 3) Isosyntypes:
  - 4) Paratypes;
  - 5) Other original material: uncited specimens and cited and uncited illustrations.

- Note that the first four are always specimens.

- An illustration cannot be designated as a lectotype if a cited specimen or an uncited isotype exists.

- However, as original material, illustrations are of equal status with uncited specimens that are original material but are not isotypes.

- *9.13.* If no original material is extant or as long as it is missing, a neotype may be selected. A lectotype always takes precedence over a neotype, except as provided by Art. 9.16 [remaining original material differs taxonomically from a destroyed type].

- *9.14.* When a type (herbarium sheet or equivalent preparation) contains parts belonging to more than one taxon (see Art. 9.11), the name must remain attached to the part (specimen as defined in Art. 8.2) that corresponds most nearly with the original description or diagnosis.

- Such an explicit exclusion is an act of lectotypification.

- *9.15.* The holotype (or lectotype) of a name of a fossil-species or infraspecific fossil-taxon (Art. 8.5) is the specimen (or one of the specimens) on which the validating illustrations (Art. 43.3) are based. When, prior to 1 January 2001 (see Art. 43.4), in the protologue of a name of a new fossil-taxon of the rank of species or below, a type specimen is indicated (Art. 40.1) but not identified among the validating illustrations, a lectotype must be designated from among the specimens illustrated in the protologue. This choice is superseded if it can be demonstrated that the original type specimen corresponds to another validating illustration.

- *9.16.* When a holotype or a previously designated lectotype has been lost or destroyed and it can be shown that all the other original material differs taxonomically from the destroyed type, a neotype may be selected to preserve the usage established by the previous typification (see also Art. 9.18).

- *9.18.* A neotype selected under Art. 9.16 may be superseded if it can be shown to differ taxonomically from the holotype or lectotype that it replaced.

- *9.17.* A designation of a lectotype or neotype that later is found to refer to a single gathering but to more than one specimen must nevertheless be accepted (subject to Art. 9.19), but may be further narrowed to a single one of these specimens by way of a subsequent lectotypification or neotypification.

- Art. 9.17 describes a process known as ‘two-step lectotypification’. If the first typifying author cites a single gathering as lectotype, but fails to restrict the typification to a single specimen, a second step is necessary.

- This situation often arises when a herbarium holds more than one duplicate specimen from a single gathering and the first typifying author does not specify which of the duplicate specimens is the lectotype (see Art. 9, Ex. 6).

- Another example would typification statements of the form "Lectotype: *Smith 1234*," where a collection is cited but the herbarium is not specified. In these cases, the second typifying author must choose from among the duplicates of the gathering cited by the first typifying author, even if other original elements of equal status exist.

- *9.19.* The author who first designates a lectotype in conformity with Art. 9.12 or a neotype must be followed, but that choice is superseded if *(a)* the holotype or, in the case of a neotype, any of the original material is rediscovered; the choice may also be superseded if one can show that *(b)* it is in serious conflict with the protologue and another element is available that is not in conflict with the protologue, or that *(c)* it is contrary to Art. 9.14 [type is a mixed gathering].

- *9.20.* The author who first designates an epitype must be followed; a different epitype may be designated only if the original epitype is lost or destroyed. A lectotype or neotype supported by an epitype may be superseded in accordance with Art. 9.19, or in the case of a neotype with Art. 9.18. If it can be shown that an epitype and the type it supports differ taxonomically and that neither Art. 9.18 nor 9.19 applies, the name may be proposed for conservation with a conserved type (Art. 14.9; see also Art. 57).
- *Note 7.* An epitype supports only the type to which it is linked by the typifying author. If the supported type is superseded, the epitype has no standing with respect to the replacement type.

Permanent role of an epitype

- Once designated, an epitype cannot be changed, unless the type to which it is attached is changed. If the epitype proves to differ taxonomically from the holotype, lectotype or neotype to which it is attached and this disrupts the application of the name, the only option is to propose the name for conservation with a different type.
- Without conservation it is the identity of the epitype that determines the application of the name

- *9.21.* Designation of an epitype is not effected unless the herbarium or institution in which the epitype is conserved is specified or, if the epitype is a published illustration, a full and direct bibliographic reference (Art. 41.5) to it is provided.
- *9.22.* On or after 1 January 1990, lectotypification or neotypification of a name of a species or infraspecific taxon by a specimen or unpublished illustration is not effected unless the herbarium or institution in which the type is conserved is specified.
- *9.23.* On or after 1 January 2001, lectotypification or neotypification of a name of a species or infraspecific taxon is not effected unless indicated by use of the term “lectotypus” or “neotypus”, its abbreviation, or its equivalent in a modern language (see also Art. 7.10 and 9.9).

Article 10

- Article 10 presents the rules for typification of names at the rank of genus and subdivision of genus (e.g. subgenus, section, series) (and also of families and subdivisions of families)

- Since the XIII IBC in Sydney in 1981, the type of the name of a genus or of a subdivision of a genus has been the type of the name of an included species – and not just “a species”.

- *10.1.* The type of a name of a genus or of any subdivision of a genus is the type of a name of a species (except as provided by Art. 10.4). For purposes of designation or citation of a type, the species name alone suffices, i.e. it is considered as the full equivalent of its type.
- *Note 1.* Terms such as “holotype”, “syntype”, and “lectotype”, as presently defined in Art. 9, although not applicable, strictly speaking, to the types of names in ranks higher than species, have been so used by analogy.

- This means that:

- A generic name is always ultimately typified by a specimen or illustration.

- A generic name is not typified by a species, which is a taxon, and not a single reference point.

- When a species name is cited as the type of a generic name, it is serving as a proxy for a citation of the type of that species name.

- Hence, in the statement:

- *Rhododendron* L. Type: *R* . *ferrugineum* L., the species name stands in for *Herb. Linn No 562.1* (LINN), which is the lectotype of *R. ferrugineum* L. as well as the type of *Rhododendron* L.

- *10.2.* If in the protologue of the name of a genus or of any subdivision of a genus the holotype or lectotype of one or more previously or simultaneously published species name(s) is definitely included (see Art. 10.3), the type must be chosen (Art. 7.9 and 7.10) from among these types, unless (a) the type was indicated (Art. 22.6, 22.7, 40.1, and 40.3) or designated by the author of the name; or (b) the name was sanctioned, in which case the type may also be chosen from among the types of species names included in the sanctioning treatment. If no type of a previously or simultaneously published species name was definitely included, a type must be otherwise chosen, but the choice is to be superseded if it can be demonstrated that the selected type is not conspecific with any of the material associated with either the protologue or the sanctioning treatment.

- *10.3.* For the purposes of Art. 10.2, definite inclusion of the type of a name of a species is effected by citation of, or reference (direct or indirect) to, a validly published name, whether accepted or synonymized by the author, or by citation of the holotype or lectotype of a previously or simultaneously published name of a species.

An example

- The genus *Anacyclus*, as originally circumscribed by Linnaeus (1753), comprised three validly named species. Cassini (1825) designated *Anthemis valentina* L. (1753) as type of *Anacyclus*, but this was not an original element of the genus.

- Green (1929) designated *Anacyclus valentinus* L. (1753), "the only one of the three original species still retained in the genus", as the "standard species" and her choice must be followed (Art. 10.5).

- Humphries (in Bull. Brit. Mus. (Nat. Hist.) Bot. 7: 109. 1979) designated a specimen in the Clifford Herbarium (BM) as lectotype of *Anacyclus valentinus*, and that specimen thereby became the ultimate type of the generic name.

- *10.4.* By and only by conservation (Art. 14.9), the type of a name of a genus may be a specimen or illustration, preferably used by the author in the preparation of the protologue, other than the type of a name of an included species.
- *Note 2.* If the element designated under Art. 10.4 is the type of a species name, that name may be cited as the type of the generic name. If the element is not the type of a species name, a parenthetical reference to the correct name of the type element may be added.

- *10.5.* The author who first designates a type of a name of a genus or subdivision of a genus must be followed, but the choice may be superseded if *(a)* it can be shown that it is in serious conflict with the protologue (or, for a sanctioned name typified under Art. 10.2(b), also with the sanctioning treatment), or *(b)* that it was based on a largely mechanical method of selection.

- **Ex. 7.* Authors following the *American code of botanical nomenclature*, Canon 15 (in Bull. Torrey Bot. Club 34: 172. 1907), designated as the type “the first binomial species in order” eligible under certain provisions. This method of selection is to be considered as largely mechanical. Thus the first type designation for *Delphinium* L., by Britton (in Britton & Brown, Ill. Fl. N. U.S., ed. 2, 2: 93. 1913), who followed the *American code* and chose *D. consolida* L., has been superseded under Art. 10.5(b) by the designation of *D. peregrinum* L. by Green (in Anonymous, Nomencl. Prop. Brit. Botanists: 162. 1929).

- *10.6.* The type of a name of a family or of any subdivision of a family is the same as that of the generic name on which it is based (see Art. 18.1). For purposes of designation or citation of a type, the generic name alone suffices. The type of a name of a family or subfamily not based on a generic name is the same as that of the corresponding alternative name (Art. 18.5 and 19.8).
- *10.7.* The principle of typification does not apply to names of taxa above the rank of family, except for names that are automatically typified by being based on generic names (see Art. 16), the type of which is the same as that of the generic name.
- *Note 3.* For the typification of some names of subdivisions of genera see Art. 22.6 and 22.7.

Summary of salient elements of the type method

- As noted, there are two main aspects to the application of the type method today
- The more straightforward is the requirement since 1 January 1990 for valid publication of the name of a new taxon to designate a single specimen as holotype, or the type of a single species name (for names above the rank of species).
- The more complex is the selection of a type for a name published prior to 1990, and in particular prior to 1958, for which no type currently exists.

Selection of a type for untypified names

- The provisions of Art. 9 for names of species and infraspecific taxa and Art. 10 for names of genera and subdivisions of genera, in association with the general rules in Art. 7, provide the framework for the selection of a type for an existing name that is without a type.

Acknowledgements

- It it with pleasure that I acknowledge the suggestions of Fred Barrie (Missouri Botanical Garden, St Louis, but based at The Field Museum, Chicago) on some of the points of emphasis in this presentation.

The type method: an introduction

(The end)