Report of the Special Committee on Publications Using a Largely Mechanical Method of Selection of Types (Art. 10.5(b)) (especially under the *American Code*)

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Abstract The Special Committee on Publications Using a Largely Mechanical Method of Selection of Types (Art. 10.5(b)) (especially under the *American Code*) was established at the XVIII International Botanical Congress (IBC) in Melbourne in 2011, with the mandate to develop a list of works that are deemed to have followed the *American Code* and any similar cases in which the method of type selection is "considered to be largely mechanical". This Report reviews the origins of, and problems associated with, the provision that permits a designation of type using a largely mechanical method to be superseded. The Committee concluded that use of the *American Code* and its predecessors was so widespread in the first two decades of the 20th century that no comprehensive list of works following these *Codes* could be generated. Instead it proposed that six criteria be adopted that will permit determination of works that can be taken to have used a largely mechanical method of type selection. Two of these are general and should apply until the *American Code* was completely abandoned around 1935: (1) inclusion of any statement to that effect; (2) adoption of a provision of the *American Code* contrary to the provisions of the *International Rules*. The other four seek to identify those persons who can be considered to have followed a largely mechanical method; although many followers of the *American Code* persisted in its use throughout the 1920s, not all did, and these criteria are limited to publications prior to 1921, when the *Type-basis Code* was published; hence all publications by the following categories of person: (3) signatories of the 1904 "Philadelphia Code" (all also signatories of the *American Code*); (4) persons who had publicly declared that they followed the *American Code*; (5) employees and associates of the New York Botanical Garden; and (6) employees of the U.S. federal government. This Report provides the supporting documentation for the proposals that are also published in this issue.

Keywords *American Code*; generic names; "Harvard Code"; *International Rules of Botanical Nomenclature*; "Madison Rules"; mechanical selection; "Philadelphia Code"; typification

Introduction

Membership. — The original membership of the Special Committee (Wilson in Taxon 61: 878. 2012) included "James Reveal (U.S.A.)". Sadly, Jim Reveal died in January 2015 and the Committee operated without his great experience. The Committee has since co-opted James Zarucchi (Saint Louis, U.S.A.) and, in part to broaden the disciplines represented to include bryophytes as well as vascular plants and fungi, Lars Söderström (Trondheim, Norway). The Convener and Secretary have consulted with the Secretaries of the Permanent Nomenclature Committees for Algae and on Fossils, who have advised that they did not think that co-opting representatives of these disciplines was necessary.

Mandate. — The mandate of the "Special Committee on Publications Using a Largely Mechanical Method of Selection of Types (Art. 10.5(b)) (especially under the *American Code*)" was: "To develop a list of works that are deemed to have followed the *American Code* (Arthur & al. in Bull. Torrey Bot. Club 34: 167–178. 1907) and any similar cases in which the method of type selection is 'considered to be largely mechanical'."

The establishment of the Committee at the Melbourne Congress arose from the Comments of the Rapporteurs with respect to a proposal by Gandhi & Reveal (in Taxon 59: 1931. 2010) that sought to clarify which were the works in which "a largely mechanical method of selection" of a type was practised. The Rapporteurs, noting that the proposal as presented would be nomenclaturally disruptive, commented (McNeill & Turland in Taxon 60: 254–255. 2011) "that in addition to publications stating that they were following the *American Code* there is need for a list of works that are deemed to have followed it. This would seem to be a task for a Special Committee".

Current provisions. — The *Melbourne Code* wording of the relevant Article and Examples is as follows – the most relevant portions being in **bold**:

"*10.5.* The author who first designates (Art. 7.9 and 7.10) 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 with the sanctioning treatment in the case of names typified from the sanctioning work, Art. 10.2(b)), or *(b)* that **it was based on a largely mechanical method of selection.**

Ex. 6. Fink (in Contr. U.S. Natl. Herb. 14(1): 2. 1910) specified that he was "stating the types of the genera according to the 'first species' rule". His type designations may therefore be superseded under Art. 10.5(b). For example, Fink had designated *Biatorina griffithii* (Ach.) A. Massal. as the type of *Biatorina* A. Massal.; but his choice was superseded when the next subsequent designation, by Santesson (in Symb. Bot. Upsal. 12(1): 428. 1952), stated a different type, *B. atropurpurea* (Schaer.) A. Massal.

**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 Sprague, Nom. Prop. Brit. Bot.: 162. 1929)."

This provision goes back to the *Seattle Code* (Stafleu & al. in Regnum Veg. 82. 1972), where it was included in Art. 8 with the phrase "was made arbitrarily". The *Delphinium* Example (now *Ex. 7) was also included. At the Sydney Congress in 1981 it was noted that far from being "made arbitrarily", *American Code* typifications followed very precise rules and so "made arbitrarily" was replaced by "a largely mechanical method of selection" (the current wording) in the *Sydney Code* (Voss & al. in Regnum Veg. 111. 1983). No substantive change in the provisions has occurred since. In the *Tokyo Code* (Greuter & al. in Regnum Veg. 131. 1994), the rules on typification of names of genera and subdivisions of genera were separated from general rules on typification (Art. 7) and from those on species and infraspecific taxa (Art. 8 & 9) and so the rule on largely mechanical selection was moved to its present location in Art. 10. It was also at that time that voted Examples were first indicated in the *Code* by an asterisk.

Background. — The issue of *American Code* typifications goes back long before the Seattle Congress in 1969, but it only became a problem with the introduction of explicit priority in typification in the *Montreal Code* (Lanjouw & al. in Regnum Veg. 23. 1961). Because the type method only entered the *International Rules* in Cambridge in 1930 (Briquet, Int. Rules, Bot. Nomencl., ed. 3. 1935), whereas it was an integral part of the *American Code* (Arthur & al., l.c. 1907: 172) and its immediate predecessors, most types of generic names designated in the first few decades of the 20th century were under the *American Code*. The *American Code* required that "the first binomial in order" be selected as type under a number of explicit qualifying provisions, e.g., "a figured species is to be selected rather than an unfigured one" – the thrust, however, remaining that selection be by objective criteria – what the current *Code* calls "largely mechanical".

By contrast, in the lead-up to the acceptance of the type method in the *International Rules*, lists of "Standard species" were prepared for the generic names already conserved (Green, l.c.: 97–109) and for those published by Linnaeus (Hitchcock & Green in Sprague, l.c.: 110–199). These authors referred to Hitchcock's "Type-basis Code" (Hitchcock in Science 53: 312–314. 1921), noting that it laid "stress on agreement with the original description", recognized "the desirability, where possible, of following general usage", and accepted "the species first chosen as type, provided that no other species is more eligible", but went on to express doubt as to whether any rigid method of applying these criteria would yield satisfactory results. It is clear from their selections that the dominant criterion adopted by Hitchcock & Green in their selection of a "standard species" (now accepted as types – Art. 7 *Ex. 13) was maintenance of the predominant usage of each generic name. Shear (in Science 60: 254–258. 1924) also argued for abandonment of the *American Code* and instead proposed the designation of types to preserve established usage.

The lists of types developed by Green and Hitchcock were discussed at Cambridge in 1930, included as an appendix to the *Cambridge Rules* (Briquet, l.c. 1935), accepted by the Amsterdam Congress in 1935, and appeared in the unofficial "Brittonia Rules" (Camp & al. in Brittonia 6: 1–120. 1947) – those of conserved names incorporated in Appendix III (Nomina generica conservanda), and these need not concern us further, and those of Linnaean names in a Supplement. Although stated at the Stockholm Congress to have been accepted, the list in that Supplement did not appear in the *Stockholm Code* (Lanjouw & al. in Regnum Veg. 3. 1952) or any subsequent *Code* (cf. Jones in Taxon 9: 175–189. 1960). The *Stockholm Code* did, however, introduce an Appendix entitled "Determination of types" that included the statement "Mechanical systems such as the automatic selection of the first species or specimen cited or of a specimen collected by the person after whom a species is named should be avoided as unscientific and productive of possible future confusion and further change."

As noted above, the existence of very many typifications of generic names under a *Code* that prescribed a set of criteria for automatic type selection – there are over 400 Linnaean names and just over 700 other names in one work alone (Britton & Brown, Ill. Fl. N. U.S., ed. 2; cf. Jones, l.c.) – only became a matter of concern when priority of publication of type selections became mandatory in Montreal in 1959. The particular triggers for what is now Art. 10.5(b) were two conservation proposals, one on *Delphinium* (Rauschert in Taxon 17: 231. 1968) and the other on *Asperula* (Rauschert in Taxon 17: 233–234. 1968). The earliest typifications (by Britton & Brown, l.c.) applied *Delphinium* L. to *Consolida* Gray and *Asperula* L. to *Galium* L. and Rauschert sought by conservation to maintain the current usage. The members of the then Committee for Spermatophyta were not impressed by the need for conservation, considering that the Britton & Brown selections were contrary to what was by then the "Guide for the Determination of Types" (McVaugh in Taxon 18: 477–480. 1969). The Committee did recognize that some adjustment to the Articles themselves would be needed to achieve this – and the wording set out above was the result (cf. Stafleu & Voss in Regnum Veg. 81: 25–28. 1972). The proposal also received support from Reed Rollins, the President of the Nomenclature Section in Seattle, who had discovered that if Britton & Brown designations were priorable, some generic names in *Cruciferae* would switch their application. For example, *Sisymbrium* L. would apply to *Rorippa* Scop., *Erysimum* L. would apply to *Sisymbrium*, and the genus to which *Erysimum* is applied would need a new name.

The problems with Art. 10.5(b)

The wording and previous attempts to address this. — The wording of Art. 10.5(b) is a little strange. Typifications made under a largely mechanical system are not made ineffective (as, for example, are those that do not use the word "type" or, after 2000, that do not state "designated here"), it is just that they can always be superseded, unless, that is, the typification is affirmed in a work not using a largely mechanical system. It would seem that the only nomenclatural effect of this different arrangement is that the date of typification remains with that of the mechanical selection and not that which affirmed that typification, so, for example, the typification of *Quercus* L. by *Q. robur* L. has priority from its publication in 1913 by Britton &

Brown (l.c. 1: 616), even though it was only affirmed as type by Green (l.c.: 189) in 1929. There are three Articles of the *Code* for which the date of type selection of a generic name is critical. These are Art. 22.2 (on autonyms), Art. 48.2 (on determining what is a later homonym), and Art. 52.2(b) (on nomenclatural superfluity).

Recognizing this anomalous situation and the fact that most typifications carried out prior to the adoption of the type method in the *International Rules* in Cambridge in 1930 either used a largely mechanical system or else (particularly in the 19th century) did not use the word "type" in a nomenclatural sense but as a taxonomic exemplar, often designating several types for a particular name, the Special Committee on Lectotypification reporting to the Berlin Congress in 1987 proposed that a starting date of 1 January 1935 be established for priority of typifications (McNeill in Taxon 35: 867–880. 1986). Although the positive effect on the application of generic names had been well researched using Linnaean names as a sample (McNeill & al. in Taxon 36: 350–401. 1987), the lack of evidence on the effect of the proposal on lectotypification at species level and below was an important factor in the rejection of the proposal (Greuter & al. in Englera 9: 46–54. 1989). Had it been confined to names of genera and subdivisions of genera, such restriction would have resolved the issue of *American Code* typifications and probably been generally stabilizing. But after all those years of unrestricted priority in type selection, such action now, even just for generic names, would very likely be disruptive.

The issue of typification of Linnaean generic names is now satisfactorily resolved (cf. Barrie in Taxon 55: 795–796. 2006; Jarvis, Order out of Chaos: 58–60. 2007), partly by the wording of Art. 10.5(b) in association with voted *Ex. 7 and partly by conservation. Moreover that wording, although it could be improved (see below), makes pretty clear that, for example, the typifications by Britton & Brown (l.c.) of the 700 or so non-Linnaean generic names are only acceptable if the first published typification that was not using a largely mechanical method made the same choice, i.e., affirmed the mechanical selection; otherwise they are automatically superseded by the first selection of a different type.

Incidentally, any typification of a generic name under the *American Code*, for which no superseding typification was published prior to 1979, will almost certainly have been affirmed in *Index Nominum Genericorum* (ING; Farr & al. in Regnum Veg. 100, 101 & 102. 1979) or possibly earlier in the ING printed cards. [The statement: "ING is not intended as a place to publish new combinations or lectotypes" in the preface to the printed volumes of ING (Farr & al. in Regnum Veg. 100: xxiv. 1979), which some have suggested means that there are no new typifications in the work, merely indicates intent and, as all type statements are definitely accepted (Art. 7.10), any that prove to be new are effective, for example that of *Pyrochroa* Eschw. (Lücking & al. in Taxon 56: 1298. 2007). The situation with the ING Supplement (Farr & al. in Regnum Veg. 113. 1986) is less clear, as the statement (p. xi) "the user is urged to use caution in evaluating lectotypifications attributable to ING" can be interpreted as meaning that not all typifications cited in the work are accepted by the authors. However, no names in the Supplement are likely to be relevant to typifications made originally under a largely mechanical method of selection.] Consequently the issue that the Committee had to address were typifications made under the *American Code* and its immediate predecessors (see below) and their potential supersession in the period up until the 1970s.

Current problems. — The main problem today in the application of Art. 10.5(b) and *Ex. 7 is determining which works, other than those explicitly stating so and probably all those by Britton in the first quarter of the 20th century, used a largely mechanical system of type selection by their following the *American Code* or its predecessors. Our mandate "to develop a list of [such] works" reflects this. It is clear that any publication in which the criteria for typification were stated to be largely mechanical is subject to Art. 10.5(b). This is well exemplified by Art. 10 Ex. 6, Fink specifying that his typifications were under the "first species rule". However given the widespread acceptance of the *American Code* in much of the United States (but by no means all – see below), many works that certainly adopted a largely mechanical method of typification had no need to say so explicitly.

The use of largely mechanical methods

The starting date. — The final decade of the 19th century and the first few years of the 20th century represented a period of great turmoil in botanical nomenclature, with considerable controversy as to how to apply in detail the generally agreed principles of Candolle's *Lois* of 1867 (see Nicolson in Ann. Missouri Bot. Gard. 78: 33–56. 1991). As has happened at other times with regard to nomenclature, two opposing "schools" emerged: the one seeking to govern precisely all situations regardless of its effect on current usage, and the other seeking to preserve the current names and their application. The first approach, the one that led ultimately to the *American Code*, is exemplified in the "Madison Rules" developed by the Botanical Club of the American Association for the Advancement of Science (Britton in Bull. Torrey Bot. Club 20: 360–365. 1893), in which priority of position was established in choosing between competing names (e.g., *Buda* Adans. (1763) was given precedence over *Tissa* Adans. (1763) as it appeared a few lines further up in the same work – both now rejected in favour of *Spergularia* (Pers.) J. Presl. & C. Presl (1819), conserved at the Vienna Congress in 1905). The alternative approach was enunciated in, for example, the so-called "Harvard Code" signed by 74 North American botanists (Anderson & al. in Beibl. Bot. Jahrb. Syst. 52: 12–15. 1895). The more mechanical approach led first to the "Philadelphia Code" (Arthur & al. in Bull. Torrey Bot. Club 31: 249–290. 1904 – English text 249–261) submitted in English, French, and German to the Vienna Congress for adoption, and then, after that Congress declined to adopt it, to what was entitled the *American Code of Botanical Nomenclature* (Arthur & al., l.c. 1907) published only in English, which Nicolson (l.c.) thought more properly termed the "Brittonian Code" in view of the number of U.S. botanists, principally of the "Harvard school", who did not accept it. The traditional approach of the "Harvard Code" became, of course, the basis of the international "Vienna Rules" (Briquet, Règles Int. Nomencl. Bot. 1906).

The Committee concluded that it was necessary to look not just at publications that appeared after the publication of the *American Code* in 1907, but also to consider earlier works that also adopted a largely mechanical method of type selection. There are a number of examples. Underwood, in a review of genera of ferns (in Mem. Torrey Bot. Club 6: 247–283. 1899) wrote (p. 251): "For each genus established the first named species will be regarded as type" and went on to outline (p. 252) "a few of the many reasons for accepting the principle of the first species under a genus". [Underwood made an exception for generic names in Linnaeus's *Species plantarum* (1753) treating them as though published by their pre-1753 author.] Murrill in a historic review of the genera of *Polyporaceae* (in J. Mycol. 9: 87. 1903) referring to generic types wrote: "The principles by which I have been chiefly guided are also quite well known having been stated and explained by Underwood in … (Mem. Torrey Club, 6: 250)." Murrill

(in Bull. Torrey Bot. Club 32: 633–656. 1906 ["1905"]) even changed some of his own earlier lectotypifications as the mechanical method that he followed became more refined, e.g., his designation (l.c. 1903: 98) as type of *Coriolus* Quél. of *C. lutescens* (Pers.) Quél., "the first species listed by Quélet under *Coriolus*" and one "accompanied by the citation of a figure" was, later (Murrill, l.c. 1906: 630) replaced by *Polyporus zonatus* Nees because it was "the first species accompanied by a correct citation of a figure"! Arthur, the distinguished mycologist and plant pathologist and a signatory of both the "Philadelphia Code" and the *American Code*, stated (in Wettstein & al., Verh. Int. Bot. Kongr. Wien: 335. 1906) with regard to the nomenclature that he was using in a paper presented in German to the Vienna Congress in 1905: "Diese gründet sich auf die amerikanische Idee von Typen und befolgt den Philadelphischen Kodex, der jetzt dem botanischen Publikum wohl bekannt ist" (This is based on the American idea of types and complies with the "Philadelphia Code", which is now well known to the botanical public).

Given these early endorsements of a largely mechanical system, and as types of generic names were not even considered except by those operating under such a system, the Committee concluded that no starting date need be considered for the application of Art. 10.5(b). Any type selected by those who became followers of the *American Code* will have been carried out under a largely mechanical system whether prior to the publication of that *Code* in 1907 or in the years following its adoption.

Ending date. — The date or dates at which a largely mechanical system was no longer operating is more difficult to determine. For example, Merrill in his obituary of N.L. Britton (in Biogr. Mem. Natl. Acad. Sci. 19: 145–202. 1938) wrote (p. 157) that Britton's publications were "issued under the 'American' Code" without any suggestion of time limit. By contrast it is clear that while Arthur followed the *American Code* or its predecessors in his 1905 presentation at the Vienna Congress referred to above (Arthur, l.c. 1906: 331–348) and in his account of *Dicaeoma* Gray (*Uredinales*) on various hosts (in N. Amer. Fl. 7: 269–453. 1920–1921), by 1934 (Man. Rusts U.S. Canada. 1934) he was no longer doing so – this is evident from his replacement of *Dicaeoma*, correct under the *American Code*, by *Puccinia* Pers. correct under the *International Rules* (and subsequently sanctioned under modified rules in later *Codes*). Additionally, immediately following the Cambridge Congress in 1930, Clements & Shear (Gen. Fung., ed. 2: 14–15. 1931), both of whom were original signatories of the *American Code*, explicitly abandoned it in favour of the "International Code", even going so far as to propose non-original species as types to preserve "present application", much as current conservation proposals attempt to accomplish. Use of the *American Code* had substantially declined by 1930, and adoption of the Cambridge "International" Rules started prior to publication in 1935 via publication of unofficial versions by A.B. Rendle (in J. Bot. 72 Suppl.: 1–29. 1934) cited and again published in full by C.W. Dodge (Med. Mycol.: 75–96. 1935), and therefore acceptance of the *American Code* essentially ended with the publication of the *Cambridge Rules* in 1935 (Briquet, l.c. 1935). The Committee was of the opinion that even although some use of the *American Code* persisted until replaced by the *Cambridge Rules*, for the purposes of general application of Art. 10.5(b), a more conservative termination date was necessary, except for publications that provided explicit evidence of continuing to follow the *American Code*. The publication of another, less well-known *Code* provides such a date, because it gives evidence that botanists in the United States were endorsing an alternative to the *American Code*. This is the "Type-basis Code" (Hitchcock, l.c. 1921).

The "Type-basis Code" arose from an initiative of the Botanical Society of America that, in 1917, set up a small committee on generic types with A.S. Hitchcock as chair and including N.L. Britton. This committee published a report (Hitchcock in Science 49: 333–336. 1919) with a set of "Regulations on fixing generic types" but also stating that implementation should await the production of "a proposed Code of Nomenclature" for which it proposed that the committee be expanded. This was done and a report with the full text of this *Code* was published (Hitchcock, l.c. 1921). Although elements of this *Code* remained mechanical, e.g., priority by position in a publication, a very important difference was that the mechanisms for type selection, although still set out as a detailed procedure including selection of the first species (albeit at the last position in the sequence), were no longer mandatory but were included as "Recommendations". The authors of the full "Type-basis Code" included many of the signatories of the *American Code*, not only Britton, but also Arthur, Barnhart, Cook, Coville, Evans, Howe, Knowlton, and Shear. Fink (cf. Art. 10 Ex. 6) was also an author.

The present Committee took the view that the publication of this *Code* in 1921 should be taken as the end of the predominant use by its authors and others of the *American Code*. We are consequently proposing that, except where there is explicit evidence to the contrary, general application of Art. 10.5(b) should apply only to works published up to and including 1920.

Those who adopted largely mechanical methods. — This is the key issue that the Committee had to address. As noted above, the widespread acceptance of the *American Code* in several productive institutes in the United States meant that, after the initial period to which reference is made above, few authors would see any need to state explicitly the nomenclatural system that they were following. Frodin (Guide Stand. Fl. World, ed. 2: 40–41. 2001), discussing the numerous floristic works authored by "Britton and his group" for different parts of North America, Bermuda, and the Caribbean, stated that all were written not only for an increasing market but "also as part of an overall strategy, including propagation of the 'American Code' of nomenclature" that Frodin suggested was "introduced … amidst a rising tide of nationalism and [was] widely used in the United States until 1930", including, Frodin noted, being adopted by the U.S. federal government for botanical names. Examination of the works themselves reveals that this is substantially true. For example, although there is no mention of following the *American Code* in Britton's *Flora of Bermuda* (1918), the inclusion of tautonyms (e.g., "*Abutilon Abutilon*", p. 233), permitted under that *Code*, but not in the *International Rules* (Briquet, l.c. 1906), makes clear that the *American Code* was being followed.

The Committee sought to identify categories of persons who might reasonably be considered to have followed a largely mechanical system at least in the heyday of the *American Code*. The first category is clearly the 18 signatories of the *American Code* (Arthur & al., l.c. 1907) along probably with the five additional signatories of the "Philadelphia Code" (Arthur & al., l.c. 1904). The signatories of the *American Code* are: J.C. Arthur, John Hendley Barnhart, N.L. Britton, Frederic E. Clements, O.F. Cook, Frederick V. Coville, F.S. Earle, Alexander W. Evans, Tracy E. Hazen, Arthur Hollick, Marshall A. Howe, F.H. Knowlton, George T. Moore, H.H. Rusby, C.L. Shear, Lucien M. Underwood, David White, and William F. Wight. The five additional signatories of the "Philadelphia Code" are: Stewardson Brown, John M. Coulter, E.L. Morris, William Alphonse Murrill, and William Trelease. Details of these 23 gentlemen are appended.

A second category is similar to the first in that it also represents persons who publicly acknowledged their adoption of the *American*

Code or its predecessors. Some, such as Underwood, Murrill, and Arthur, whose endorsement of a largely mechanical method of type selection is mentioned above, were also signatories at least of the "Philadelphia Code", but there are others who were not signatories but who explicitly expressed publicly their adoption of a *Code* involving mechanical methods, but in some of their other publications had no occasion to do so. These persons must also be treated as having used a largely mechanical method of type selection in the period prior to 1921.

A good example is Paul C. Standley who, as a preliminary to his account of *Amaranthaceae* in the *North American Flora*, published a separate paper (in J. Wash. Acad. Sci. 5: 72. 4 Feb 1915) considering the typification of *Achyranthes* L. Standley selected *A. repens* L. as type on the basis that "there seems, moreover, no doubt as to [this being] the type of the genus *Achyranthes* under the American Code of nomenclature". He made the selection even although recognizing that, as a result, "the name *Achyranthes* must be used in a sense other than that in which it has generally been employed in recent years". When Standley came to publish his account of *Achyranthes* in the *North American Flora* (in Britton, N. Amer. Fl. 21: 134. 9 Jun 1917) he cited *A. repens* as type but nowhere in his treatments of *Amaranthaceae* and *Chenopodiaceae* did he refer to his method of type selection – hardly surprising given both the format of the work and the overwhelming use of the *American Code* by its contributors. It is evidently absurd to suppose that Standley, in maintaining the disruptive type he had designated two years earlier under the *American Code*, was not still following that *Code*. Consequently his citation in 1917 of *A. repens* as type of *Achyranthes* is not that of an author not following a largely mechanical method and so cannot be treated as an affirmation of his 1915 selection. Instead his selection was superseded by Hitchcock (in Sprague, l.c.: 135), who chose *A. aspera* L. Standley, in his *North American Flora* treatments (in Britton, N. Amer. Fl. 21: 1–254. 1916–1918) also republished type designations previously made using a largely mechanical method by other authors, such as Britton & Brown. Likewise, those type citations such as that of *Chenopodium rubrum* L. (l.c. 1916: 9) and *Amaranthus caudatus* L. (l.c. 1917: 102) do not constitute priorable affirmation of their original selection; the typification of *Chenopodium* L. has been superseded by that of *C. album* L. selected by Hitchcock (in Sprague, l.c. 137) while that of *Amaranthus* L. was first affirmed by Green (l.c.: 188).

The third major category covers those employed by or closely associated with the New York Botanical Garden (NYBG) under N.L. Britton's directorship. Frodin (l.c.: 150), referring to the great number of Floras prepared by Britton and his followers, commented that "all became vehicles for the propagation of the so-called 'American' Code of nomenclature". Merrill (l.c.), one of his successors as Director of NYBG, wrote of N.L. Britton: "his own publications and **most of those prepared by his associates in New York** were issued under the 'American' code" (our emphasis). The most important of these associates were George Valentine Nash (1864–1921, employed by NYBG), Per Axel Rydberg (1860–1931, first curator of the NYBG Herbarium), and John Kunkel Small (1869–1936, Curator of Museums then Head Curator, NYBG), as they were NYBG staff members who contributed extensively to the *North American Flora* edited by Britton (with Underwood until his death in 1907) until 1914, when Britton was joined by Murrill and Barnhart, the last-named later becoming sole editor – thus edited by *American Code* signatories for throughout the period during which that *Code* operated.

This also raised the question of whether all contributions to the *North American Flora* should be considered to have followed the *American Code*, at least prior to 1921. Frodin (l.c.: 150), for example, stated that "the use of the 'American Code' was, of course, also extended by Britton's *North American Flora* launched in 1905". However, at least some parts of the *Flora* included an initial "Announcement" that included the paragraph "Each author will be wholly responsible for his own contributions, being restricted only by the general style adopted for the work, which must vary somewhat in the treatment of diverse groups" suggesting that authors were free to follow or not the provisions of the *American Code*, although given the context, it seems extremely likely that most would. Due, however, to this statement of personal responsibility, the Committee concluded that being published as part of the *North American Flora* could not in itself be treated as a criterion for following the *American Code*. Only in those contributions to the *Flora* by authors deemed on other criteria to be following the *American Code* would typifications be supersedable.

The Committee considered whether a fourth category of followers of the *American Code* should be included. Frodin (l.c.: 50) stated that "the U.S. federal government also adopted the *American Code* as official for botanical names" and that this "resulted in its use in a great many standard works … published through the National Herbarium as well as more applied botanical works issued directly by the Department of Agriculture (and the Forest Service) and in publications of the first U.S. Biological Survey". The Committee, due to its Convener starting its work rather late, did not have time to locate contemporary sources for the adoption of the *American Code* by the U.S. government and Frodin (pers. comm.) has indicated that his sources were largely circumstantial, e.g., that F.V. Coville, one of the authors of the *American Code*, was in a key position as U.S. Department of Agriculture Chief Botanist and Hon. Curator of the U.S. National Herbarium at the Smithsonian, both of which posts he held for over 40 years, and that publications by U.S. government employees in the period in question, such as George Sudworth's *Forest trees of the Pacific slope* (1908), followed the *American Code*.

That the U.S. government did formally adopt the *American Code* is supported through statements by Andrews in his Introduction to *Index of generic names of fossil plants 1820–1950* (in Geol. Surv. Bull. 1013: 1–11. 1955). Andrews referred to the instructions (given June 1904) for the preparation of the U.S. Geological Survey's "Compendium Index of Palaeobotany" that "the type species of each genus should be determined by the currently accepted rules of nomenclature" and then Andrews stated that the Compendium Index "type slip" "in all or nearly all cases leads to … the first binomial published for a genus" establishing that at least for the U.S. Geological Survey the accepted rules of nomenclature in the period of active compilation of this Index (1904–1933) was the *American Code*. [For the record, Andrews himself made clear that this was not his approach.]

The Committee concluded that it is almost certain that during the time in question it was formal U.S. government policy that its employees should follow the *American Code*, and includes provisionally this category of authors in the proposals being made by the Committee (in Taxon 65: 1441–1442. 2016) in the hope of securing more explicit documentation prior to the Shenzhen Congress.

Publications of those using a largely mechanical method. — Given the extensive adoption of the *American Code* and its predecessors in the first two decades of the 20th century, and the prolific publication record of many of its followers, particularly those associated with the New York Botanical Garden, the number of publications that would follow a largely mechanical method of type selection is very large. Of course, many did not deal with generic names and their typification, but a substantial number did. Those that included very

many such typifications are well known. By far the largest number is to be found in the three volumes of the second edition of *An illustrated Flora of the Northern United States* ..., by Britton & Brown, published on 7 June 1913, with, as noted above, some 700 typifications. Other important sources of first generic typifications using a largely mechanical method include Britton, *Flora of Bermuda* (1918), Britton & Millspaugh, *Bahama Flora* (1920), Britton & Wilson, *Botany of Porto Rico and the Virgin Islands* (1923–1926), and Earle, *The genera of North American gill fungi* (in Bull. New York Bot. Gard. 5: 373–451. 1909). However, there is no index of typifications, even of generic names, and so the potential for first typifications using a largely mechanical method appearing in other works remains considerable. For that reason, the Committee concluded that no list of titles could be prepared that would be sufficiently exhaustive, and that a safer approach would be to identify the categories of authors adopting these methods (as set out above) and to make typifications in any of their publications supersedable. Examples are also suggested that will guide users as to the most common type of publication in which a typification may be superseded.

Addendum: Signatories to the *American Code* and to the "Philadelphia Code". — The five that were signatories only of the latter are marked "[Phil.]" at the end of the entry; the text in italic immediately following the life span is slightly abbreviated from the "Philadelphia Code"; details of the affiliation of signatories were not included in the *American Code*.

Joseph Charles Arthur (11 Jan 1850–10 Apr 1942) (*Professor of Plant Physiology and Pathology, Purdue University*), plant pathologist and mycologist; publications include Order *Uredinales* in N. Amer. Fl. 7: 83–969. 1907–1931; note also that his *Manual of the rusts of United States and Canada* was published only in 1934.

John Hendley Barnhart (4 Oct 1871–11 Nov 1949) (*Editor, Torrey Botanical Club*), biographer, librarian, etc. at New York Botanical Garden (NYBG).

Nathaniel Lord Britton (15 Jan 1859–25 Jun 1934) (*Director-in-Chief, NYBG*), prolific taxonomist primarily of vascular plants; author of several works important for generic typification, incl. Ill. Fl. N. U.S., ed. 2. 1913; Fl. Bermuda. 1918; Bahama Fl. 1929 (with C.F. Millspaugh); Bot. Puerto Rico 1923–1926 (with P. Wilson), authored accounts in N. Amer. Fl. incl. with J.N. Rose on *Crassulaceae* (1905) and, also with Rose, a monograph of *Cactaceae* (1922); founder and first president of NYBG.

Stewardson Brown (1867–1921) (*Conservator, Botanical Section, Academy of Natural Sciences of Philadelphia*) [Phil.].

Frederic Edward Clements (16 Sep 1874–26 Jul 1945) (*Assistant Professor of Botany, State University of Nebraska*), primarily an ecologist but author of *The genera of fungi* (1909) and ed. 2 (1931) with C.L. Shear.

Orator Fuller Cook, Jr. (28 May 1867–23 Apr 1949) (*Botanist in Charge of Investigations in Tropical Agriculture, United States Department of Agriculture [USDA]; Assistant Curator [Cryptogamia], United States National Herbarium*), economic botanist, entomologist, and evolutionist.

John M. Coulter (20 Nov 1851–23 Dec 1928) (*Professor of Botany, University of Chicago; Editor, Botanical Gazette*) [Phil.].

Frederick Vernon Coville (23 Mar 1867– 9 Jan 1937) (*Chief Botanist, USDA; Curator, United States National Herbarium*), botanist and agronomist with USDA in Washington, D.C.

Franklin Sumner Earle (1856–1929) (*Director, Estación Agronómica Central de Cuba*), mycologist, author of *The genera of North American gill fungi* (1909).

Alexander William Evans (1868–1959) (*Assistant Professor of Botany, Yale University*), bryologist (hepaticologist) and lichenologist at Yale.

Tracy Elliot Hazen (1874–1943) (*Tutor in Botany, Barnard College, Columbia University*), phycologist, Columbia University; author of *The Ulothricaceae and Chaetophoraceae of the United States* (1902).

(Charles) Arthur Hollick (6 Feb 1857–1 Mar 1933) (*Assistant Curator [Palaeobotany], NYBG*), dendrologist and palaeobotanist at NYBG.

Marshall Avery Howe (1897–1936) (*Assistant Curator [Algae], NYBG; Editor, Torreya*), hepaticologist and phycologist at NYBG (later Director).

Frank Hall Knowlton (2 Sep 1860–22 Nov 1926) (*United States Geological Survey; Custodian [Mesozoic Plants], United States National Museum*), palaeobotanist (and ornithologist) at George Washington University, D.C.

George Thomas Moore (1871–1956) (*Physiologist, in Charge of Laboratory of Plant Physiology, USDA Custodian [Algae], United States National Herbarium*), phycologist, Director of Missouri Botanical Garden 1912–1953.

Edward Lyman Morris (1870–1913) (*Head of the Department of Biology, Washington [D.C.] High Schools*), after 1907 Curator of Natural Sciences Brooklyn Institute of Arts, expert on *Plantaginaceae* [Phil.].

William Alphonso Murrill (13 Oct 1869–15 Dec 1947) (*NYBG*), mycologist, retired from NYBG in 1924 [Phil.].

Henry Hurd Rusby (1855–1940) (*Professor of Physiology, Botany and Materia Medica, and Dean of the Faculty, College of Pharmacy of the City of New York*), economic botanist at NYBG; an "incorporator" of the Garden.

Cornelius Lott Shear (1865–1956) (*Plant Pathologist, USDA*), agrostologist, mycologist, and plant pathologist at George Washington University (D.C.) and USDA, and co-author of *The genera of fungi*, ed. 2 (1931) with F.E. Clements.

William Trelease (22 Feb 1857–1 Jan 1945 (*Director, Missouri Botanical Garden*), botanist, entomologist, explorer, writer, and educator; Engelmann Professor of Botany, Washington University, Saint Louis (1885–1913), Director, Missouri Botanical Garden (1889–1912) [Phil.].

Lucien Marcus Underwood (26 Oct 1853–16 Nov 1907) (*Professor of Botany, Columbia University*), pteridologist, bryologist, and mycologist, Columbia University, then NYBG.

Charles David White (1862–1935) (*United States Geological Survey; Custodian [Palaeozoic Plants], United States National Museum*), geologist and palaeobotanist, U.S. Geological Survey, then at the Smithsonian Institution (US).

William Franklin Wight (8 Jun 1874–1954) (*Assistant, Geographic Botany, USDA*), vascular plants, especially *Rosaceae*.