

## CHAPTER XII

### PUBLICATION OF GROUPS

Genera, species and other taxonomic categories are said to be published when, in connection with the name, a description or sufficient characterization is printed and distributed. There are, then, two factors in publication: (1) a description that is sufficient to identify the group to which the name is applied; and (2) the accessibility of this description to botanists. In practice these conditions are not always met. It not infrequently happens that the description consists of a few words which may have seemed to the author to be sufficiently definitive but which to later botanists appear vague and indefinite. It is customary to give the author the benefit of the doubt and to consider his name published if there is an attempt to define the group or to distinguish it from others, especially if the description is given in a formal manner. A new name appearing without description is called a *nomen nudum* (bare name, name only). Casual mention of plants in travelers' notes, where a name appears in connection with a remark or two as to habit but without the information necessary to identify the species, does not constitute publication. Such names are sometimes referred to as *nomina seminuda*.

A description is accessible if printed in a book or serial which is placed on sale, or publicly distributed in sufficient quantity to supply the normal demand. If printed in a serial it should be one that ordinarily reaches botanists or is accessible to them. A description printed in an obscure newspaper would scarcely be considered properly published. Even if it were printed in a seed catalog, proper publication would be questioned. If the seed catalog were issued by a botanical garden and widely distributed to botanists, and

if it belonged to a series normally kept on file in libraries, proper publication would be conceded by most botanists.

A description is not properly published unless a sufficient number of copies are issued to make it generally accessible. A few copies printed and distributed privately are not always accepted as proper publication, because the work has not been given to the public. Carbon, mimeographic, photographic, and other multiple copies made by processes other than printing, may be channels for publication in the technical botanical sense if sufficiently accessible. Cases are on record where a sufficient number of properly printed copies were made, but all but one or two, or at most a few, were destroyed by fire before distribution was accomplished. Doubtful cases of the kind mentioned above would be considered on their merits. Names offered as new through such channels are accepted as properly published only if it can be shown that the description reached a sufficient number of botanists interested in the group proposed.

### Publication of Species

As stated in a previous paragraph, the one who first applies a name to a species (or other group) in effective publication is said to be the author of the species or group, and when the name is used in a formal manner it is followed by the name of the author. A specific name may be published in two ways.

1. The species is proposed as new, named and described for the first time. This is the original description of the species. The author may place his own name after the name of the species, or he may omit his name and merely indicate that the species is new by appending "n. sp.," "spec. nov." or other equivalent term. Earlier authors sometimes used the abbreviation "nob." (*nobis*, by us) or "mihi" (or *m.*, by me), for their new species, or indicated them by an asterisk. If the new species appear in a book or article written by the author there is no ambiguity. Sometimes, however, an author publishes a species under a

name which has been given to it by another botanist. This name may have been given to a plant in an herbarium, or mentioned in a letter to a friend. An author is under no legal obligation to publish such a name for another, but if he choose to publish it he credits the species to the other author. Whether one is under a moral obligation to publish an herbarium name depends upon the circumstances. If there is evidence that the herbarium name was given as a result of a serious study, or if the name occurs in a well-considered manuscript, the publishing author does well to publish it (if he is taking up the species on the basis of the specimen), crediting the species to the other, and might be criticized for piracy if he did not do so. On the other hand, names are often written on herbarium sheets in a casual manner, without proper study, or with the desire to call attention to peculiar specimens for further study. Authors are under no obligation to take up such names, and are wiser not to do so, for it may lead to confusion if the name, as sometimes happens, has been applied to two or more species. It is especially unfortunate to publish a name, crediting it to another, when the other's actual specimen has not been seen. (For an interesting example illustrating this, see the case of *Paspalum Pittieri* Hack. elaborated on page 149.)

Sometimes a writer prepares the descriptions of new species to be included in the work of another. For example, one may be preparing a monograph on a family of plants and may ask another botanist to furnish the manuscript for a genus. The second writer would then be credited with the new species of that genus. Or one botanist may edit a series of works to which others contribute families, tribes, or genera, each contributor then being credited with the new species he describes.

*Example.* De Candolle issued a series of monographs, one of which was devoted to the Andropogoneae, a tribe of grasses. The manuscript for this group was furnished by Professor Hackel. Hackel's new species published here may be cited thus: *Andropogon* — Hack. in DC. Monogr. Phan. 6 : — . 1889.

2. A name is published by a reference to a previous description. This method may be applied in three ways:

(a) A species may be transferred from one genus to another. This is sometimes referred to as a new combination, because the old specific name has been combined with a new generic name. The author making the transfer is credited with the new name as explained in Chapter IV. The publication of the new name is validated by a reference to the original name.

*Example.* *Sporobolus indicus* (L.) R. Br. (*Agrostis indica* L.). Robert Brown thus publishes the new name by referring to an older name already published. In older works one finds publication of this kind accomplished in a variety of ways. One might find: *Sporobolus indicus* (L. sub *Agrostis*). The author of the new combination is not named, but it is to be inferred that he is the author of the article in which the name occurs. In the parenthesis we see that the species was described by Linnaeus under *Agrostis*.

(b) It may be found that a name of a species properly described is not valid (can not be legally used) because it is a homonym, and a new name must be given. The new name will be effectively published if the non-valid name is cited.

In transferring a species to another genus it may be found that the name is not valid because the specific name is already in use in that genus for another species; it is then necessary to supply a new name.

*Example.* *Muhlenbergia biloba* Hitchc., 1913 (*Bealia mexicana* Scribn., 1890, not *Muhlenbergia mexicana* Trin., 1824). Hitchcock concluded that *Bealia mexicana* was properly a species of *Muhlenbergia* and transferred it to the latter genus. As there was already in that genus a species with the name *Muhlenbergia mexicana*, it was necessary to give *Bealia mexicana* a new specific name under *Muhlenbergia*.

Again, after a species is originally described in a genus, it may be found that it is not valid because the same name has been used earlier for another species; a new name is then required.

*Example.* *Panicum concinnius* Hitchc. & Chase, 1910 (*Panicum gracilicaule* Nash, 1903, not *P. gracilicaule* Rendle, 1899). Nash described *Panicum gracilicaule* in 1903, not knowing that Rendle had published the same name for a different species in 1899. Consequently it was necessary to give Nash's species a new name.

Many botanists now distinguish between the three categories of publication described above by designating them as new species, new combinations and new names.

*Examples.* (1) *Panicum leucothrix* Nash, n. sp. or sp. nov. (species nova); or more frequently the author's name is omitted, to be inferred from the author of the article. (2) *Sporobolus indicus* (L.) n. comb. (with a citation of original name to effect publication). The formal use of the term "new combination," has scarcely received the sanction of the best usage; illustrated in the example given. It may, however, be properly used to designate the kind of publication. For example, one might say, "Rydberg has transferred several species of *Sporobolus* to *Muhlenbergia* and has made new combinations for them." (3) *Muhlenbergia biloba* Hitchc. new name or nom. nov. (nomen novum).

(c) A specific name may be assigned to a species previously described under a misapplied name, or to one described but not named. An author may identify a given species with one previously described, and a subsequent author, discovering the error, may assign a new name.

*Examples.* *Panicum Scribnerianum* Nash (*Panicum scoparium* Lam. as described by S. Wats.). Sereno Watson (in Gray's Manual, ed. 6, 1890) described a species under the name *Panicum scoparium* Lam. Nash, finding that this species was not the same as the *P. scoparium* of Lamarck, assigned a new name. Sometimes the botanist giving the new name may indicate the change thus: *Panicum Scribnerianum* (*P. scoparium* Amer. Auth. not Lam.). Another method, unfortunately rather common, is to cite the synonym thus: (*P. scoparium* S. Wats. not Lam.). Such a citation is misleading since it seems to indicate a case like that described under *b* (see example, *Panicum concinnius*) whereas it is really a misapplication of a name by Watson, not a new name proposed by him as is implied.

*Panicum Muhlenbergianum* Schult. (*Panicum* No. 27 Muhlenberg). Muhlenberg described a species but gave it no name, merely giving it a number. Schultes assigned a name, referred to the number in Muhlenberg's work, but gave no description. Schultes's name was effectively published.

**Publication Based on Figures.** — There is a difference of opinion among botanists as to whether a new species based upon a figure, without description, is effectively published. In paleobotany such publication is usually accepted as effective. With diatoms also, new species are considered valid if based on figures. Among higher plants, however, new species based solely on figures are usually rejected. It is best to consider each case on its merits. If the figure or plate is carefully made and includes details of the flower, fruit, or other characters of diagnostic value, especially if accompanied by a full explanation, it is probable that the new species is as fully identified as if supported by a formal description, and therefore should be considered as effectively published. However, there are many figures so crudely or inaccurately drawn that identification is impossible or at least uncertain, and species based upon them would be a subject of controversy. It is nevertheless true that equal uncertainty may be occasioned by the acceptance of names based on insufficient description. The Type-basis Code provides that names based on figures are not effectively published except in paleobotany and in the literature of diatoms. (See Appendix, page 202.)

### **Publication of Genera<sup>1</sup>**

Genera may be published by the distribution of a printed description, as in the case of species. We have here, however, a somewhat different set of conditions. The species is the unit of classification, while a genus is a group of species. Hence, when a genus is first described, the included species are mentioned. The description of the genus states the characters common to the species included and the particulars in which the group differs from other genera in the same family. It is more important to know the species of the group than to know the generic characters, for if the species are known the characters common

<sup>1</sup> See Appendix, The Type-basis Code, page 201.

to the group can be determined even though no generic description has been given.

It is now customary in describing a new genus to indicate the type, that is, one species that shall determine the application of the generic name.

Publication of genera therefore may be effected by (1) describing the genus and assigning a binomial specific name, (2) describing a species and assigning a generic and specific name, (3) giving a generic and specific name and citing a previously published description, or (4) applying a generic name to a previously published binomial species or group of species.

As effective publication of generic names is very important from the standpoint of stability in nomenclature, these four cases will be somewhat elaborated. It is assumed in all cases that the requirements of printing and distribution have been met.

1. Description, with at least one binomial specific name. This has already been discussed in the preceding paragraphs. Even though the description be meager or obscure, the genus can be interpreted from the included species if these have been previously described.

2. Description of species with an accompanying binomial. This in effect assigns a generic name to a species or group of species. In the first work published under binomial nomenclature, Linnaeus' "Species Plantarum," there are no generic descriptions, the genera being given by name, each followed by the descriptions of the included species. Under the Type-basis Code these genera are effectively published. Some botanists maintain that this method does not effectively publish genera, and insist that effective publication requires a generic description simultaneously or previously published. These botanists validate the genera of Linnaeus' "Species Plantarum" by the fifth edition of his "Genera Plantarum" published the next year (1754).

*Example.* The genus *Eragrostis* was established by Host in 1809. He describes *Eragrostis major* but gives no generic description.

3. Publication by the citation of a synonym. A subdivision of a genus may be raised to generic rank. A new name may be given to a genus as a substitute for one that is not valid. A species or group of species may be detached from an old genus to form a new genus. In all these cases there may be no new generic description, publication being effected through the citation of synonyms that have been properly published.

*Examples.* *Bromelica*, first described as a section of *Melica* by Thurber, was raised to generic rank by Farwell. *Chaetochloa* was proposed by Scribner as a substitute for *Setaria* Beauv., the latter name being invalidated by the earlier use of the name for a genus of lichens by Michaux. *Bulbilis* was established by Rafinesque, who gave this name to *Sesleria dactyloides* Nutt.

4. Application of a generic name to a previously published binomial species or group of species. This differs from the preceding method (3) only in case no direct synonym is cited.

*Examples.* Adanson applied the name *Apera* to the first species of *Agrostis* in Linnaeus' "Species Plantarum," without definitely citing the name of the species. Necker applied the name *Psedera* to the Linnaean species of *Hedera* with compound leaves.

The difficulties connected with defective and insufficient publication are to be found mostly in books written before botanists developed their present methods of procedure. To avoid confusion and to establish effective publication, authors are expected to publish names in books, journals or serials accessible to botanists. In order that such a publication may be considered accessible, the number of copies should be ample and the medium one that ordinarily reaches botanists. Botanical journals are to be preferred, though journals devoted to general science, if well-known and widely circulated, are not objectionable. Publication in literary journals or in those devoted especially to sciences other than botany would be legal but is certainly to be discouraged. Publication in ephemeral pamphlets or leaflets

should be avoided.<sup>1</sup> The publication of names in books of travel is unfortunate, especially if this is done in a casual way. Any form of publication which is likely to escape the indexers, or which puts upon them an extra burden, is to be avoided. It is well to print new names in conspicuous type so that they will not be overlooked. Not infrequently, new names have failed to receive attention even when published in taxonomic works, because they have been inserted inconspicuously. This is especially true of changes of names recorded in footnotes or remarks appended to other matter and with no distinctive type to give them prominence.

For some years after the birth of descriptive taxonomy, new species were described in Latin, as that was the language of international science. Gradually the exclusive use of Latin was abandoned and descriptions began to appear in English, French and German, at first usually with Latin diagnoses and later entirely in the modern language. At present the descriptions, for the most part, appear in the languages mentioned, but there is an increasing tendency to use other languages. As long as the foreign language is one that uses Roman letters, it is possible for botanists to work out the descriptions; but the use of such languages as Russian and Japanese renders the new material unavailable to the great majority of botanists, and, therefore, can scarcely be said to meet the requirement of accessibility. The International Rules (Vienna Code) provide that publication, to be effective, must be in Latin or be accompanied by a diagnosis in Latin.

<sup>1</sup> The present writer has been guilty of transgressing this rule. *Roripæ Armoracea*, *R. sessiliflora* and *R. sinuata*, all transfers, were published in his "Key to the Spring Flora of Manhattan" (1894), a pamphlet privately published for the use of students and soon out of print. Such works might be classed as ephemeral. Fortunately, the names were recorded by indexers and, at most, they were only transfers and not original publications.

## CHAPTER XIII

### HOMONYMS AND SYNONYMS

In the preceding chapters, frequent reference has been made to synonyms and occasional reference to homonyms. The subject is of so much importance in descriptive taxonomy that a further elaboration is advisable.

#### Homonyms

Homonyms are identical names applied to different groups of the same rank. They may have been applied by accident or by design. An author may publish a new name for a species without knowing that the same name has been used for another species. If the name has not been given sufficient publicity in connection with the first species, it may come into general use with the second. The second publication may have been due to carelessness, the author not taking sufficient pains to determine whether or not the name had been used. Until the issue of the "Index Kewensis," which listed the names of genera and species of flowering plants published up to about the time that work appeared, it was not an easy matter to determine homonyms. Even at the present day, a homonym may be published because the earlier name has been so recently published that there has been insufficient time for it to reach botanists. Every effort should be made to avoid the publication of homonyms as it burdens literature with extra names and is an indication of carelessness on the part of the worker.

Some botanists have published a name a second time designedly, because the earlier application of the name had fallen into disuse, sometimes because it was generally recognized as a synonym, sometimes because it had not been generally accepted. In the early days of descriptive

taxonomy, the principle of priority of publication was not so generally accepted as it is at present, and botanists were more likely to accept names on authority, regardless of priority.

### Synonyms

Synonyms are different names applied to the same group. They are of two general kinds: first, those that are identical in their application, being based on the same concept, the same specimen, or the same type; and second, those whose identity is a matter of taxonomic opinion. The first class may be called absolute synonyms, or typonyms. Typonyms occur accidentally when two botanists independently describe a new species based upon the same specimen or upon different specimens of the same collection. Substitute names are absolute synonyms, in cases where the name of a group is found to be invalid and a new name is given. The most common kinds of absolute synonyms are those which result from the transfer of species from one genus to another or of varieties from one species to another, or from the change in rank from variety to species or species to variety.

It not infrequently happens that an author transfers a species from one genus to another but misapplies the name. For example, Humboldt, Bonpland and Kunth transferred *Axonopus aureus* Beauv. (1812) to *Paspalum*, as *P. aureum* H.B.K. (1816) but applied the name to a different species, as is shown by their description and plate. Many botanists, the present writer included, consider *P. aureum* to be based upon *A. aureus* and hence a typonym of the latter, and look upon the application of the name *P. aureum* to the plant described as being an error, a misapplication of a name. Hence, the plant described by Humboldt, Bonpland and Kunth will be called by another available name, *Paspalum chrysoblephare* (Lag.) Doell (*Axonopus chrysoblepharis* (Lag.) Chase). Other botanists look upon *P. aureum* as a new name to be applied to the plant described, in consequence of which, the species described as *Axonopus aureus* by

Beauvois must receive a new name when transferred to *Paspalum*. In the writer's opinion, this second procedure is more confusing than the first and should not be followed.

Synonyms of the second class are not consistently applied and depend upon taxonomic opinion. The names were applied originally by their authors to groups thought by them to be distinct. Two generic names may be applied by some botanists to two distinct allied groups. Other botanists may believe these groups to belong to one genus, to which they apply one of the names, the other being regarded as a synonym. The term synonym is used somewhat loosely, in two ways. Two names applied to one group are synonyms, but the term "synonym" is also used in contrast with "valid name." Of two synonyms one may be valid; the other is said to be a synonym of the valid name. It is in this second sense that the term synonymy is usually applied. In a taxonomic article, a valid name may be followed by a list of synonyms, this list constituting the synonymy. Taxonomists do not agree as to the limits of species or genera; consequently the synonym of one botanist may be the valid name of another.

#### Examples of Homonyms and Synonyms

- (a) *Setaria* Achar.; Michx. Fl. Bor. Amer. 1803.  
*Setaria* Beauv. Ess. Agrost. 51. 1812.

These names are homonyms, the first being a genus of lichens, the second a genus of grasses. Scribner substituted the name *Chaetochloa* for *Setaria* Beauv. because the latter was invalidated by the earlier *Setaria* of Acharius as published by Michaux.

- (b) *Homalocenchrus* Meig, Act. Helv. Phys. Math. 4 : 307. 1760. The type species is *Phalaris oryzoides* L.

*Leersia* Swartz, Prodr. Veg. Ind. Occ. 21. 1788. The type of this genus is also *Phalaris oryzoides*. Hence *Homalocenchrus* and *Leersia* are typonyms. The first name,

having priority, is valid, the second being a synonym. The International Rules conserve *Leersia*, that is, arbitrarily validate this name even though it was published later than *Homalocenchrus*. Hence, under these rules, *Homalocenchrus* is the synonym.

- (c) *Bromus* L. Sp. Pl. 76. 1753.  
*Ceratochloa* Beauv. Ess. Agrost. 75. 1812.  
*Zerna* Panz. Denkschr. Baier. Akad. Wiss. München  
 4 : 296. 1813.  
*Serrafalcus* Parl. Rar. Pl. Sic. 2 : 14. 1840.  
*Forasaccus* Bubani, Fl. Pyren. 4 : 380. 1901.

These names are usually considered now to apply to the same group. *Bromus*, having been published first, is the valid name; the others are synonyms. The generic names listed are based on different species and hence are not typonyms.

- (d) *Anthochloa* Nees; Meyen, Reise um Erde 2 : 14.  
 1835.  
*Stapfia* Davy, Erythea 6 : 110. 1898. Not *Stapfia*  
 Chodat. 1897.  
*Neostapfia* Davy, Erythea 7 : 43. 1899.  
*Davyella* Hack. Oesterr. Bot. Zeitschr. 49 : 133. 1899.

Davy published *Stapfia* as a new genus, not recognizing it as being the same as *Anthochloa*, and not knowing that the name *Stapfia* had been used the preceding year for another genus. There had scarcely been time for Chodat's name to become generally known, and, moreover, it did not come to Davy's attention for some time as the first genus belonged to the algae and the second to the grasses. The next year, Davy discovered that his name was a homonym and changed it to *Neostapfia*. The same year, and only a short time after the publication of *Neostapfia*, Hackel, without knowing of *Neostapfia*, changed *Stapfia* to *Davyella* for the same reason that had led Davy to make a change. Still later, Scribner investigated the genus and

concluded that it was the same as *Anthochloa*, which was published many years earlier and based on a closely allied species.

- (e) *Panicum pilosum* Swartz, Prodr. Veg. Ind. Occ. 22. 1788. Described from Jamaica.  
*Panicum distichum* Lam. Encycl. 4 : 731. 1798. Described from Jamaica.  
*Panicum pilisparsum* Meyer, Prim. Fl. Esseq. 57. 1818. Described from British Guiana.  
*Panicum trichophorum* Schrad. in Schult. Mant. 2 : 247. 1824. Described from Brazil.

The present writer has examined the type specimens of all the above, and in his opinion they all represent the same species. The name first published is the valid name and the others are synonyms.

- (f) *Panicum Urvilleanum* Kunth, Rév. Gram. 2 : 403. 1830. Described from Chile.  
*Panicum megastachyum* Presl, Rel. Haenk. 1 : 305. 1830. Not *P. megastachyum* Nees, 1826. Described from Peru.  
*Panicum Preslii* Kunth, Enum. Pl. 1 : 121. 1833. Based on *P. megastachyum* Presl.

Presl's name for this species was published first, but is invalidated by the earlier homonym of Nees. Kunth observed that Presl's name was a homonym and changed it to *P. Preslii*, but he had not seen the plant and did not know that it belonged to the same species as his *P. Urvilleanum*. *Panicum Preslii* Kunth is a typonym of *P. megastachyum* Presl, and both are synonyms of *P. Urvilleanum*.

- (g) *Eragrostis maypurensis* (H.B.K.) Steud. Syn. Pl. Glum. 1 : 276. 1854. Based on *Poa maypurensis* H.B.K.  
*Poa maypurensis* H.B.K. Nov. Gen. & Sp. 1 : 161. 1816.  
*Poa VahlII* Roem. & Schult. Syst. Veg. 2 : 563. 1817.

*Eragrostis Vahlia* Nees, Agrost. Bras. 499. 1829.

Based on *Poa Vahlia* Roem. & Schult.

*Eragrostis amoena* Presl, Rel. Haenk. 1 : 275. 1830.

*Eragrostis panamaensis* Presl, Rel. Haenk. 1 : 227.  
1830.

*Megastachya amoena* Fourn. Mex. Pl. 2 : 118. 1886.

Based on *Eragrostis amoena* Presl.

*Megastachya panamaensis* Fourn. Mex. Pl. 2 : 118.  
1886. Based on *Eragrostis panamaensis* Presl.

Here is a valid name with seven synonyms. Among them are three pairs of typonyms.

(h) *Panicum Havardii* Vasey, Bull. Torrey Club 14 : 95.  
1887.

*Panicum virgatum macranthum* Vasey, Bull. Torrey  
Club 13 : 26. 1886. Not *P. macranthum* Trin.  
1826.

Vasey first published this form as a variety. Later he concluded it was a distinct species but could not use the varietal name because that had already been used by Trinius for a different species. He consequently changed it to *Havardii*, thus commemorating the name of the collector, Dr. Havard. The two names of Vasey are typonyms. All typonyms are synonyms, but not all synonyms are typonyms.

## CHAPTER XIV

### TYPES

Nomenclatural types<sup>1</sup> fix the application of names. They are used especially in reference to genera and species. The type specimen fixes the application of the specific name; the type species fixes the application of the generic name. A specific name must always be applied so as to include the type specimen; a generic name must always be applied so as to include the type species. This idea is known in systematic biology as the type concept. It applies to subdivisions of the species, and, in a general way, to families and other groups.

#### Type Species of Genera

The type species must be one of the species included in the genus when originally published. If the genus included but one species when originally published, that species becomes without question the type species. If there were more than one species included in the genus when originally published, one of them is the type species. It is now customary for authors to indicate the type species when publishing a new genus. In the early days of taxonomy there was no definite concept of types and the type of a genus was rarely indicated as such. In the process of establishing nomenclature upon a type basis, it becomes necessary to select the type species for genera containing more than one species when originally published, in cases where no type was indicated by the author. In general, the type is assumed to be the species that the author had chiefly in mind when establishing the genus. It is evident that the

<sup>1</sup> A nomenclatural type must not be confused with a biological type. The latter is a representative of the group to which it belongs; the former determines the application of a name.

selection of the type species must be guided by a taxonomic knowledge of the genus and should not be attempted by one unfamiliar with the species concerned. Much confusion has been needlessly injected into taxonomy by the study of names apart from a study of the plants to which these names are applied. In selecting the type species, the following items should be considered.

Although the author may not have indicated a type species, he may have indicated a certain group or section of the genus as being more typical, or, on the other hand, may have indicated a species or group as being aberrant or as showing a transition to another genus. In the one case, the type should be chosen from the more typical group; in the other case, the less typical species should be excluded from consideration in selecting the type.

The description of the genus may point toward certain species as being typical. Species which definitely disagree with the generic description should not be considered in selecting the type (provided some of the species do agree). Linnaeus' "Species Plantarum" (1753), the work in which the binomial system of naming first appeared and from which our binomial nomenclature starts, contains no generic descriptions. Botanists have agreed to associate with this work that author's fifth edition of the "Genera Plantarum," published in 1754. Therefore, in selecting types of these Linnaean genera, one compares the species of the "Species Plantarum" with the descriptions of the genera in the "Genera Plantarum." In the latter work the generic name is often followed by a citation from an older author, such as Tournefort, showing that the genus was adopted from a previous work. Such citations should be considered in selecting the type.

It may usually be assumed that the species that is illustrated in connection with the description of the genus is one which, to the author, is representative of the genus. Hence, other things being equal, the species illustrated would be chosen as the type.

Among Linnaean genera and sometimes among others, the name given to a species by an author may indicate that he had that species in mind as being representative. Such names as *communis*, *vulgaris*, *typicus*, *normalis* and *officinalis* would seem to point out typical species.

In the early days of binomial nomenclature, specific names were sometimes proper nouns. In segregating from a given genus a group of species including one with such a name and proposing this group as a distinct genus, the author of the new genus not infrequently adopted this proper noun as the name of the genus. In such case we may assume that the author considered this species typical of the new genus and it may be selected as the type.

If the genus contains, from the standpoint of the author, both native and foreign species, we may assume, other things being equal, that he is more familiar with the native species. In selecting types of Linnaean genera on this basis, one would choose a Swedish species rather than one from southern Europe, or a European species rather than an African, or one grown under Linnaeus' direction in the Upsala garden or in Clifford's garden and previously described in his "Hortus Upsaliensis" or his "Hortus Clifortianus," rather than a species known to him only as an herbarium specimen or from a description. For the same reason, one would assume as especially familiar a commonly cultivated economic plant or one much used in medicine, officinal plants being especially prominent in those days. Between two species, one known to the author through an herbarium specimen and the other only through a description, one would probably choose the first as the type, the idea being in all such cases that the more familiar species is likely to be to the author more representative of the genus.

If an author includes a well-known old species, segregated from another genus, and also a new species, one would assume, other things being equal, that the old species was, to the author, representative and hence the type.

In choosing types of Linnaean and other older genera, it is well to note the historical development of the genus. It is confusing to change the application of a generic name in common current use, especially if the genus now contains a large number of species or contains species important in agriculture or horticulture. Unless it violates some important taxonomic consideration, the type should be chosen so as to retain the application of the generic name according to current usage, when such usage is so wide-spread as to be practically unanimous.

Among equally eligible species, preference should be given to the one first known to have been designated as the type.

If none of the above items apply in the choice of the type, one may be justified in arbitrarily selecting the first of equally eligible species.

It will be seen from the above that a careful study of all the factors in the case, both nomenclatural and taxonomic, is necessary before the type species of critical genera can be selected. In many cases the factors are few and the conditions are simple, and all botanists would come to the same conclusion in selecting the type. In complicated cases the selection should be made only by those familiar with the genus. Every author of a taxonomic revision or monograph should state what species he considers to be the type and should give his reasons for the selection. Differences of opinion will undoubtedly develop among taxonomists as to the type species of certain genera. It is to be hoped that ultimately these differences may be submitted to a properly constituted International Commission for decision. Until such a commission is established by an International Botanical Congress, much progress is possible through the recording of relevant facts in connection with type selection by monographers in following the general principles as outlined above.<sup>1</sup>

<sup>1</sup> The author of this book has followed the recommendations of the Committee on Nomenclature of the Botanical Society of America as published in the year book of the Society for 1919 and 1920, and in *Science* (49 : 333-336. 1919; 53 : 312-314. 1921). See also the author's article, "The Type Concept in Systematic Botany" (*Amer. Journ. Bot.* 8 : 251-255. 1921).

### Examples of Generic Types

In most cases there is no difficulty in determining what species is the type of a genus. Many genera included but one species when originally published, in which cases the single species is necessarily the type of the genus.

*Aristida* L. Sp. Pl. 82. 1753. Only one species, *A. adscensionis*, is included.

*Scribneria* Hack. Bot. Gaz. 11 : 105. 1886. This was based on a single species *Lepturus Bolanderi* Thurber., which is the type. That is, Hackel bases a new genus on the species which Thurber described under *Lepturus*.

Many genera when originally described included more than one species. If no type was designated by the author, the type concept demands that one of the species be selected as the type. To determine the type, one endeavors to find out what species the author had chiefly in mind when the genus was established. Several examples will be given and the principles involved in the selection discussed. As stated above, there is usually little difficulty in determining the type. The examples given below include several that present unusual complications. Among the difficult cases the Linnaean genera are prominent. An attempt is made to show the student the principles involved so that he may be prepared to solve his own difficulties in the selection of types.

*Enneapogon* Desv.; Beauv. Ess. Agrost. 81. 1812. Beauvois describes the genus and mentions without description five species, but the first one, *E. Desvauxii*, is the only one figured (pl. 16, f. 11), hence is selected as the type. Many genera may be typified through illustrations in the original publication.

*Triniochloa* Hitchc. Contr. U. S. Nat. Herb. 17 : 303. 1913. Three species are described, one of which is new. The other two were transferred from *Avena*. One of these, *Podosaemum stipoides* H.B.K., the oldest historically, is designated as the type.

When one generic name is substituted for another the type is not changed.

*Neostapfia* Davy, *Erythea* 7 : 43. 1899. A new name is proposed for *Stapfia* Davy (1898) which is invalidated by the earlier *Stapfia* Chodat (1897). The type of *Stapfia* Davy (*S. colusana*), the only species described, becomes the type of *Neostapfia*.

*Achyrodes* Boehmer in Ludw. Def. Gen. Pl. 420. 1760. The only species mentioned is one with a phrase name of Tournefort (1700), which Linnaeus cites under *Cynosurus aureus*. No description being given, this species becomes the type of *Achyrodes*.

*Apera* Adans. Fam. Pl. 2 : 495. 1763. Adanson cites a single species, "Agrostis 1. Lin. Sp. 61," which is *Agrostis spicaventi*. This species is thus the type of *Apera*.

*Valota* Adans. Fam. Pl. 2 : 495. 1763. The only citation given by Adanson is to "Sloan. t. 14. f. 2" which is also given by Linnaeus under his *Andropogon insularis* (Syst. Nat. ed. 10, 2 : 1304. 1759), thus making that species the type.

*Homalocenchrus* Mieg, Act. Helv. Phys. Math. 4 : 307. 1760. The first species is referred to the genus with certainty and a second doubtfully. No specific names are used, but under the first there are two citations which appear in the "Species Plantarum" under *Phalaris oryzoides*, making this species the type of *Homalocenchrus*. Under the Type-basis Code, *Achyrodes*, *Valota*, and *Homalocenchrus* are not effectively published as no binomials are directly mentioned.

*Hordeum* L. Sp. Pl. 84. 1753. Linnaeus describes six species. Since no generic descriptions are given in this work, Linnaeus' "Genera Plantarum" (1754) is used to find his concept of the genus *Hordeum*. In this work he cites Tournefort's plate 295, representing *H. vulgare*, the common barley, which is one of the six species described in the "Species Plantarum." The reference to Tournefort shows that Linnaeus takes the name *Hordeum* from that

author. The description of the genus shows that Linnaeus had the same concept. Hence *H. vulgare* is selected as the type.

*Triticum* L. Sp. Pl. 85. 1753. Seven species are described. The "Genera Plantarum" (1754) cites Tournefort's figures 292 and 293, beardless and bearded wheat, respectively. Linnaeus names the bearded wheat *T. aestivum*, and the beardless wheat *T. hybernum*, these being his first and second species. As these two species were especially familiar to Linnaeus, being commonly cultivated, and as they are the basis of the name which he adopts from Tournefort, the type should be selected from these two rather than from the other five species that he describes. The description of the genus applies equally well to either and they may be considered equally eligible as the type species. In such a case it is well arbitrarily to select the first species, *T. aestivum*.

*Lolium* L. Sp. Pl. 83. 1753. Linnaeus describes two species, *L. perenne* and *L. temulentum*. These are both now retained in the genus and both were described in the flora of Sweden. Since the first was well known to Linnaeus as a common and useful meadow grass, this may be taken as the type species.

*Leersia* Swartz, Prodr. Veg. Ind. Occ. 21. 1788. Three species are described, *L. monandra*, *L. hexandra*, and *L. oryzoides*. *Phalaris oryzoides* L., the basis of the third species, is the oldest historically; hence this species is selected as the type.

*Axonopus* Beauv. Ess. Agrost. 12, 154. 1812. Beauvois mentions several diverse species under his new genus, the first being *Milium compressum* Swartz which is chosen as the type, since it is the only species that agrees with his description of the genus in having solitary spikelets. *Axonopus aureus* also has solitary spikelets, but, being mentioned in a supplementary paragraph as having been received after his work was completed, can not be the type.

*Danthonia* Lam. & DC. Fl. Franç. 3 : 32. 1805. The work cited is a local flora in which the two French species are described, *D. decumbens* (which is the same as *Sieglingia decumbens*) and *D. provincialis*. The authors, however, mention in the paragraph preceding the one devoted to the generic description that "besides the species described below one ought to refer to this genus, first, *Avena spicata* L. or *Avena glumosa* Michx.; second, *Avena calicina* Lam. not Vill." Of the four species mentioned, three are congeneric with *Avena spicata* and correspond with the generic description better than does *Danthonia decumbens*, which is the first species described under *Danthonia*. Piper has selected this latter species as the type because it is the first species described under *Danthonia*, thus transferring the application of the name to what is generally called *Sieglingia*, and has taken up *Merathrepta* Raf. for what is generally called *Danthonia*. It is the opinion of the present writer that *Danthonia decumbens* should be excluded from consideration in selecting the type. *Avena spicata* L., being the oldest historically, would be the type.

### Linnaean Genera

The Linnaean genera of the "Species Plantarum" present fundamental problems in type selection because they are the first genera published under the binomial system of nomenclature. In many cases, species have been taken out of these genera and placed in new ones by later authors and the generic concept has been greatly changed. It is important to determine how the generic name should be applied as the generic concept changes. By selecting one of the original species as the type, the application of the generic name is determined, since the name must always go with the group containing the type. Several examples are given below.

*Poa* L. Sp. Pl. 67. 1753. Seventeen species are described. In the "Genera Plantarum" no citation is given, showing that the name *Poa* is not adopted from a previous author as was *Hordeum* (see above). There is nothing in

the generic description to show that Linnaeus had in mind one species more than another, as the description applies to all. It is necessary, therefore, to find out, if possible, which of the species were more familiar to Linnaeus. We may assume that the Swedish species would be the familiar ones. Linnaeus first used the name *Poa* in his "Flora Lapponica." Among the species there described is the one he later called (in the "Species Plantarum") *Poa pratensis*. This, being the most common and familiar species known to Linnaeus, is chosen as the type. Of the seventeen original species (in the "Species Plantarum") nine are now referred to other genera. Although the authors who made these transfers recognized no type concept, they were careful to apply the name *Poa* to the group containing the most familiar species, *Poa pratensis*.

*Briza* L. Sp. Pl. 70. 1753. Linnaeus describes four species. The first three were familiar to him as cultivated plants in the Hortus Cliffortianus. Of these the second (*B. media*) which was described in his flora of Sweden, is selected as the type species.

*Uniola* L. Sp. Pl. 71. 1753. Two species are described, *U. paniculata* and *U. spicata*. The generic description applies rather better to the first species. Both species were described as coming from America and may have been equally familiar. The second species is now referred to *Distichlis*. The first species is selected as the type.

*Elymus* L. Sp. Pl. 83. 1753. Five species are described, all now retained in the genus. The first use of the name *Elymus* by Linnaeus was in his "Hortus Upsaliensis" (1748) where two species are described, the first being cited in the "Species Plantarum" under *E. virginicus* and the second under *E. sibiricus*. *Elymus sibiricus* is arbitrarily chosen as the type because it is the first of the five species in the "Species Plantarum" that is described in the "Hortus Upsaliensis."

*Aira* L. Sp. Pl. 63. 1753. Fourteen species are described. The name was first used for a genus by Linnaeus

in his "Flora Lapponica" (1737), where he described four species. These four he later (Species Plantarum) described as *A. spicata*, *A. caespitosa*, *A. flexuosa*, and *A. montana*. The description in the "Genera Plantarum" applies well enough to all four. Since the first species was later transferred to *Trisetum*, it is advisable to select as the type the second species, *A. caespitosa*.

*Phalaris* L. Sp. Pl. 54. 1753. Five species are described, two being now retained in the genus (*P. canariensis*, the first, and *P. arundinacea*, the third). The first species is chosen as the type because it is the one that best corresponds to the description of the genus in the "Genera Plantarum" (e.g., gluma obtusa) and is moreover the only one of the five species described that was known by the name of *Phalaris* to the older authors, such as Bauhin, as cited by Linnaeus.

*Panicum* L. Sp. Pl. 55. 1753. This case involves several interesting points. Twenty species are described. The first ten and the fifteenth are now referred to other genera. The historic type of *Panicum*, the species to which the name *Panicum* was applied by pre-Linnaean authors, is *P. italicum*. As usual in seeking Linnaeus' generic concept, we must go to the "Genera Plantarum" (1754). Here he describes the spikelets as having three ovate-acuminate glumes, the first smaller than the others, but says nothing about awns (as in *Panicum crusgalli*) or involucreal bristles (as in *P. italicum*). In a note at the end, he mentions that some of the species have awns and some have involucreal bristles. It would appear that Linnaeus considered these latter species as departures from the usual; hence they are excluded from consideration in selecting the type. Of the remainder, *P. miliaceum*, corresponding to the generic description, being an economic species and native from the standpoint of the author, hence probably the most familiar species, is selected as the type. This selection preserves the name *Panicum* in its commonly accepted sense.

*Andropogon* L. Sp. Pl. 1045. 1753. Twelve species are described. The reference in the "Genera Plantarum" is to "Roy. lugdb. 52" [Royen, Flora Leydensis, 1740]. Here are described two species, which later appear in the "Species Plantarum" as *Andropogon hirtum* and *A. virginicum*. The second is selected as the type since this retains the name in its present signification. Some botanists refer *A. hirtum* to *Cymbopogon* and some to *Hyparrhenia*.

*Holcus* L. Sp. Pl. 1047. 1753. This is one of the few examples in which an adherence to the type concept alters the application of a well-known generic name. Linnaeus describes seven species, *H. sorghum*, *H. saccharatus*, *H. halepensis*, *H. lanatus*, *H. odoratus*, *H. laxus* and *H. striatus*. The historical development was as follows: the first three species were segregated under *Sorghum*; *H. odoratus* was assigned to *Hierochloa*; *H. laxus* to *Uniola*; and *H. striatus* to *Panicum* (later to *Sacciolepis*), leaving *H. lanatus* to represent *Holcus*. What species had Linnaeus chiefly in mind in arranging the seven species under *Holcus*? Turning to the "Genera Plantarum," we find the citation to "*Sorghum* Mich.," which refers to the plants commonly known then as now, as *sorghum*. The description in the "Genera" applies to the first three species and not to the others. It is clear that Linnaeus considered the first three species to represent the genus *Holcus*, the others being included as an afterthought or for want of a better place to put them. Since the old name sorghum is used by Linnaeus as a specific name, *H. sorghum* is selected as the type of *Holcus*.

### Type Specimens of Species

The same general principles apply to the selection of type specimens as to the selection of type species, but the method of application is modified by the different conditions prevailing.

The type specimen is the specimen, or one of the speci-

mens, from which the author wrote the description of the species. If the description was based upon a single specimen, that one is, of course, the type (unless an error can be demonstrated). If there was more than one specimen cited with the original publication, only one of these can be the nomenclatural type even though the description was drawn to cover several specimens. Many authors of the present day indicate the type specimen when describing species. In earlier days this was seldom done, and it becomes necessary now to choose types for the previously described species. In general, the type is the specimen which the author had chiefly in mind when describing the species.

One may sometimes infer the type from the remarks which the author records about the different specimens which he has consulted and which he cites. Any specimens mentioned as being exceptional or unusual would be excluded from consideration in selecting the type. The author may direct attention to a particular specimen, even though he does not call it the type. A specimen which is illustrated, especially if details of the floral structure are given, may usually be considered the type. Such a specimen can usually be identified only by consulting the author's herbarium. The type may often be selected on the basis of the specific name, when it is derived from the collector, locality, or host.

In many cases it is necessary to examine the specimens that were before the author when he drew up the description. The location of these specimens is often known, because the author did his work at a certain herbarium and the actual sheets of specimens may be found. Unfortunately, there are some cases where the types can not be found. The specimens described may have been borrowed and no record kept of the source. Some probably have been lost or destroyed. Many descriptions have been drawn from living plants in botanical gardens and no specimens saved. The earlier authors sometimes attached

no significance to the original specimens and often exchanged them or gave them away. Such types may ultimately be located.

When the original specimens are examined, one may often determine which one should be considered the type. The specific name may be written, in the handwriting of the author, on the label or sheet attached to one of the specimens; or one of the sheets may have notes or drawings, indicating that this specimen received special attention.

Even when only one specimen was cited with the original description, an examination of this type may be necessary to identify the species. At this point care is needed to determine which sheet is the type. The data on the sheet should correspond with those published in the original description. The searcher should be on his guard concerning the unfortunate fact that occasionally an author has published a species under a different name from the one he wrote on the sheet, or, what is still more misleading, may have applied the name found on a sheet to a different species in publication.

One general principle should be borne in mind: the type specimen interprets the description and fixes the application of the name; hence, primarily, the description controls the selection of the type. The fact that the author has written the specific name on a sheet does not in itself indicate that this specimen is the type. The specimen must correspond to the description (though due allowance must be made for errors of observation and misunderstandings of structure), and there must be evidence from the date and other data on the label that this specimen was the one from which the description was drawn. It is clear that a specimen received after the description was published can not be the type even though the sheet may bear the name in the author's hand.

Sometimes no specimen is cited with the original description. Trinius often gave only the country from which the species came. For example, *Panicum lasianthum* Trin.

Gram. Icon. 3: pl. 245. 1830. Trinius states that the specimen came from Brazil. An examination of his herbarium shows that the type was collected by Langsdorf. In other cases, only the range of the species is given. To determine the type specimen it is necessary to consult the specimens which the author had before him when writing the description. Usually one sheet can be singled out as the type because it has upon it the name in the author's hand or notes or drawings which indicate that it was the specimen the author had chiefly in mind as representative of the species. If there are two or more specimens equally eligible, the one most nearly corresponding to the description or the most perfect specimen should be selected as the type.

It will readily be seen from the preceding remarks that the fixing of type specimens is a work demanding the most thorough study of all the details and should be done by one familiar with the group under consideration.

When a species is transferred from one genus to another the type remains the same. Also, when a new name is an avowed substitute for an old one, the type of the old name becomes the type of the new name (see page 117, under Publication of Names). For example, when *Agrostis indica* L. was transferred to *Sporobolus*, the type of *A. indica* became the type of *S. indicus* (L.) R. Br. When *Panicum concinnius* Hitchc. & Chase was substituted for *P. gracilicaule* Nash (1903) because the latter was invalidated by the earlier *P. gracilicaule* Rendle (1899), the type of *P. gracilicaule* Nash became the type of *P. concinnius*. (See page 118.)

The species of Linnaeus, especially those described from Europe, are often based upon familiar concepts and not upon specimens. Such species have no type specimens. The identity of the Linnaean species is often determined largely by the citations of the descriptions of others. Sometimes these citations can be traced back to actual specimens, but oftener they can not. The Linnaean species described

from countries outside of Europe are likely to be based upon types and the specimens may be in existence. The Clayton specimens described by Gronovius and cited by Linnaeus are at the British Museum of Natural History. The specimens collected by Patrick Browne and by Hans Sloane in Jamaica, and by Kalm in Canada, all described or cited by Linnaeus, are in existence, those of Kalm and Browne in the Linnaean Herbarium at the rooms of the Linnaean Society at London, those of Sloane at the British Museum of Natural History.

### Examples of Type Specimens

*Panicum magnum* Hitchc. Contr. U. S. Nat. Herb. 22 : 489. 1922. The type specimen is indicated as follows: "Type in the U. S. National Herbarium, No. 1,038,505, collected in rich soil along edge of forest about three miles southeast of Bartica, British Guiana, December 10, 1919, by A. S. Hitchcock (No. 17,194)." Several other specimens are cited at the same time.

*Panicum Helleri* Nash, Bull. Torrey Club 26 : 572. 1899. Nash does not indicate a type as such but he cites a single specimen with data as follows: "Collected at Kerrville, Kerr Co., Texas, by A. A. Heller, May 14-21, 1894, No. 1759." At that time Nash maintained a private herbarium (now a part of the herbarium of the New York Botanical Garden) and there was no difficulty in finding the specimen cited, which is the type. This specimen was one of a series or set, with printed labels, distributed to many herbaria. The whole series of specimens under the same number, collected at the same time and place, makes up the type collection; those other than the type are called duplicate types (the co-types of some botanists, though this term is used by some for specimens cited at the same time as the type).

*Panicum neuranthum* Griseb. Cat. Pl. Cub. 232. 1866. Charles Wright collected plants for several years in Cuba. His plants were made up into sets at the Gray Herbarium

and distributed to many herbaria. A preliminary set was sent to Grisebach for study and he published the results in his catalog of Cuban plants. The type specimens are in Grisebach's set, now at the University of Göttingen. The sets distributed to herbaria were for the most part numbered, but some specimens were sent out without number, bearing the year of collection. The article says concerning *Panicum neuranthum*, "Cuba or. (Wr. 3453); occ., in savanis pr. Hanabana (Wr. a. 1865: forma ascendens, ramosa, foliis planis, spiculis ut in  $\alpha$ )." On consulting Grisebach's herbarium, one finds two specimens. The one from which the description is drawn and which is labeled *P. neuranthum*, was collected in eastern Cuba in 1860 and is numbered "103-3453." The first number is the number of Grisebach's preliminary set and the second is the corresponding number of the distributed sets. A second specimen was collected in 1865 and is labeled " $\alpha$  forma ascendens ramosa." This specimen belongs to a different species, afterwards published as *P. chrysopsidifolium* Nash. There has been much confusion regarding *P. neuranthum* because both species were distributed under the number 3453. To add to the confusion, a third species (*P. fusiforme* Hitchc.) called by Grisebach *P. neuranthum ramosum*, based upon "Cuba occ. (Wr. 3454)," was mixed with the preceding. The result is that in different herbaria one finds under number 3453 the three species, singly or mixed. Only by an examination of the type specimen could the confusion be cleared up.

There are numerous cases where confusion has arisen as to the application of specific names because more than one species has been distributed under one number. In critical work a botanist should assure himself that any duplicate type he may have at hand is the same as the type, especially if there appears to be any discrepancy between specimen and description.

*Panicum distantiflorum* Rich. in Sagra, Hist. Cuba 11 : 304. 1850. The author states, after the description, con-

cerning the specimen, "Crescit in graminosis montosis insulae Cubae." This statement implies a single specimen which would be the type. In the Paris Herbarium is a specimen received from Sagra (the author of the "History of Cuba" in which Richard described the plants) and labeled "in montosis ins. Cubae." The specimen corresponds to the description and is the type. On a sheet of a very different species, from Cayenne, is a slip with a diagnosis and drawing, and also the name *Panicum distantiflorum*. This slip was evidently attached by mistake to the wrong sheet. It is mentioned here only to warn the student against being misled by errors. The mere finding of a specimen with a name attached does not establish a type. Many of the older collections were studied and handled unmounted, and labels might have been misplaced.

*Panicum Chapmani* Vasey, Bull. Torrey Club 11 : 61. 1884. Vasey describes the plant, citing no locality or specimen but stating, "This is the *Panicum tenuiculmum* of Chapman's Flora, but is not the *P. tenuiculmum* of Meyer." In the U. S. National Herbarium is a specimen from the Chapman Herbarium labeled in Chapman's hand, "*Panicum tenuiculmum* S. Fl. S. Florida" (that is, *P. tenuiculmum* of the Southern Flora from South Florida), and in Vasey's hand, "*Panicum Chapmani* Vasey." This specimen establishes the connection indicated by Vasey and is evidently the type of his species.

*Panicum subspicatum* Vasey, U. S. Dept. Agr. Div. Bot. Bull. 8 : 25. 1889. At the end of the description one finds merely "Texas (Buckley, Nealley)." Both the specimens cited are in the U. S. National Herbarium. The specimen collected by Nealley has the specific name in Vasey's handwriting and the one collected by Buckley has not. Furthermore, the Buckley specimen is a mixture of *P. subspicatum* and *P. Reverchoni*. Hence, the Nealley specimen is chosen as the type. Another Nealley specimen bears the name in Vasey's handwriting, but was collected in 1892, after the publication of the species. *Panicum subspicatum* Vasey

was invalidated by *P. subspicatum* Desv. (1831) and the name was changed by Scribner to *P. ramisetum*. As this is a substitution of one name for another, the Nealley specimen is also the type of *P. ramisetum*.

*Panicum adpersum* Trin. Gram. Pan. 146. 1826. The extreme degree to which abbreviation was practiced by some of the older authors is illustrated here. Trinius states concerning the origin of his specimen, "V. sp. Doming. (Sprengel, sub nomina Pan. caespitose.)" The type, in the Trinius Herbarium is labeled, "Panicum adpersum m. St. Domingense s. n. P. caespitosum Lam. (!) mis. cl. Sprengel." (m. = mihi; s. n. = sub nomine; mis. cl. Sprengel = sent by (the celebrated) Sprengel.)

*Panicum dichotomiflorum* Michx. Fl. Bor. Amer. 1:48. 1803. Michaux states concerning this, "Hab. in occidentibus montium Alleghanis." The present writer sought the type of this species in the Michaux Herbarium, segregated in a special case in the Paris Herbarium. A specimen here was labeled "in regione Illinoensium." This was an authentic specimen but the locality did not agree with that published. Later a specimen was found in the Drake de Castillo Herbarium (then at the residence of Drake de Castillo in Paris, now a part of the Paris Herbarium) which was evidently the type. It was collected by Michaux, sent to Drake de Castillo by Richard (who prepared Michaux's flora), and was labeled "ad occidentum montium Alleghanis," thus agreeing with the published data.

*Panicum capillare campestre* Gattinger, Tenn. Fl. 94. 1887. No locality nor specimen is cited, but as the work cited is a flora of Tennessee the type must be from that state. In the Gattinger Herbarium are four specimens labeled in Gattinger's hand, "*Panicum capillare* L. var. *campestre* Gattinger." One of these was arbitrarily chosen as the type by Hitchcock and Chase in their revision of *Panicum*, the one bearing the data "Cedar glades near Nashville, Sept. A. Gattinger." On account of the earlier *Panicum campestre* Nees, Gattinger's variety could not be

raised to specific rank with the name *campestre*, and the name was changed by Nash to *P. Gattingeri*, the type remaining the same.

*Panicum capillare* L. Sp. Pl. 58. 1753. Linnaeus gives no description of his own but bases his name upon a phrase name of Gronovius (Fl. Virg. 1 : 13. 1739) which he quotes. Gronovius mentions one specimen, Clayton 454, which is the type of the Linnaean species. This specimen is at the British Museum of Natural History.

*Panicum barbipulvinatum* Nash in Rydb. Mem. N. Y. Bot. Gard. 1 : 21. 1900. Nash cites as synonym, *P. capillare brevifolium* Vasey, not *P. brevifolium* L., but he also gives a description and indicates a type, Rydberg & Bessey 3544 from Yellowstone Park. If there were no description the new name would be a substitute for the old and would have the same type. But with a description given, the indicated type from which the description was drawn must be accepted.

*Panicum Hallii* Vasey, Bull. Torrey Club 11 : 64. 1884. Vasey states that "this is number 816 of E. Hall's Texas Collection." There were two species distributed under this number. The specimen in the U. S. National Herbarium from which Vasey drew up the description and which bears the name in his handwriting is the type. The other species was subsequently named *P. filipes* by Scribner. This and similar cases emphasize the necessity of guarding against errors when collecting or distributing several specimens under one number.

*Panicum Ghiesbreghtii* Fourn. Mex. Pl. 2 : 29. 1886. Fournier cites three specimens, one of which was collected by Ghiesbreght and hence is the type.

*Panicum depauperatum* Muhl. Descr. Gram. 112. 1817. As Muhlenberg cites no definite specimen, merely saying that the species grows in Pennsylvania and Carolina, it is necessary to consult his herbarium, now at the Philadelphia Academy of Sciences, in order to determine the type. In the cover marked *P. depauperatum* are specimens of three

forms, one with smaller spikelets (*P. linearifolium*), and two with larger spikelets, one of which has glabrous sheaths and the other pubescent sheaths. A careful comparison shows that the last specimen accords best with the description and hence this was selected as the type and so marked in the herbarium.

*Panicum barbulatorum* Michx. Fl. Bor. Amer. 1 : 49. 1803. Michaux gives Carolina as the locality. In the Michaux Herbarium at Paris are two specimens with bearded nodes and one not bearded (*P. Lindheimeri*) all said to be from Canada. In the Drake de Castillo Herbarium is a specimen of *P. Ashei*, labeled *P. barbulatorum*, collected by Michaux in Carolina, and sent by Richard. There is conflict of evidence here. The description states that the nodes are pubescent or barbed (whence the name) which excludes the specimen of *P. Lindheimeri* and that of *P. Ashei*. Hence the specimens from Canada are chosen as the type. It would appear that the description was drawn from the Canada specimen with bearded nodes and the locality taken from the specimen sent by Richard.

*Panicum Scribnerianum* Nash, Bull. Torrey Club 22 : 421. 1895. The choosing of the type of this species illustrates the effect of conflicting evidence. Nash proposes the above name as new, giving as synonym "*Panicum scoparium* S. Wats. in A. Gray; Man. Ed. 6. 632. 1890. Not Lam. *Panicum scoparium* var. *minor* Scribn. Bull. Univ. Tenn. 7 : 48. 1894. Not *P. capillare* var. *minor* Muhl. 1817." The two synonyms represent two species. The subsequent descriptions of *P. Scribnerianum* by Nash show that he had in mind the species described by Watson in Gray's Manual. The specific name would indicate that he had in mind Scribner's *P. scoparium minor*. It is evident, however, that Nash was citing Scribner's name without knowing the form to which Scribner applied it (the smaller velvety species that Nash afterwards named *P. malacophyllum*). The common northeastern form described by Watson in Gray's "Manual" under the name *P. scoparium*, well known to

Nash, was clearly the form to which he wished to give a tenable name, "*P. scoparium*" being a misapplication. Hence the type of *P. Scribnerianum* is the specimen which is the basis of the description of *P. scoparium* in the sixth edition of Gray's "Manual." An examination of the various editions of Gray's "Manual" shows that the description of *P. scoparium* in the sixth is identical with the description of "*P. pauciflorum* Ell.?" in the other editions, back to the first where a specimen by Carey is mentioned. Therefore, the type of *P. Scribnerianum* is the Carey specimen in the Gray Herbarium collected at Wysox, Pennsylvania, by J. Carey in 1836.

It is interesting to note in this connection that *P. scoparium* as described by Elliott in his "Botany of South Carolina" is not the same as *P. scoparium* Lam. Scribner and Merrill, therefore, renamed this *P. Ravenelii*, of which Elliott's specimen is the type.

*Panicum campestre* Nees; Trin. Gram. Pan. 197. 1826. This was described by Trinius from a specimen collected in Brazil by Sellow. Three years later (Agrost. Bras. 197. 1829) Nees described under the name of *Panicum campestre* a different species collected by Martius. Trinius and Nees were in correspondence and Nees sent many specimens to Trinius. The latter described *P. campestre*, ascribing it to Nees, supposing it to be the same species that Nees had under that name. *Panicum campestre* Nees, as described by Trinius, is the valid species, while the species described by Nees himself must receive a different name. A botanist, in searching for the type of *P. campestre* Nees, would find in the Munich Herbarium the Martius specimen with the name in Nees' handwriting, and would be misled thereby if he did not seek further and compare the description published by Trinius and examine the type in the Trinius Herbarium.

*Paspalum Pittieri* Hack.; Beal Grasses N. Amer. 2 : 88. 1896. This name was first applied by Hackel to a species collected in Costa Rica by Pittier (No. 507) and the duplicates of this collection were distributed to many herbaria,

bearing this unpublished name. Scribner identified one of Pringle's Mexican grasses (No. 2359) as *P. Pittieri*, and this collection was also distributed. The Costa Rican and Mexican plants belonged to different species, however. Beal, in working over American grasses for his book, noting that *Paspalum Pittieri* was unpublished, described it and cited only one specimen, "Mexico, Pringle 2359." Later, Hackel published his *P. Pittieri* (Oesterr. Bot. Zeit. 51 : 234. 1901) citing Pittier's No. 507, not knowing that the name had been published by Beal. The unfortunate result is that *P. Pittieri* Hack., as published by Beal with the type Pringle 2359, a specimen not seen by Hackel, has precedence over *P. Pittieri* as published by Hackel himself, which is a different species.

The case is further complicated because *Paspalum Pittieri* as published by Beal is the same as *P. clavuliferum*, an earlier name, while the Costa Rican species had no tenable name until Ekman published *P. pictum* for the species, the type being from South America.

## CHAPTER XV

### CODES OF NOMENCLATURE

It is only within the last three or four hundred years that books have been devoted to the description of plants. The earlier works published within this period, usually known as herbals, were, from the modern standpoint, very crude in their method of presentation. There has been a gradual evolution in classification and nomenclature. Species were first looked upon merely as kinds of plants, without much conception of relationships. Later, certain related species, such as the oaks and the maples, in which the affinities were especially obvious, were recognized as groups. The concept of genera as a system in taxonomy with a corresponding generic nomenclature, dates from the publication of Tournefort's "Institutiones Rei Herbariae," in 1700. Generic names were here consistently applied to groups of related species. The species themselves were indicated by short Latin descriptions, sometimes referred to as polynomials, more accurately as phrase names. The following example from this work will illustrate how species were listed. After describing the genus *Hordeum*, Tournefort says the species of *Hordeum* are:

*Hordeum polystichum*, Hybernum [of Bauhin].

*Hordeum polystichum*, vernum [of Bauhin].

*Hordeum distichon*, quod spica binos ordines habeat [of Bauhin].

*Hordeum distichum*, spica brevior & latior, granis confertis [of Ray].

*Hordeum distichum*, spica nitida, Zea seu Briza nuncupatum.

This method of citing species was cumbersome. A great advance was made when Linnaeus introduced binomial

nomenclature in his epoch-making work, the "Species Plantarum," published in 1753. Here he assigned to each species a single name, called by him the trivial name but later known as the specific name. This system placed nomenclature upon a sound basis. Every species was assigned to a genus; the name of the plant was the binomial, the combination of the generic and specific names. No two genera could bear the same name; no two species in the same genus could bear the same name. The introduction of this system gave a great impetus to systematic botany. There followed an era of exploration in which large numbers of new plants were brought to light. Hundreds of new species were described and the number of genera greatly increased. In a general way, priority of publication was recognized, and in a conflict between two names applying to the same species but published at different dates there was a tendency to use the earlier name. The number of known species was growing so rapidly that confusion in nomenclature arose. For various reasons the botanists of one country did not always keep themselves informed of what was being done in another country. National and personal jealousies occasionally had their influence in suppressing published names. Certain botanists, through the weight of their influence, often dominated the taxonomic field in their respective countries. The names used in important taxonomic works gained the ascendancy, at least for a time. The need for generally recognized and accepted rules of nomenclature became apparent. Individual botanists from time to time proposed rules, but the first general movement took place at the International Botanical Congress which met at Paris in 1867. This Congress formulated a set of rules, or Laws of Nomenclature, which crystallized the consensus of botanical opinion prevailing at that time. The experience gained in applying these rules gradually brought out their deficiencies. In the main, the rules had proved their value, but it became increasingly evident that modifications were needed.

The next effort by an international body to formulate rules was made by the International Congress which met at Vienna in 1905. This Congress formulated a code known as the International Rules of Botanical Nomenclature. These rules were based upon the Paris Code, but included many important modifications.

Meantime, in the United States, there arose a group of taxonomists who wished to develop a set of rules which they thought would place our nomenclature upon a much surer foundation as compared with the old Paris Code. The movement involved, first, the concept of types as a system for directing the application of names, and second, the strict application of the laws of priority. It was believed that while the application of such a system would necessitate a considerable number of changes of plant names, the nomenclature would finally be more stable.

The result of this movement to introduce new rules was the code published in 1904 (Bull. Torrey Club 31 : 249) and modified in 1907 (op. cit. 34 : 167), which came to be called the American Code. This code was presented for consideration to the Vienna Congress. While it may have had some influence in modifying the International Rules, its main features were rejected. Many of the botanists who had supported the American Code refused to accept the International Rules — usually known in this country as the Vienna Code — and continued to work under the code to which they had become accustomed and which they felt was founded upon such logical principles that it must in the main ultimately prevail.

Several years' trial with both codes brought to light weaknesses in each, and there was desire for modifications. In 1920 a new code, called the Type-basis Code, was prepared by the Committee on Nomenclature of the Botanical Society of America.<sup>1</sup> This code included the principles of

<sup>1</sup> This code was presented as a report of progress and was not acted upon by the Society.

the American Code but introduced more flexibility to meet unforeseen circumstances.

The zoölogists have the International Code of Zoölogical Nomenclature, the ornithologists their code of nomenclature adopted by the American Ornithologists' Union, and the entomologists the Entomological Code prepared by Banks and Caudell. The rules of these codes are similar to those included in the American Code of Botanical Nomenclature.

A code of nomenclature is a set of rules to aid biologists in applying names by which groups are designated in classification. Such rules have authority only through a consensus of opinion among taxonomic biologists. They represent this consensus of opinion just as do rules or codes in any other branch of human activity. A code, therefore, represents agreement among those who formulated its provisions. While dominating personalities may, through their influence, mold a code according to their wishes, the code in order to continue as a guide must be intrinsically acceptable to users. These considerations were clearly set forth in the first two articles of the Paris Code (1867) previously mentioned.

ARTICLE 1. — Natural History can make no real progress without a regular system of nomenclature, acknowledged and used by a large majority of naturalists of all countries.

ARTICLE 2. — The rules of nomenclature should neither be arbitrary nor imposed by authority. They must be founded on considerations clear and forcible enough for everyone to comprehend and be disposed to accept.

The student of taxonomy should become familiar with the four important botanical codes, known conventionally as the Paris Code, the Vienna Code, the American Code, and the Type-basis Code. Brief outlines of these follow.

### The Paris Code

Laws of Botanical Nomenclature adopted by the International Botanical Congress held at Paris in August, 1867.

The dominating influence in the formulation of this code

was that of Alphonse de Candolle, who drew up the document for consideration by the Congress.

The code consists of 68 articles followed by a rather extensive commentary or explanation. Articles 1 to 7 present general principles; articles 8 to 14 describe the kinds of groups in classification and give the name by which each is designated; articles 15 to 40 give in detail the manner in which the names of the groups are formed; articles 41 to 47 concern the publication of names; articles 48 to 52 concern the manner of indicating the authority for names of groups. Up to this point the code contains only provisions to which botanists in general subscribe. Articles 53 to 58 deal with names to be retained when changes in rank of groups are made; and articles 59 to 64 deal with the rejection of names. Here are rules which are of vital importance in establishing a stable nomenclature. These rules are as follows:

Article 53. An alteration of characters or a revision carrying with it the exclusion of certain elements of a group, or the addition of fresh ones, does not warrant a change in the name or names of a group.

Article 54. When a genus is divided into two or more genera, its name must be retained and given to one of the chief divisions. If the genus contains a section or some other division, which, judging by its name or by its species, is the type or origin of the group, the name is reserved for that part of it. If there is no such section or subdivision, but one of the parts detached contains, however, a great many more species than the other, it is to that part that the original name is to be applied.

Article 55. In case two or more groups of the same nature are united into one, the name of the oldest is preserved. If the names are of the same date, the author chooses.

Article 56. When a species is divided into two or more species, if one of the forms happens to have been distinguished earlier than the others, the name is retained for that form.

Article 57. When a section or a species is moved into another genus, or when a variety or some other division of a species is given as such to another species, the name of the section, the specific name or that of the division of the species is maintained, unless there arise one of the obstacles mentioned in Articles 62 and 63.

Article 58. When a tribe is made into an order, when a subgenus or a section becomes a genus, or when a division of a species becomes a species, or vice versa, the old names are maintained, provided the result be not the existence of two genera of the same name in the Vegetable Kingdom, two divisions of a genus, or two species of the same name in the same genus, or two divisions of the same name in the same species.

Article 59. Nobody is authorized to change a name because it is badly chosen or disagreeable, or because another is preferable or better known, or for any other motive, either contestable or of little import.

Article 60. Everyone is bound to reject a name in the following cases:

(1) When a name is applied, in the Vegetable Kingdom, to a group that has before received a name in due form.

(2) When it is already in use for a class or for a genus, or is applied to a division, or to a species of the same genus, or to a subdivision of the same species.

(3) When it expresses a character or an attribute that is positively wanting in the whole of the group in question, or at least in the greater part of the elements of which it is composed.

(4) When it is formed by the combination of two languages.

(5) When it is in opposition to the rules laid down in Section 5 [Articles 53-58].

Article 61. The name of a cohort, subcohort, order, suborder, tribe or subtribe, must be changed if taken from a genus found not to belong to the group in question.

Article 62. When a subgenus, a section, or a subsection passes as such into another genus, the name must be changed if there is already, in that genus, a group of the same rank, under the same name.

When a species is moved from one genus into another, its specific name must be changed if it is already borne by one of the species of that genus. So, likewise, when a subspecies, a variety, or some other subdivision of a species is placed under another species, its name must be changed if borne already by a form of like rank in that species.

Article 63. When a group is transferred to another, keeping there the same rank, its name will have to be changed if it leads to misconception.

Article 64. In the cases foreseen in Articles 60, 61, 62, 63, the name to be rejected or changed is replaced by the oldest admissible one existing for the group in question; in the absence of this, a new one is to be made.

Article 65 concerns names above the genus; Article 66, the correction of badly formed names; Article 67, the desirability of using Latin names; Article 68, the avoidance of names not derived from Latin.

### The Vienna Code

International rules of botanical nomenclature adopted by the International Botanical Congress of Vienna, 1905.

These rules are based on the Paris Code but considerably modified and amplified. There are 58 articles. The prescriptions governing nomenclature are divided into principles, rules and recommendations. Articles 1 and 2 of the Paris Code (noted above on page 154) are repeated, as are several others. The more important modifications or additions are mentioned below.

In the Paris Code the principle of priority was included in Article 15 as follows: Each natural group of plants can bear in Science but one valid designation, namely, the most ancient, whether adopted by Linnaeus, or since Linnaeus, provided it be consistent with the essential rules of nomen-

clature. This in a slightly modified form appears in the Vienna Code (Art. 15) but is modified by Article 19, which says: "Botanical nomenclature begins with the 'Species Plantarum' of Linnaeus, ed. 1 (1753) for all groups of vascular plants." It is agreed to associate genera, the names of which appear in this work, with the descriptions given of them in the "Genera Plantarum," fifth edition (1754).

Article 20 contains the following reference to *nomina conservanda*: "However, to avoid disadvantageous changes in the nomenclature of genera by the strict application of the rules of Nomenclature, and especially of the principle of priority in starting from 1753, the rules provide a list of names which must be retained in all cases. These names are by preference those which have come into general use in the fifty years following their publication, or which have been used in monographs and important floristic (floristiques) works up to the year 1890. The list of these names forms an appendix to the Rules of Nomenclature.

Under section 4, on the publication of names, the following rule is of interest:

Article 36. On and after January 1, 1908, the publication of names of new groups will be valid only when they are accompanied by a Latin diagnosis.

The series of rules concerning the names to be used when groups are united, separated, or transferred (Art. 53-58 of Paris Code; Art. 44-49 of Vienna Code) are essentially the same in the two codes.

Article 50. No one is authorized to reject a name . . . because of the existence of an earlier homonym which is universally regarded as non-valid. This is an important modification of Article 59 of the Paris Code and constitutes one of the prominent differences between the American and Vienna Codes.

Article 53 includes the statement "When a species is moved from one genus into another, its specific epithet must be changed if it is already borne by a valid species of that

genus." This is an important modification of Article 57 of the Paris Code.

In Article 55 of the Vienna Code, duplicate binomials are disposed of thus: "Specific names must be rejected when they merely repeat the generic names."

Finally, Article 58, the last one, is somewhat controversial. It says that the rules of botanical nomenclature can only be modified by competent persons at an international congress convened for that express purpose. Some have asserted this to mean that the present rules can legally only be amplified but can not be fundamentally changed. Others interpret the rule to mean that a properly constituted congress can change the rules in any way that it sees fit.

In 1910, another International Botanical Congress met at Brussels and made some minor changes in the rules of nomenclature.

Article 19 was amended so as to legalize different starting dates for nomenclature in different groups of Cryptogams.

An important recommendation was added to Article 30: "When publishing names of new groups, one should indicate carefully the subdivision which one considers the nomenclatorial type of the group: the type genus of a family; the type species of a genus; the type variety or type specimen of a species. This precaution will avoid the nomenclatorial difficulties where, in the future, the group is to be divided." This recommendation is the first recognition of the type concept.

Appended to the Code is a list of conserved names, names which shall be conserved even though there are earlier synonyms (see Article 20).

### The American Code

A Nomenclature Commission was appointed by the Botanical Club of the American Association for the Advancement of Science at a meeting held in Washington, D. C., January 2, 1903. This Commission prepared a code

for presentation to the International Congress that was to meet in Vienna in 1905. It considered modifying the Paris Code of 1867 but finally decided to formulate an entirely new code. The code, called a Code of Botanical Nomenclature, was printed in the Bulletin of the Torrey Botanical Club.<sup>1</sup>

The Code is divided into Principles and Canons. The Principles are of sufficient importance to be quoted:

1. The primary object of formal nomenclature in systematic biology is to secure stability, uniformity and convenience in the designation of plants and animals.

2. Botanical nomenclature is treated as beginning with the general application of binomial names of plants (Linnaeus' "Species Plantarum," 1753).

3. Priority of publication is a fundamental principle of botanical nomenclature. Two groups of the same category can not bear the same name.

*Note.* — Previous use of a name in zoölogy does not preclude its use in botany.

4. The application of a name is determined by reference to its nomenclatorial type.

Priority of publication was recognized, at least by inference, in the Paris and Vienna codes, but the American Code sets it forth as a fundamental principle.

Principle 4 of the American Code announces the Type Concept. This concept, which was entirely ignored in the preceding codes, is the really outstanding contribution of the American Code to botanical nomenclature.

Canons 1-8 concern categories of classification and formation of names; canons 9-13, the publication of names; canons 14 and 15, the application of names; canons 16-19, the rejection of names. The arrangement of the code is more logical and more concise than that of the Paris or Vienna codes.

The above code was presented at the Vienna Congress

<sup>1</sup> Bull. Torrey Club 31 : 249. 1904.

but was rejected. In view of agreements reached at the Vienna Congress, the Nomenclature Commission which had formulated the American Code decided to revise it. The revised code was published under the name of the "American Code of Botanical Nomenclature."<sup>1</sup> The arrangement and number of the canons is the same as in the earlier edition, but there are some modifications in the wording and in the scope of the canons.

The outstanding features are as follows:

The principle of priority definitely stated.

The concept of types as controlling the application of names.

A generic name is published (among other ways) when accompanied by a specific description and a binomial specific name.

Priority of position: Of names published in the same work and at the same time, those having precedence of position are to be regarded as having priority (Canon 13).

The rules for selecting (retroactively) the type species of genera and the type specimens of species.

A name is invalidated by an earlier homonym even though the latter may not be valid (Canon 16).

The earliest generic name is used; there is no list of *nomina conservanda*.

### The Type-basis Code

More recently, the Committee on Nomenclature of the Botanical Society of America formulated a new code based upon the American Code but containing important modifications which allowed much greater flexibility in its use. This code was called the Type-basis Code of Botanical Nomenclature. As this represents the most recent consensus of opinion among those taxonomic botanists in America who accept the type concept, it is reproduced in full in the Appendix.

<sup>1</sup> Bull. Torrey Club 34 : 167-178. 1907.

This code differs from the American Code in many minor details, and in one important respect, the inclusion of an article (Art. 7) providing that there may be exceptions to the rules if these exceptions can be agreed upon.

### Chief Differences between the Type-basis Code and the International Rules

1. The most important feature of the Type-basis Code is the type concept — the application of names by means of types. This is ignored in the International Rules [referred to below as the "Rules"]. At the Brussels Congress, a recommendation was added providing for the designation of types in the future. The type concept of the Type-basis Code is not contrary to the International Rules.

2. The Type-basis Code adopts 1753 as the starting point for nomenclature of all groups of plants. The Rules adopt 1753 for vascular plants and for some groups of Cryptogams, and later dates for certain other groups of Cryptogams. If the type concept were introduced into the Rules, the need for later starting points for certain groups would not be felt to the same degree by the followers of those rules.

3. Priority of publication is accepted as a fundamental principle by both codes. The Rules, in order to retain well-known generic names in their current usage, arbitrarily conserve certain of these even though they would be rejected under the priority rule. These conserved names are brought together in a list appended to the Rules. This is the list of *Nomina Conservanda*. The Type-basis Code includes no such list. It is recognized, however, that the strict application of the law of priority may in a few cases cause inconvenience by displacing well-known names. Article 7 provides for exceptions. Ultimately there may be a short list of *nomina conservanda* attached to the Type-basis Code if in the opinion of its followers such a list is desirable.

4. The Type-basis Code provides that a generic name is effectively published when there is a specific description

and a binomial specific name. The Rules do not admit effective publication in such a case. The attitude of the Code is influenced by the Type Concept. Publication of the kind mentioned is effective because the proposed genus is connected with one or more species and its type species may be determined.

5. The Rules provide that a genus is effectively published when there is a generic description without the mention of included species. The Type-basis Code considers such publication to be ineffective because it is impossible to determine the type species of the proposed genus.

6. The Type-basis Code provides that "Of names published in the same work and at the same time, those having precedence of position are to be regarded as having priority." This has been referred to as priority of position. The Rules provide, instead, that such names have equal standing.

7. The Type-basis Code provides that both generic and specific names are to be rejected if there are earlier homonyms, regardless of the standing of these homonyms. The Rules provide that a name shall not be rejected "because of the existence of an earlier homonym which is universally regarded as non-valid." In practice, this requires the investigation of the standing of the earlier homonym, often in groups with which the investigator is unfamiliar, and is obviously unsatisfactory. Under the Rules, if the earlier homonym is a synonym, the later name may stand. Few will take the time to conduct an investigation as to the standing of the synonym; instead, they are likely to accept the statements of others.

As a result of the provision quoted from the Rules in the preceding paragraph, another article of the Rules provides that "When a species is moved from one genus to another, its specific epithet must be changed if it is already borne by a valid species of that genus." If the earlier homonym is a synonym, the transferred name can stand. The Type-basis Code, on the contrary, holds that the later homonym is always invalid.

8. The Rules reject a specific name when it repeats the generic name. Names of this sort, such as *Phragmites Phragmites*, have been called duplicate binomials. The Type-basis Code admits no exception to the law of priority because of the identity of the generic and specific names.

9. The Rules provide that, after January 1, 1908, effective publication of genera, species and other groups of plants, shall require the diagnosis to be in Latin.

An analysis of these differences shows that (1), (2), (4) and (5) concern the type concept. This concept is making such headway among botanists of the world, including the followers of the Rules, that it probably will be formally adopted in the near future, especially as the concept is not contrary to the present provisions of the Rules. If this is adopted, the other differences in this connection (the other three of the four mentioned) can be easily compromised.

The differences mentioned under (3) the *nomina conservanda*, (6) priority of position, and (8) duplicate binomials are not of fundamental importance and probably could be compromised. The advocates of the Type-basis Code are not strongly in favor of duplicate binomials, nor are they, for the most part, in favor of rejecting well-known names merely to satisfy "priority of position." Many of these advocates, including the present author, have no inherent objection to conserved generic names. They wish, however, that the number may be kept low and consider the present list of *nomina conservanda* to be entirely too long. Furthermore, they think that the list was not sufficiently considered before its adoption.

The seventh difference mentioned above, the validity of homonyms, may not be easily reconciled. Those who have used the American Code in times past find its provisions in regard to this so convenient and so definite that they will scarcely give them up for the vague and unsatisfactory provisions of the Rules.

As to difference number (9), it is probable that the provision will be eliminated from the Rules because of a general

objection to its limitations. It is not a matter that need seriously concern those who wish to bring about a compromise.

It would appear that the followers of the Rules have judged the American Code largely upon three points, the refusal of its advocates to adopt the list of *nomina conservanda*, the freak workings of the law of priority of position, and the curious appearance of duplicate binomials. These points are of minor importance. Fundamentally, the type concept is the important point in the American Code and in the Type-basis Code. If the three points mentioned were modified or eliminated, much of the objection to the Type-basis Code would disappear.