revised or discarded. Moreover, those of us who are prudent will be particularly wary of the quick and simple explanation of the processes of living matter. In his classical monograph on comparative embryology von Baer places on the back of his title page the Latin slogan: "simplex est sigillum veritatis!"—simplicity is the seal of truth. That may have been a good working hypothesis at the time; but in view of our new knowledge of the remarkable intricacy of nature should we not change it to read:

Complex est sigillum veritatis!

GEORGE L. STREETER
DEPARTMENT OF EMBRYOLOGY,
CARNEGIE INSTITUTION OF WASHINGTON,
BALTIMORE, MARYLAND

HOW THE TAXONOMISTS MAY UTILIZE THE INTERNATIONAL COMMITTEE ON NOMENCLATURE[1]

STABILITY in botanical nomenclature has been sought sporadically ever since there have been recognized systems for naming plants. At Paris in 1867 an international congress of botanists formulated a code called the "Laws of Botanical Nomenclature." About forty years later another international congress drew up another code, the "International Rules of Botanical Nomenclature," based in part on the Paris code, but introducing many alterations. A third congress held at Brussels in 1910 amended and enlarged these rules somewhat but did not materially modify them. It was proposed to hold these international congresses at five-year intervals, the succeeding one to be at London in 1915, but the World War interfered and the London congress did not meet. A fourth congress was interpolated at Ithaca in 1926, but no regulatory legislation was adopted; and the fifth congress was authorized to be held at London in 1930 at which the international rules will be again considered.

The Ithaca congress made an important contribution to the history of botanical nomenclature by appointing an international interim committee on nomenclature[2] to consider proposals for amending the international rules. Botanists now have a method by which amendments may be brought before a large committee for adequate study in advance of the congress. It is important that legislation adopted at a congress should be based on facts and should represent a real consensus of the botanical opinion of the world. If taxonomists take sufficient interest in nomenclature to present their ideas to this committee and to support their opinions with carefully prepared arguments and with sufficient evidence, the congress can legislate upon the basis of a fairly accurate knowledge of the actual taxonomic opinion.

During the last decade of the last century, and several years before the Vienna Congress, a group of American botanists formulated a carefully thought-out series of rules of botanical nomenclature, which has been known as the American code. It was felt by these botanists that the nomenclature then in use, based in part on the old Paris code, was in many respects illogical, and gave little promise of ultimate stability. In the American code all compromises, exceptions and concessions were thrust aside and a series of rules was built upon a foundation of principles, the chief of which were the type concept for the application of names and the strict acceptance of the principles of priority (dating from 1753) in establishing the validity of names.

It was thought that the advantages of such a code would be so evident that it would be accepted by the botanical world as soon as the rules were understood. The application of the American code to nomenclature of the day would result in the replacement of many well-known generic names, but it was thought that, the initial changes having been made, the names would not be subject to further change. I accepted the American code with enthusiasm and I have followed its provisions for thirty years. My experience during these years leads me to state that the American code is a good code, easy to apply and definite in its application. If we had built our nomenclature on such a code from the beginning it would now be as stable as any nomenclature could be. If all the world would adopt the American code we would reach ultimate stability in the same degree. In 1918 and the following years a committee of the Botanical Society of America prepared the "Type-basis Code of Botanical Nomenclature.[3] This is a modification of the American code in which the rules for typification are amplified and made more flexible, and certain provisions eliminated which experience had shown to be inexpedient.

At present the botanical world is divided in its support of the two codes, the international rules and the American code. With few exceptions the botanists outside of the United States support the international rules. In the United States approximately half the taxonomists are following the American code. The supporters of the international rules do not all follow the detailed provisions of these rules, but

[1] Read at the Philadelphia meeting of the Botanical Society of America.

[2] See SCIENCE 64: 290–291, 1926.

[3] SCIENCE 49: 333–336, 1919; 53: 312–314, 1921; the complete code is found in Hitchcock, "Methods of Descriptive Systematic Botany," 201–206, 1925.

they align themselves on the side of the rules as against the American code.

It is evident that the best interests of taxonomy are not served by perpetuating indefinitely two independent codes. The botanical public, without a clear realization of the difficulties, press the taxonomists for an agreement. Absolute agreement can scarcely be expected, as that has not been attained among any body of scientific workers. It is possible, however, to have what might be called a practical agreement, especially as to the use of generic names.

Probably the chief objection to the American code has been to the replacement of well-known generic names under its provisions. The underlying wishes of those who formulated the international rules was to preserve well-established names. It was difficult to do this by a series of rules because the ultimate effect of the rules could not be foreseen in all cases. The adoption of a list of Nomina Conservanda was a clear evidence of the desire to crystallize general usage, although the list itself was hastily prepared and was not the result of careful investigation.

Botanists should understand that a strict adherence to the international rules has resulted in many replacements of well-known names, and such changes will continue. If it be considered an objection that the adjustments to a code result in a change of names, then that objection will apply to the international rules as well as to the American code, though probably not to the same degree.

In my opinion taxonomists would do well to retain well-known generic names, regardless of the restrictions concerning priority, synonyms and homonyms, in so far as these names concern important economic plants or genera with large numbers of species.

I have investigated the names of the grass genera as to their differences under the international rules and under the American code. The technical notes will be published elsewhere, but some of the results may be of interest here. The differences in the names of genera as accepted under the two codes come under four divisions: (a) Names on the list of Nomina Conservanda (*e.g.,* Glyceria vs. Panicularia); (b) differences due to homonyms (*e.g.,* Setaria *vs.* Chaetochloa); (c) differences due to typifications (*e.g.,* Sorghum *vs.* Holcus); (d) differences due to mistaken identification (*e.g.,* Eatonia *vs.* Sphenopholis).

Several of the generic names rejected in the list of Nomina Conservanda have been accepted under the American code but are ineffectively published under the type-basis code. A few ought to be removed from the list of Nomina Conservanda, as there was no adequate reason for conserving them (*e.g.,* Ctenium *vs.* Campulosus). Several ought to be added to the list in order to conserve names sanctioned by usage (*e.g.,* Sorghum *vs.* Blumenbachia).

Amending the International Rules by Changes in the List of Nomina Conservanda

One of the British proposals was that the list of conserved names should be revised. I am strongly in favor of this, but I fear it is impracticable and inadvisable to have it all done at one time. There is no person or group that has the time, the inclination or the taxonomic knowledge to perform the task. It is entirely practicable, however, to revise the list little by little as various groups are worked over taxonomically. The study of names apart from the organisms they represent should be discouraged.

When an author revises a group he may find that nomenclatural changes are desirable and, for the most part, will make these in accord with the rules. But proposed editions to or eliminations from the lists of Nomina Conservanda may be presented to the International Committee on Nomenclature with the supporting evidence. The committee after consideration will submit a recommendation to the succeeding congress which will make the final decision, presumably validating proposals that have received the support of the committee.

I believe that we can eventually make this list one that will be accepted by the great majority of taxonomists, because each name will have been considered on its merits. Much critical investigation must be carried out before this is done. The weak point of all codes is that they are, in a way, premature; they attempt to establish rules to govern procedure in unforeseen circumstances. A code, like any other human instrument, should be subject to alteration on the basis of experience. The International Committee on Nomenclature gives us machinery by which we can gradually build up a code that most botanists will be willing to follow.

So far as concerns the list of conserved names, a specialist should scrutinize the generic names in the group he is studying. He may ask to have names removed from the list if there has been insufficient reason for conserving them; or he may ask to have names added to the list if it is found that well-established names are in danger of being replaced on the ground of priority. The followers of the American code may find that many of the names they have been using should be rejected on the basis of inadequate publication. It would be well to adopt the policy of avoiding the replacement of a well-established name that is inadequately published, especially if it has been but little used. The presence on the list of names that are valid does no harm, though

such names extend the list unnecessarily. However, it may be advisable to retain many of these superfluous names because the uninformed might not otherwise accept the validity.

The international rules were framed with the intention of preserving well-established generic names. I think it would be desirable to take into consideration this policy in future modification of the list of Nomina Conservanda or in other decisions on conserving names. If it is found that a well-known generic name should, under the rules, be replaced by an earlier name which never came into general use, it would be well, in case there is adequate reason for conserving it, to ask to have this done, rather than to take up the earlier name in publication and make new binomials.

In considering what names should be retained on the list or added to the list by virtue of direct conservation as opposed to the rejection of the alternatives, I would suggest as a working basis that generic names may be conserved against the action of priority if (a) they contain a large number of species, or (b) they contain important economic species, or (c) when the acceptance of an earlier name would invalidate an established homonym in another group.[4] Each case must be decided on its merits by the committee on the basis of the evidence submitted by the botanist asking for the conservation.

Conservation of Names by validating Later Homonyms and by Decisions on Standard Species

This method of conservation is not now provided for in the international rules, but I think it would greatly favor ultimate stability in the use of generic names if a method for such conservation were incorporated therein. The present list of Nomina Conservanda conserves later synonyms. It would be well to establish a second list in which later homonyms are conserved. For example, Setaria (Beauv. 1812) came into general use for a genus of grasses. Under the American code the name is invalid because of Setaria Achar. (as published by Michaux in 1803), a genus of lichens and was replaced by Chaetochloa (Scribn., 1897). Since Setaria Beauv. includes a large number of species over the warmer regions of the earth, I think the name should be conserved and I should favor having it placed upon the list of conserved homonyms.

Some differences in usage are caused by the application of generic names in different senses, depending on how an original genus was divided. When for taxonomic reasons a genus is divided the generic name should apply to one of the parts. In some cases there has been a difference in this application. Under the American code the determination of the application of a name in such cases is called typification. When a decision is desirable to establish future usage this can conveniently be done by asking an international congress (through the committee on nomenclature) to decide on the type or standard species of a genus. For example, under the American code the type species of the grass genus Holcus is H. sorghum, but the preponderance of usage has been to segregate the group containing H. sorghum as the genus Sorghum, applying Holcus to a different group. I would recommend that *H. lanatus* be chosen as the *standard* species of *Holcus,* thus confirming the historic development instead of the historic type. Such decisions would appear in a third list, which might be called "Accepted Standard Species."

[4] If Blumenbachia Koel. (1802) were to displace Sorghum Pers. (1805) on the ground of priority, then Blumenbachia Schrad. (1825), an accepted genus of Loasaceae, would be invalidated.

Incorporation of the Type Method into the Rules

The British have proposed that "the principle of the type-method of applying names should be formally accepted." I am strongly in favor of this, but I realize that the principle is not well understood by all taxonomists. It may be better to put it in the form of a recommendation rather than a rule. I would suggest that the recommendation be added to No. xviii (under Article 39 of the Rules). At the Brussels congress an addition to this recommendation was made to the effect that in the future the types should be indicated for new genera and species. I would insert after this a statement similar to the following: That when an author revises a genus or other group of plants he indicate what he considers the type or standard species of the genus, or, when it can be determined, the type specimen of the species studied.

The method is so reasonable and so definite that I believe it will be generally adopted when understood. The particular rules for establishing the type or standard species of genera can be added later as botanists become more familiar with the method.

The original presentation of the type method in the American code was as Principle 4, "The application of a name is determined by reference to its nomenclatorial type." Later in the code there were rules for selecting the type, some of which were mechanical. The type-basis code introduced more flexibility into the rules for establishing the type, and defined the type species as being the species or one of the species the author of a genus had chiefly in mind. The British have introduced a new factor, which is in conformity with Principle 4, above, namely, the stand-

ard species. If the type species selected in accordance with the rules of the type-basis code result in changing the application of the name which it is desired to retain, another of the original species, called the standard species, is chosen, which will retain the name. By the use of the standard species the type method can be incorporated in the International Rules without disturbing other parts.

A. S. HITCHCOCK

BUREAU OF PLANT INDUSTRY,
WASHINGTON, D. C.

WILLIAM S. VALIANT

THE late William S. Valiant was curator of the Geological Museum at Rutgers College from the year 1903 until his death on March 27, 1927, except for a short interval in 1919, when he retired and removed to Rome, New York. His paramount interest was in the work of the museum which he had learned to love and he returned to New Brunswick and continued actively until the year 1923, when no longer strong enough to attend to his duties.

Born at Rome, New York, in 1846, he was educated in the schools there and later served as a special teacher for classes in natural history in the Free Academy of his native city for many years before going to Rutgers. He possessed unusual keenness of observation and ability, which enabled him, without the advantage of a university training, to excel in his chosen field of mineralogy. An expert collector, and good correspondent, he added to the collections of the museum and was ever ready to give information to visitors, and was widely known among his fellow workers. An outstanding result of his work was the discovery, of fundamental importance to both biology and geology, of Ordovician trilobites with their ventral appendages attached. A chance find in 1884 led him to search at every opportunity and at the end of eight years in 1892 he was rewarded by finding a layer less than half an inch thick in the Utica shales at Rome, New York, in which numerous fossils occurred, including the well-known form of *Triarthrus becki*, with the ventral anatomy beautifully preserved, even including the antennae.

A large amount of the material was collected and studied by the late Professor Charles E. Beecher, of Yale University, who devoted the last ten years of his life mainly to the preparation and study of the significance of the appendages, but died in 1904 before he had prepared his final manuscript. Professor Percy E. Raymond, of Harvard University, who had studied under Professor Beecher's guidance, then took up the work and published the results of their combined efforts in 1920 as a memoir of the Connecticut Academy of Sciences entitled, "The Appendages, Anatomy and Relationships of Trilobites." In a foreword of this memoir, Professor Charles Schuchert points out the importance of the discovery which made possible studies in the evolution of the Crustacea, which bear also on that of most of the Arthropoda, and gives Mr. Valiant the credit due to his untiring efforts to locate the original material.

Mr. Valiant published scientific articles from time to time. In 1896 he read a paper entitled "Appendaged Trilobites" before the New Jersey State Microscopical Society, of which he was a member. The manuscript was published in the Mineral Collector of Volume 10, No. 3. Two articles on the geology of the Rutgers College campus appeared in the Rutgers *Targum* of April and May, 1898. His unpublished records of the history of the museum and the results of his work point to a life of usefulness and devotion to science, which can not be adequately indicated in this brief sketch.

ALBERT O. HAYES

RUTGERS UNIVERSITY

SCIENTIFIC EVENTS

THE ESTABLISHMENT OF AN INTERNATIONAL BUREAU OF METEOROLOGY[1]

AT the sixth session of the International Committee on Intellectual Cooperation, held at Geneva from July 27 to July 29, 1925, the chairman communicated to the committee a proposal submitted by M. van Everdingen, director of the Netherlands Meteorological Observatory and chairman of the International Meteorological Committee (I. M. C.), with regard to the creation of an International Bureau of Meteorology (I. B. M.) (Annex 4 to document C. 445, M. 165, 1925).

After a brief discussion, the committee requested the undersigned to consider, together with M. van Everdingen and several other experts, how the committee might assist in establishing this bureau.

The present report sets out our conclusions:

M. van Everdingen's proposal was defined in a letter which General Delcambre, director of the French Meteorological Service and chairman of a special committee set up by the International Meteorological Committee, addressed officially to the International Institute for Intellectual Cooperation on November 23, 1925.

The International Meteorological Committee is composed of the directors of the meteorological services of thirty countries (including Germany and Austria), who meet once every three years to discuss scientific

[1] Report by the subcommittee appointed at the meeting of the International Committee on Intellectual Cooperation on July 29, 1925, submitted to the committee on July 26, 1926.