

Dr. Carl L. Alsberg, director Food Research Institute, Stanford University, chairman section on food transportation and distribution; Dr. R. Masujima, member of the Japan Bar Association, chairman section on international law and agreement, and Dr. Barton Warren Evermann, chairman of the section on fisheries, marine biology and oceanography.

Honorable Wallace R. Farrington, governor of Hawaii and president of the Pan-Pacific Union, speaking from the throne in Iolani Palace, welcomed the delegates, and Dr. Howard made the response.

All the general sessions were held in the Throne Room, Iolani Palace, in the forenoons, while the afternoons were given over to section meetings.

The conference was divided into several sections, among which some of the more important were those on sugar industry; fisheries, marine biology and oceanography; plant quarantine; plant entomology and plant pathology; animal husbandry; food-crop production and improvement; forestry in relation to agriculture; food transportation and distribution; and international law and agreements.

The problems considered by the conference were the big problems of food production, proper utilization and conservation, and they were considered in a broad way; the international viewpoint was constantly to the fore and the problems were discussed in their international relations. Basic principles relating to soil management, crop production, animal husbandry, the fisheries, care of crop products, transportation and distribution, insect-pest control, quarantine, etc., were presented and discussed in their world application, rather than those of merely local interest.

It is not difficult to see that a conference of nearly 150 representative men, experts in their various lines, gathered together from so many different countries, discussing before formal meetings and in informal meetings daily for a period of two weeks, these big food problems, could not fail to contribute greatly to our knowledge of these problems and to an understanding of the methods for their solution.

The meetings were intensely interesting from the very beginning to the last. Every delegate regarded the conference as one dealing with problems of world importance and demanding the most serious thought and treatment. That much good will come from the conference is certain.

The most important conclusions and agreements reached by the conference are set forth in a series of 33 resolutions adopted. Only a few may be mentioned: One calling for an international treaty for the protection and conservation of the fishery resources of the Pacific, particularly fur seals, sea otters, whales and other marine mammals; another for the protection of marine turtles; another to prevent pollution of the sea and coastal waters by oil tankers and other vessels, and a fourth recommending

the formation of an international commission for the study of the physics, chemistry and biology of the North Pacific.

Other resolutions were adopted urging cooperative study of the insect pests of sugar cane, the problems of soil management and crop production, adoption of uniform and proper quarantine regulations and the appointment of an international crop protection board.

An account of the Food Conservation Conference would not be complete without mention of Alexander Hume Ford, the organizer and director of the Pan-Pacific Union. A few years ago Mr. Ford went from the States to Honolulu, as a newspaper man and writer. Soon after arriving at the "Cross-roads of the Pacific" he began to grasp the momentous importance of the problems of the Pacific. He conceived the idea that those problems could be solved only through an understanding of their scientific and commercial relations to *all* the countries bordering on the Pacific, and mutual understanding of the people of those countries. Mutual understandings among nations, as among individuals, are difficult if not impossible unless they know each other. Mr. Ford believed that, if the countries bordering on the Pacific could come to know each other, their international disputes and misunderstandings would largely disappear. So he organized all those countries into the Pan-Pacific Union, which at once began to hold conferences or congresses of various kinds. Any group of men who wish to get together to discuss important problems relating to the Pacific area, by making their wishes known to the Pan-Pacific Union, can have a conference called, and the Union will help by inviting delegates as requested, by arranging the details of the meeting, raising money to defray expenses and in any other proper way.

Several such conferences have already been held, including a scientific conference, an educational conference, a newspaper conference, a commercial conference and a food conservation conference.

The Pan-Pacific Union is probably the greatest force in the world to-day in promoting mutual understanding and good will among the countries of the Pacific area.

And Alexander Hume Ford has been the promoter, the moving spirit, the money-getter, the live wire, the man of vision, in all these conferences.

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### THE FAILURE OF THE PRINCIPLE OF PRIORITY TO SECURE UNIFORMITY AND STABILITY IN BOTANICAL NOMENCLATURE

THE priority of publication principle was adopted with the idea that it would furnish a simple and satisfactory basis for determining which of the various

synonyms that have been applied to most species should be used as a permanent binomial for each species, and at the same time give due credit to the author who first described and named the plant.

The great protagonist of the priority principle, Alphonse de Candolle, began to advocate and apply this rule about 75 years ago, and in 1867 it was adopted by the International Botanical Congress at Paris and has been, with some slight reservations, a part of all subsequent botanical codes.

All human activities, scientific and otherwise, are in the nature of experiments. After having carried on an experiment for a considerable period, it would seem desirable to summarize and evaluate the results obtained. It therefore may be worth while to note the results of 57 years of effort in the application of the principle of priority as a means of securing uniformity and stability in the use of plant names.

It may be appropriate to state briefly what should be reasonably expected from the application of the priority principle and why it has failed. A satisfactory plan should secure for us generic and specific names for plants which would be uniform throughout the world and stable; that is, the same name would always be applied to the same plant and this name would not be subject to change. It is very evident that this end has not been attained in any general way. There are various reasons why these efforts have not been successful and why there is little hope of success according to this plan.

If we examine and compare recent floras of different parts of the world or of different countries, it will easily be seen how far we still are from the desired end, even among the flowering plants where the principle has been applied longest and where the difficulties are least.

The fact that taxonomists after so many efforts have failed to come to any general agreement in regard to a code and that the adherents to different codes do not arrive at the same results in the application of their own rules appears to be rather strong evidence that something is wrong.

Fortunately or unfortunately, according to your point of view, the day of imperial edicts is about past and though organizations of scientists may pass "laws" or make rules they have no power to enforce them other than an appeal to reason and persuasion. The original Paris code recognized this fact when it stated that "rules should be so plain and so convincing that every one would be disposed to accept them." Many botanists and users of Latin names of plants have never been sufficiently convinced of the reasonableness or practicability of the various codes to approve and adopt the changes required, and if they should do so it would not give stability to the names, for continual changes would be necessary as older names

were discovered, and thus much valuable time would have to be wasted in learning new names which should be spent in increasing our knowledge of the plants themselves. In mycology, for example, it would require a totally different application or rejection of many of our most common, best known and well-established names.

A few examples may be cited to show the sort of changes which would be required on a basis of priority of publication to the fungi. *Hysterium*, now applied to a large and well-known group, would be applied to the small genus of *Discomycetes*, now called *Clithris*. The name *Valsa*, instead of being applied to the present large group of species, would supplant the present name *Xylaria*. The familiar name *Daldinia* would be displaced by *Perisphaeria* and the name *Phoma*,<sup>1</sup> instead of being applied to the small pycnidial forms, as at present, would supplant the name *Hypospila* for a small group of *Pyrenomyces*. The well-known generic name *Hypocrea* would become *Corynesphaera*. These are only a few samples of the new applications and the strange names which would have to be learned and used according to this rule as interpreted under the American code. Under the Vienna-Brussels code, with its various dates as starting points for different groups of fungi, the results would be very different and would vary according to the person applying them and his interpretation of the rules. Such names, after all, in the present state of our knowledge would only be "pro tem," as older ones might be found at any time or different interpretations of their application made by later taxonomists.

The principle of priority was supposed to have the particular merit of being easy of application and of producing uniform results. Experience has shown the fallacy of this idea. In applying the rule one immediately becomes involved in questions regarding the actual dates of publication of various books and periodicals and also with questions of validity of publication, and many others which continually arise. These practical difficulties have made it necessary to extend and modify the codes until they have become so long and complicated that our English friends say,<sup>2</sup> "The average botanist who is not an expert in nomenclature finds it difficult to interpret them correctly." They then go on to cite cases in which even the experts fail to agree. On account of these and similar

<sup>1</sup> Shear, C. L., "Phoma: A sample of mycological nomenclature and classification." *Mycologia* 15: 174-182, Jy. 1923.

<sup>2</sup> Britten, James, Ramsbottom J., Sprague, T. A., Wakefield, E. M., Wilmott, A. J. Sub-committee on nomenclature. Imperial botanical conference. Interim report on nomenclature. *Journ. Bot.*, 62: 79-81. March, 1924.

difficulties the zoologists have found it necessary to appoint a committee of experts to decide differences of opinion among the taxonomists as to the application of their rules and the choice of names to be adopted.

There is still no general agreement as to the date to be taken as a starting point in determining priority for the lower plants. There is also no general agreement as to what authors and publications shall be recognized nor exactly what constitutes valid publication. Of course when it comes to questions of synonymy there always will be more or less difference of opinion among specialists, and this can not be entirely avoided.

It is generally understood that the chief purpose of botanical names is to make it possible for all who use binomial names for plants throughout the world to designate particular genera and species conveniently and accurately and in as uniform a manner as possible. It should be recognized clearly that botanical names are no longer primarily for the specialist in taxonomy or the purely systematic botanist. There are large and increasing numbers of horticulturists, pathologists, general botanists and many specialists in plant research who find it necessary to use technical names of flowering plants and fungi. For all such users of plant names, the requirements are primarily practical and utilitarian. They can not be expected to continue to discard names which have been in use for a long time and which to them have a very definite application.

The idea that we are obligated to restore old names as a matter of justice to the early botanists is rather sentimental than ethical. Whatever is best for the benefit and progress of science and humanity is the primary consideration. To perpetuate an author's mistakes and failures, as is frequently the case in taking up old names, is no credit to the author and chiefly a source of trouble to us. The substitution of an obsolete generic or specific name for one in general use, unless for some more important reason than mere priority of publication, serves no sufficiently useful purpose to justify the inconvenience and trouble caused by the change.

The proposal to abandon the resurrection of obsolete names does not mean that we should neglect the history of mycology or the determination of synonyms, but that the current use and application of names should not depend upon such investigations, any more than that our present English vocabulary should be changed on account of the discoveries of philologists and the many obsolete words substituted for those now in common use. Philology is an interesting and valuable study, but no one has seriously attempted to change current usage of English on account of the older synonyms discovered.

A knowledge of the origin and history of binomials

and their application and synonymy is interesting and important from an historical standpoint, showing the stages and modes of development of our knowledge of plants and their relationships and modes of treatment, as well as the development and workings of the minds of the various taxonomists. There seems to be no good reason, however, why we should keep changing the names of our common plants in order to reflect increases in our knowledge of the history of taxonomy and nomenclature and the synonymy of plant names.

So far as mycology is concerned the stupendous amount of labor involved and the insurmountable difficulties to be overcome make it impracticable and frequently impossible to determine with certainty the application of the vast number of fungus names to be found in systematic mycology and unless mycologists become more numerous and devote much more attention to the determination of the old species, it will be centuries before we can hope to have the last word said regarding the synonymy of the fungi and the oldest name located and adopted.

It is seen then that one of the principal reasons why stability of fungus names can not be attained for centuries at least, even though perfect agreement should be reached in regard to carrying out the plan, is the practical difficulty of labor, skill and time involved in determining the exact identity and synonymy of the vast number of names of genera and species which have been proposed; many of which have been very imperfectly described and have not been represented by any type or authentic specimens upon which satisfactory identifications can be based.

In the case of the fungi also the difficulties in determining with any reasonable degree of certainty just what organisms the older and also many of the more recent mycologists had before them when they prepared their original descriptions are so great as to be practically impossible in a great number of instances. Still there is usually somebody who will hazard a guess and attempt a change of names on that basis.

Since the writer has been personally interested in nomenclatorial questions for the past thirty years his present position and the reasons therefor may perhaps be worth stating. After much study and many attempts to apply the priority principle to the nomenclature of the fungi, we have finally been driven to the conclusion that even with the general adoption of various improvements, especially the type method of fixing the application of names, it will still be impossible to secure a reasonably uniform or stable nomenclature on that basis.

Until recently we have labored under the delusion that by access to the herbaria of the old mycologists and a study of their type specimens most of the questions of specific identity could be settled. Consider-

able experience, however, in the study of the older collections as well as those of recent mycologists in all the large herbaria in Europe and America has convinced me that in a great number of cases no certain determination can be made as to what particular plant the authors originally applied their names. Most of the old species are not represented by types in the true sense of the term, that is, in most cases it is impossible to say that any particular specimen, which may be in an author's herbarium or may have been labelled by him, is the particular one upon which he based his original description. Where such specimens do occur they are frequently too fragmentary or too poor for certain identification, and the time and labor consumed in attempting to find the type and determine it is in most cases not justified by the results to be obtained. The present application of many of the older names is based on tradition handed down from one mycologist to another.

If we are not to have stable names for our fungi until the possibility of finding older synonyms has been exhausted there will be a more or less continuous change of names for several hundred years to come, even though a considerably increased number of systematic mycologists undertake the work. Synonymy is important and should eventually be determined so far as practicable, but there is no justification for expending the time and energy required in discarding old names and learning new ones every time older synonyms are unearthed.

These considerations, taken in connection with the fact that there will always be, as now, more or less difference of opinion among mycologists as to the identity and validity of many of the older species, as may be used to determine, in case of synonyms, which shall be permanently adopted. It will no doubt be asserted that usage is too uncertain and indefinite to be practicable. We believe, however, that it can be placed upon a practical working basis and thus relieve us of the necessity of the more or less continuous change of names required by the priority rule.

Of course there is nothing new in this proposition. We simply wish to urge that it be recognized as a valid method of fixing plant names whenever possible and practical provision made for its adoption and application. The list of "*Nomena Conservanda*" adopted by the Botanical Congress at Vienna in 1905 was a partial abandonment of the priority rule and a recognition of the desirability, if not necessity, of accepting usage in some cases. Unfortunately, however, some of the names in that list were chosen from the standpoint of national or personal rather than general usage. Usage should be interpreted and adopted on an international basis.

A practical and, I believe, satisfactory method of carrying out the plan would be to have an international commission of expert taxonomists in different

groups of plants prepare a list of the genera and species which should, on the basis of general usage, as found in the chief systematic literature, be adopted. For this purpose only works in the English, French, German and Latin languages would need to be consulted.

In order to assure certainty and stability in the use of the names adopted under any plan, a type species must be assigned for each genus and type specimens cited for each species.

Perhaps the most convincing proof of the failure of the priority principle to meet the requirements of the people who have most use for binomials is the fact that the principal users of flowering plant names, horticulturists, florists, nurserymen and others, have recently prepared and adopted a list of "standardized plant names."<sup>3</sup> A glance at many of the binomials adopted will indicate that they were not chosen because of priority of publication. The primary purpose of the list is said to be convenience and stability in the use of names in the horticultural trades. To accomplish this purpose a name for each plant has been more or less arbitrarily selected. While it is not specifically stated that general usage has played an important part in the choice of the names, the list shows many remarkable coincidences in this respect.

If these names are to be adopted by all practical and professional horticulturists, florists, nurserymen and pharmacists, as is indicated by the endorsement of their national organizations, the professional taxonomists will find little use for any new or old names which they attempt to substitute or reinstate for those in this list. Why not, then, frankly recognize the inevitableness of the situation and adopt these names and also proceed to complete the list for all wild as well as cultivated plants, and at the same time try to persuade other nations to do likewise.

There is one thing still necessary to make this list or any other meet the needs of scientific taxonomy as well as practical horticulture. That is, the designation of a particular species as the type of each genus and a specimen or specimens as type of each species and variety, in order that any doubt or question which may arise regarding the exact application of the names may be settled by comparison and study of typical specimens of the plants themselves.

Since the chief users of flowering plant names have found it necessary to abandon the priority principle and arbitrarily adopt names, how can mycologists and pathologists ever hope for uniformity and stability of the names of fungi on that basis? The difficulties in the way of determining with certainty the

<sup>3</sup> "Standardized Plant Names." A catalogue of approved scientific and common names of plants in American Commerce. American Joint Committee of Horticultural Nomenclature, pp. 1-546, Salem, Mass., 1923.

identity and synonymy of the nearly one hundred thousand so-called species of fungi in mycological literature are insuperable, as has been found by actual experience in studying a few genera, even with all the library and herbarium facilities of America and Europe available.

In order to facilitate the preparation of a list on a basis of usage it may be found desirable to omit from consideration under this plan names of less than 25 years standing, as such names could not perhaps in most cases be regarded as established by usage. As there is considerable dissatisfaction with present codes and their operation even among their adherents—as is evidenced by recent proposals in America and also by the report of the English committee cited—we hope careful consideration may be given to the usage plan.

This plan has the great merit of relieving us of the necessity of abandoning many of the names with which we have long been familiar and learning new and strange names in their place. This is a matter of great practical importance with most users of plant names and has been the source of much of their opposition to the various efforts to reform nomenclature. A well-prepared plan of this kind would probably receive the approval of the majority of botanists who are not particularly interested in taxonomy but still need to use plant names.

The selection of names for all plants on the basis of usage involves no difficulties other than those already overcome by the committee which prepared the list of standardized names mentioned. The zoologists have found it necessary to establish a commission to decide mooted questions regarding the choice of names under their code which is founded on the principle of priority, and a commission of expert plant taxonomists should find no greater difficulties in determining the choice of plant names on the basis of current usage.

As an example of the result of following usage as compared with priority among the fungi we may cite the genus *Daldinia*, a common and conspicuous Pyrenomycete. This generic name was applied by Cesati and de Notaris in 1863, and two species included *D. concentrica* and *D. vernicosa*. These are regarded as forms of one species by some mycologists. Fortunately, the priority rule has not yet been applied to the majority of fungus names and the name *Daldinia* has been generally used for these plants by the mycologists of the world ever since it was proposed. However, there are already known three other generic names which had previously been applied to this species. *Perisphaeria*, Roussel, 1808, and *Peripherostoma*, S. F. Gray, 1821, are typonyms, being based upon the same species as *Daldinia*. The third, *Stromatosphaeria*, Greville, 1824, included 19 species of

which the first was *S. concentrica* and would therefore, according to the first species method, be taken as the type of the genus. What we propose is to accept *Daldinia* as the only valid name for this genus with the type species, *D. concentrica* Bolt., fixed and unchangeable. As to the specific name, *concentrica*, applied by Bolton in 1791, three other specific names of the fungus are already known which may claim priority of publication. These are *atrum* (*Lycoperdon atrum* Schaeffer, 1770), *tuberosa* (*Valsa tuberosa* Scopoli, 1772) and *tunicata* (*Sphaeria tunicata* Tode, 1791). On the priority basis the specific name would be *atrum*. We propose, however, to adopt the name *concentrica* because of general usage. As no original specimen of Bolton is known, a type specimen should be arbitrarily chosen. Cesati and de Notaris cite several specimens in connection with their description of the genus and the first of these might very properly be regarded as type of the species for future purposes. The specimen cited is Erb. Critt. Ital., No. 642. This set of exsiccati is found in the principal large herbaria, and typical specimens are therefore much more accessible to mycologists than the types of most authors.

As a reconsideration and modification of botanical codes is under discussion now, we would suggest that a more general and distinct recognition of usage be provided for in any revision that may be made.

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## THE QUANTUM PUZZLE AND TIME

THE essential feature of the quantum theory is the postulate which restricts any periodic motion of an atom or molecule to a discrete series of allowed states of motion with wide gaps between which are not allowed. Stated in ordinary mechanical terms the quantum postulate may be exemplified as follows:

(1) *Simple to and fro vibration*: Consider a material particle of mass  $m$ , bound by a spring, and oscillating to and fro so that its distance  $q$  from its equilibrium position is

$$q = A \sin \omega t \quad (i)$$

where  $A$  and  $\omega$  are constants and  $t$  is elapsed time. Let  $p$  be the momentum ( $= m \frac{dq}{dt}$ ) of the particle. Then

$$p = \omega m A \cos \omega t \quad (ii)$$

and if we eliminate  $t$  from (i) and (ii) we get

$$\frac{A^2}{q^2} + \frac{p^2}{\omega^2 m^2 A^2} = 1 \quad (iii)$$

This is the equation of an ellipse (if  $p$  and  $q$  are thought of as rectangular coordinates). The area of this ellipse is

$$\int p \cdot dq = \pi \omega m A^2,$$