

Comments and Communications

On the Mental Ability of the Dog

As part of a long range research program on the relation between genetics and behavior, we are very much interested in the problem of mental ability in the dog. We therefore read the communication entitled "Concerning a Dog's Word Comprehension" (*Science*, May 13, p. 494) with great interest. While we are probably sufficiently biased to believe that the reported word comprehension ability is true, we are not convinced that the evidence is sufficient to be passed off as a scientific fact. There can be no question but that the dog is an intelligent animal—how intelligent, and what factors of intelligence it possesses remain to be experimentally demonstrated. We are assembling a battery of mental tests for the dog by means of which we believe it may be possible eventually to demonstrate the existence of the factors of space perception, memory, reasoning, and movement perception.

The point to be made here is that there can be no question that the dog is capable of what we might call intelligent behavior. The question is whether the dog's understanding moves over into the realm of our particular language. The report of Eckstein smacks of the "anecdotal" period of comparative psychology and is replete with lack of even obvious controls. As examples, no mention is made of the "Clever Hans" error, apparently no trials were made in which the experimenter said (in the same tone of voice) "La mesa, Topper," or "Borscht, Topper," not to mention the fact that there is complete lack of any statistical consideration of the element of chance with respect to the animal's behavior.

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Citation of Botanical References

The present confusion in citing botanical references, with some publications following several conflicting systems and others without consistent practice, is absurd in an orderly science. A standard system is badly needed. Perhaps a simple set of rules for citation could be formulated and adopted by representatives of botanical societies, editors of botanical publications, and bibliographers at an annual scientific meeting, such as that of Section G of the American Association for the Advancement of Science at New York City this month.¹ Then, at the Seventh International Botanical Congress at Stockholm next year, further efforts should be made to obtain international agreement upon a uniform system for citations

¹ An open discussion meeting on botanical citations in the literature now has been scheduled for the New York City meeting at 9:30 p.m., Tuesday, December 27, in the Colonial Room of Hotel McAlpin under sponsorship of the Committee on Publications of the American Institute of Biological Sciences.

which the majority of botanists in many countries will accept and follow voluntarily.

Some years ago, E. D. Merrill (*Science*, 1925, 62, 419) suggested shorter and simpler ways of citing scientific references, remarking that the average editors and authors were ultraconservative. As he stated, an author preparing a paper for a certain journal and then later submitting it to another frequently has to rewrite parts to conform to the different style of citations used in the second. Some authors have the attitude, "What's the use of having an editor, if not to do these chores?" An editor quoting that remark, C. A. Shull (*Scienc*, 1931, 73, 363), justly criticized authors for carelessness and mistakes in spelling, citing titles, volumes, years, etc.

An anonymous university scientist (*Amer. Sci.*, 1947, 35, 306 ff.) has advocated that, instead of striving for consistency in citations and other details, editors should relax and accept an author's own tastes and print the manuscripts as they come, provided they are done in some regular manner. As a possible solution he suggested the voluntary adoption of a uniform standard by journals generally or by separate branches of science through a representative body, such as The Society of the Sigma Xi or the AAAS.

Apparently the only system for citations officially accepted by a representative group of botanists in the U. S. was the *Rules for Citation* adopted in 1893 by the Botanical Congress in Madison, Wisconsin, and by Section G, AAAS (reprinted in *Bull. Torrey bot. Club*, 1895, 22, 130). These *Rules*, only two pages long, were summarized in a paragraph by Lazella Schwarten and H. W. Rickett (*Bull. Torrey bot. Club*, 1947, 74, 348).

Noting that the good, widely used Madison *Rules* have stood the test of time, Rickett (*Bull. Torrey bot. Club*, 1948, 75, 166) has proposed that, with certain desirable modifications, they be given international authority by the next International Botanical Congress. He has further proposed that the editors of the next edition of the *International rules of botanical nomenclature* be instructed to bring its present inconsistent citations into conformity and that the rules for citation be inserted as an appendix to serve as a model for future use (Camp, W. H., Rickett, H. W., and Weatherby, C. A., compilers. *Brittonia*, 1947, 6, 3; and *ibid.*, 1949, 7, 51).

However, the Madison *Rules* seem rather brief for covering the enormous volume of botanical literature with complex citations which has arisen in the present century. A system which has been in use more than 50 years should be improved by some revision, anyway. I urge the botanists within the U. S. to act promptly now and agree upon a set of rules for citation before requesting international approval at the Stockholm Congress in 1950.

First, several more or less obvious general principles should be established. In nontechnical publications for general readers it may be best to list references in full.

The chief purposes of shortened citations of botanical references are to save time of authors and readers and to save space and to avoid repetition on the printed page. Though a citation should be short and simple, clarity must not be sacrificed to achieve brevity. Citations should be sufficiently clear not only to specialists in a narrow field of botany but also to botanists in general, workers in applied plant sciences and related fields, editors, and librarians. Citations should not be so short that readers waste time in deciphering them, nor so ambiguous that they fail to guide readers to the correct volume and page. Within one article, and among the issues of the same periodical, citations should be consistent. And wide, voluntary adoption of the same rules by many different periodicals and serials is an important objective.

Botanical indexes and bibliographies. Each of the four leading botanical indexes and bibliographies published in the U. S. has its own system of citing references. "Index to American Botanical Literature," published bi-monthly in *Bulletin of the Torrey botanical Club*, and also printed on cards for libraries, began in 1886 and is the oldest. It follows the *Madison Rules* and its own published list of abbreviations of periodicals by Swarthen and Rickett and is now prepared in the library of the Arnold Arboretum of Harvard University.

Each monthly issue of *The Agricultural Index* contains a list of abbreviations used for the periodicals and bulletins indexed. This system of extreme abbreviations without periods, like that in city telephone directories, may be justified for special bibliographies to save space and expense, but is not a model to be followed by botanists in their scientific writings. *Biological Abstracts* has no published summary of its rules but in each May issue lists, without abbreviations, the periodicals and serials covered.

Bibliography of Agriculture, a monthly publication of the U. S. Department of Agriculture Library, follows the Department of Agriculture's *Citations to literature* by Carolyn Whitlock (*Citations to literature in the Journal of Agricultural Research, technical bulletins, circulars, and miscellaneous publications [other than bibliographies]*, U. S. Dept. Agric., 1940), which was published in 1940, replacing shorter rules issued in 1927. It adopts, with nine shortened exceptions, *Abbreviations used in the Department of Agriculture for titles of publications*, also by Whitlock (*Misc. Publ. U. S. Dept. Agric.*, 1939, 337, 278 pp.). These directions for citations have been developed through the years by the Department of Agriculture, the largest institution of plant scientists in this country.

If as many as three of these four indexes and bibliographies could agree in citing botanical references, this system probably would become widely adopted throughout the U. S. Then international agreement would be simpler when compromises with systems in other countries and other languages are sought.

Revised rules. A uniform system of rules for citation could be developed through consolidation of the two-page *Madison Rules* for citation and the 15-page *Citations to literature* used in the U. S. Department of Agriculture into one of intermediate length with some exceptions per-

mitted. There should be many well-chosen examples of both ordinary and complicated references.

With the main rules of the Department of Agriculture as a base, I shall list some of the more important features of a proposed revised system, including several items upon which agreement is unnecessary and omitting minor details. The revised rules should provide separately for the two groups of botanical references, books, and articles in periodicals.

The essentials of a reference in the two groups, as quoted from the Department of Agriculture directions (p. 2), are:

A book citation should include author, date, title, edition (except first), pagination or volume, illustrations, and place of publication. Important series may be noted.

A periodical citation should include author, date, title of article, title of periodical, series, volume, pagination, and illustrations. Number or part is given only when it is separately paged, or is necessary for finding the reference easily.

The revision should contain additional provisions for citation of scientific names, the special, shortened form used by plant taxonomists in citing place of publication of scientific names of plants, including synonyms. Many details are the same as in book and periodical references, but the differences are beyond the scope of this article.

In some periodicals, as well as U. S. Department of Agriculture publications, the listed references are numbered and cited in the text by number. In others they are cited in the text by author and year. Each method has certain advantages and limitations.

Book citations. Citations of author and title are the same for both books and periodical articles and seldom present problems. Special cases are covered in the Department of Agriculture directions (pp. 4-9). Name of author should be given as in original publication, rather than with initials only, and the title, unless it is very long, is cited in full.

In ordinary botanical citations the less important items, not needed in finding the reference, are preferably omitted. These items include the preliminary pages of a preface or introduction, numbered with Roman numerals, the number and kinds of illustrations, and the name of the publishing company. The abbreviation "illus.," as used by the Department of Agriculture, is sufficient to indicate that the reference is illustrated. Where desirable, numbers and kinds of illustrations may be indicated by "pl." for plate and "f." for figure. However, use of italics for illustrations, as provided in the *Madison Rules*, is not general and should remain optional. Arabic numerals are better, even for plates bearing Roman numerals. Definite action should be taken on whether to abbreviate pages as "p." or "pp."

Periodical citations. These differ from book citations chiefly in including an abbreviated title of the periodical. The *Madison Rules* call for series in Roman capitals, whereas the Department of Agriculture directions state that series numbers should be set off by commas (my choice) or in parentheses preceding volume number.

Under both systems, volume numbers are in Arabic numerals, followed by colon, space, and page number. How-

ever, boldface numerals for volumes, specified by the Madison *Rules* and supported by Rickett (*Bull. Torrey bot. Club*, 1947, 75, 166), are not used by the Department of Agriculture and should be optional. They require extra care and time of author, editor, and printer but do not stand out noticeably and do not assist the reader materially. Besides, publications reproduced from type-written copy by offset process, which are multiplying rapidly and which include both *Bibliography of Agriculture* and *Biological Abstracts*, cannot use boldface type. Roman numerals for volumes, still retained in some conservative publications, most of them foreign, should be abandoned.

Agreement is needed on how to cite the number or part of a periodical when separately paged. The Madison *Rules* provided for writing the separately paged part as a small upper number, such as used in numbering footnotes and variously called a superior figure, index figure, or superscript number. However, superscript numbers have objections similar to those of boldface numerals. I prefer the Department of Agriculture method of citing separately paged numbers or parts in parentheses between volume and colon.

Ordinarily the year of the particular issue is sufficient in citation of the date of a periodical article. The Madison *Rules* recommended that the exact date be given, if possible, with the following abbreviations of months used by the Library Bureau: Ja, F, Mr, Ap, My, Je, Jl, Ag, S, O, N, D. However, the conventional abbreviations of months are clearer to readers, both English-speaking and foreign.

Abbreviation of titles of periodicals. The item in which usage probably varies most widely is abbreviation of titles of periodicals. Fortunately, most shortened titles are readily understood even though inconsistent. A list of these abbreviations was mentioned in the Madison *Rules* but was never published. Agreement on abbreviations is less important than accord upon numerals and typographical devices, and could be considered separately when the rules are revised.

The most detailed reference on this subject is Whitlock's *Abbreviations used in the Department of Agriculture for titles of publications*, issued in 1939 and following earlier lists of 1905 and 1925. It contains a valuable list of abbreviations for single words (pp. 258-278) for preparation of uniform citations of older and newer periodicals and changed titles. Some botanical bibliographies, such as those by S. F. Blake and Alice C. Atwood (*Misc. Publ. U. S. Dept. Agric.*, 1942, 401, 262) and by Alfred Rehder (*Bibliography of cultivated trees and shrubs*. Jamaica Plain, Mass.: Arnold Arboretum of Harvard University, 1949. Pp. xvii-xxxvii.), have their own special lists of abbreviations of the periodicals cited.

Three arrangements of citation based upon the order of words or abbreviations are used: (1) by strict order of title; (2) by name of institution or society, if a part of title; or (3) by place of institution or society. Thus, *Proceedings of the biological Society of Washington* may

be abbreviated: (1) *Proc. Biol. Soc. Wash.*, (2) *Biol. Soc. Wash. Proc.*, or (3) *Wash. Biol. Soc. Proc.*

The first arrangement, with abbreviations in order of title, is the simplest and most widely adopted, being used in *Abbreviations of periodicals cited in the Index to American botanical literature*, by Schwarten and Rickett, and by many botanical periodicals. The Department of Agriculture and *The Agricultural Index* follow essentially the second order. State publications are listed with abbreviation of the state first, publications of the U. S. Department of Agriculture and other departments are under "U. S.," and foreign government publications are entered under names of countries. Advantages for placing institution, society, or state first are that most libraries catalogue periodicals in this manner and that all publications of one organization are listed together.

Many titles, those not containing the name of an institution or society, have the same order under all systems. The second and third arrangements agree with the first for many titles and with each other for most, also. Published lists reveal that slight inconsistencies may occur in any system. None of these arrangements is greatly superior to the others. If agreement upon one is not possible, perhaps the best features of two systems could be combined satisfactorily, or one might be adopted with certain exceptions allowed.

Which words to omit in abbreviations of periodicals is a problem. Rickett (p. 167) stated that "Bot." can be omitted in an exclusively botanical work. Thus, Schwarten and Rickett listed *Bull. Torrey Club* for *Bulletin of the Torrey botanical Club*, *Jour. Wash. Acad.* for *Journal of the Washington Academy of Sciences*, etc. Rather, the question is whether the readers are exclusively botanical. I urge retention of these parts indicating contents, such as "Bot.," "Sci.," and "Agr.," as essential for clarity and for helping nonbotanical readers, students, foreigners, and librarians to find the references.

How much to abbreviate each word is another item in which usage varies too much. For example, *Journal* is reduced to "Journ.," "Jour.," "J.," and "J.," and *Bulletin* to "Bull.," "Bul.," "B.," and "B.," Rickett (p. 168) has noted that Recommendation XXX of the *International rules of botanical nomenclature*, for abbreviating authors' names, serves admirably for titles.

Possibilities for variation and originality in citing botanical periodicals are almost unlimited. The number of words may vary, their order may be changed, and the abbreviations of words may differ in length. As an illustration, I have found in current usage for *Journal of the Washington Academy of Sciences* eleven different abbreviations. Isn't all this variation rather silly? A partial solution is more one-word periodicals and serials in the future, as discussed by E. D. Merrill (*Brittonia*, 1931, 1, 1), or even two-word periodicals. A one-name title, such as *Science*, is not abbreviated and cannot be reversed.

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