DISCUSSION

A UNIFORM SCHEME FOR CITATIONS[1]

THE desirability of a standard scheme for footnote and other references to literature has been frequently set forth and is obvious to any one who has much contact with the 57 varieties now to be found. One of the government bibliographers writes:

> Bibliographical material at best is hard to read, and we believe that in order to fulfill its purpose it should be printed with the comfort and convenience of the reader in mind.

The difficulty would of course be lessened by a uniform scheme. Such a scheme, based on experience with thousands of citations, has been in use for many years in the publications of the U. S. Geological Survey and has proved entirely satisfactory. It can be exhibited best by sample citations of the two major classes:

> 1 (for an article or paper contained in a serial publication): Brewer, W. H., On the age of the gold-bearing rocks of the Pacific coast: Am. Jour. Sci., 2d ser., vol. 42, pp. 114–118, 1866.
>
> 2 (for an independent paper or book—that is, one not contained in a serial publication): Wright, W. B., The Quaternary ice age, 2d ed., p. 374, 1916.

If the place of publication and publisher's name seem necessary or desirable for more certain identification they are inserted just before the date.

The outstanding features of this scheme are the punctuation, the use (not omission) of the forms "ser.," "vol.," "pp.," etc., and the use of ordinary roman type throughout.

The punctuation keeps each citation together as a unit, the items being separated only by commas except that a colon is used to separate the title of an article in a serial publication from the title of the publication. If more than one paper by the same author is cited in a single reference a semicolon is used to separate the citations:

> Bouyoucos, G. J., Estimation of the colloidal material in soils: Science, new ser., vol. 64, p. 362, 1926; A rapid method for mechanical analysis of soils: Idem, vol. 65, pp. 549–551, 1927.

Some styles use a period after the author's name, after the title of the article, and before the date, each period followed by the same amount of space that is used between sentences in text. This breaks up the citation unnecessarily and is especially undesirable where more than one work is cited in a single reference. For example, one footnote in a recent Geological Survey publication contained references to four papers by three sets of joint authors—one paper each by two sets and two papers by the third set. In this footnote periods and sentence spaces were used only in two places—to separate the references to the different sets of authors. In the style just indicated it would have been broken up by thirteen periods and sentence spaces. Other styles use a colon after the author's name. This seems unnecessary, as a comma is adequate punctuation; moreover, the colon is needed in the place indicated above—between the title and the serial designation.

The scheme of omitting the forms "ser.," "vol.," "pp.," etc., and using parentheses for series number, black face for volume number, and colon preceding page numbers effects a small saving in space but is objectionable in every other respect. Its meaning is not clearly evident without an explanation, and it falls down in a citation that must include reference to a number (or part, Heft, Teil, etc.), as well as a series and a volume. With the abbreviated forms for these designations any one of average intelligence can understand a citation at a glance; without them even a reader familiar with the scheme is likely to be halted a few seconds in taking in the meaning. The government bibliographer already quoted says: "Too great emphasis on space saving may defeat the purpose of such compilations." Even the slight saving in space may not mean a saving in cost of printing, as some printers make an extra charge for composition in which black face type is used in combination with roman. Professor W. M. Davis, in a recent contribution to SCIENCE, states that it seems unnecessary to give the series number, as the date is sufficient to identify the series cited. If this is a valid argument the volume number might also be omitted in most citations. Certainly a publication issued in series, each series starting with volume 1, is not adequately cited if the series number is omitted. For example, the *American Journal of Science* is now in its fifth series and has had five volumes numbered 12. To compel the reader to identify the particular volume 12 by means of the date is shifting to him part of the author's burden. The need of omitting the series number disappears if the forms "ser.," etc. are used. In German citations in Geological Survey style the forms "Band," "Heft," "Hälfte," "Teil," "Abt." (for Abteilung), and "Lief." (for Lieferung) are retained for the sake of certain identification, but "p." or "pp." is used instead of "S." (Seite). In citations from other languages the English forms "vol." and "pt." (for part) are generally clear enough.

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If a volume of a serial is paged continuously it is not necessary to cite the particular number. In "vol. 8, No. 3, p. 267," the "No. 3" is superfluous if page 267 is nowhere else in volume 8 than in No. 3. If the pagination starts afresh with each number that item must be included.

Of course under some conditions the need of saving space may be so urgent as to overbalance the disadvantage of omitting these terms. For example, in the list of geologic literature on North America from 1785 to 1918 (U. S. Geological Survey Bulletin 746) it was necessary, in order to keep the volume within reasonable dimensions, to cut the citations to the bone, and even the periods after abbreviations were omitted. In this book, which with all the condensation still contains 1,167 pages, the Brewer citation given above appears as "Am J Sc (2) 42: 114–118 (1866)" The plan was clearly explained in the introduction, however. Such exceptional conditions should not furnish a guide for ordinary practice.

In some styles the title of the paper or book cited is set in small capitals or inclosed in quotations; in others italic is used for the title of the journal cited. There is no need for such typographic distinctions. Plain roman "lower case" is easier to read than any other style. A title set in all small capitals is especially hard to read and is also typographically ugly.

In order of items the U. S. Geological Survey style corresponds to practically all other styles in most respects. The author's name is inverted, as it appears on library cards and in catalogs. If it seems necessary to identify the author by telling who he is, the designation is given in parentheses after his name: "McDonough, D. C. (American consul, La Paz)," etc. The position of the date of publication is sometimes questioned. It is placed last for several reasons:

(*a*) It appears last on the title-page of a book.

(*b*) In most references to serial publications the volume number is the principal distinctive item of identification and the date is simply additional information, more or less incidental, though important where questions of priority are involved. The distinctive item should be given first.

(*c*) A volume may run over more than one year, and the date used in the citation should of course be that of the particular pages cited. To write, for example, "vol. 43, 1893, pp. 6–20," and "vol. 43, 1894, pp. 296–371," is obviously less desirable than to put the date after the pages to which it belongs.

(*d*) The annual report of an organization covering the operations of one calendar year is of course not published until the following year. To put the date of publication directly after the title, as in "Arkansas Geol. Survey Ann. Rept. for 1928, 1929, pp. 24–36," is confusing, to say the least. These dates might be taken to mean a fiscal year covering parts of both 1928 and 1929, though the proper form for that would be "1928–29." Placing the date of publication at the end, however, removes the confusion. (To make such references to annual reports clear, the "for" should always be used, whether it appears on the title-page or not. If, however, the reports are numbered, as in "Fiftieth Annual Report," that is sufficient identification, and it is unnecessary to give the period covered.)

(*e*) An illustration of the difficulty arising when the date is put anywhere except at the end is afforded by the following citation: "Soc. géol. France Mém., sér. 2, vol. 8, No. 3, p. 404, 1868." Série 2 of the Mémoires comprises ten volumes, published at intervals from 1844 to 1877; volume 8 contains three papers, published in 1865, 1866, and 1868; the date 1868 applies to No. 3 and page 404 in this citation and to nothing else.

(*f*) Some journals are published in two volumes a year, and the date is thus not an exact indication of the particular volume cited. Here again the distinctive item should be given first.

It is occasionally desirable to arrange a list of citations chronologically. To emphasize this arrangement the date may be transposed from the end to the beginning of the citation, but no other change is required. When that is done a period is used after the date.

The one apparent exception in Geological Survey style to the rule of placing the date last is not a real exception. Some journals have no distinctive numeral designation other than the year of publication. For example, the Neues Jahrbuch für Mineralogie, Geologie und Palaeontologie has no distinctive volume number but is issued as Band 1 and Band 2 in each year. In citing this journal the year must be given as a substitute for the volume number—"Neues Jahrb., 1929, Band 2, pp. 67–104"—and is not repeated at the end. In such a citation the date is not really shifted from its normal position: it is used for another purpose, and then, repetition being unnecessary, it is omitted as the date of publication.

The standard abbreviations used by the Geological Survey for titles of serial publications are based in general on the principle of giving enough to indicate the words clearly. For example, "Jour." is used for Journal, not "J.," which might mean Jahrbuch or Jahresbericht.

The capitalization follows the usual library style. In English titles of books or papers only the first word, proper nouns, and proper adjectives are capitalized; in English titles of serial publications (usually abbreviated) principal words are capital-

ized. In foreign titles national practice is followed throughout.

The use of Latin terms in footnotes to avoid repetition of titles is confined to "op. cit." and "idem." "Op. cit." may be used if the previous reference is not far away, provided there can be no doubt as to what work is cited. If two works by the same author have been cited previously it is necessary to repeat the reference. "Idem" is used only for a second citation of the same work, immediately following the first, on the same page. "Idem" may represent all of the preceding citation except the page numbers, or it may be used to represent simply the journal just cited, the author and title being different. The forms "id.," "ibid.," "ibidem," and "loc. cit." are not used—not because they are not good Latin but for the sake of simplicity. Even "op. cit." should be used sparingly.

Most features of the Geological Survey scheme are regarded as having obvious advantages; a few represent simply a choice among different styles to insure uniformity. Owing to the vagaries of publishing organizations no scheme can provide for every difficulty that may arise. For troublesome citations that are not covered by the general rules common sense and analogy must serve as guides.

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U. S. GEOLOGICAL SURVEY

REGARDING TWIST IN CONIFERS

I WAS much interested in Mr. Chester K. Wentworth's article in the February 13 issue of SCIENCE concerning the twist in trees, especially at timberline in the Rocky Mountains. It has been my privilege to spend five years in the Colorado Rockies. During the summers of 1927 and 1928 I was stationed at the summer camp of the University of Colorado, which is located near timberline on the eastern slope of the Continental Divide. While here I spent much time studying the flora of the region and noticed particularly the twisted structure of most of the trees at timberline.

The same question asked by Mr. Wentworth was asked by members of different parties we were escorting, so two of the students and myself studied the question in an effort to find out what might be the cause of the twisting. We studied the living trees and those with one side alive, together with the dead ones in the vicinity. Knowing how hard it would be to prove an hereditary tendency toward twisting, we looked for an environmental explanation. From this angle three factors entered into our study, namely: (1) Direction of winter storms; (2) direction of prevailing winds during growing season; (3) natural protection, especially during the younger stages of growth.

It was obvious to the observer that the trees most strongly twisted were entirely devoid of branches on the upper or northwestern side. Upon studying the weather maps of the region we learned that the prevailing heavy storms of winter came from that quarter. These storms, laden with ice and sleet, cut off the small, tender twigs and consequently no branches were formed on the windward side. This left the tree much like a flag with the surviving branches pointing to the south and east. Further study of the weather maps together with our own knowledge of the summer winds told us that the prevailing winds of summer came from the south and west. We could now see that this lopsided tree with its branches on the east would be strongly whipped to the right during the time when its trunk cells would be most active and pliable. It is highly possible that this constant pressure to the right would strain the old fibers and also cause the new tissues to form in a slightly twisted condition. When the storms of winter came from the north and west the tree would tend to become untwisted but being dormant it would yield less in winter than in summer, consequently it would remain twisted. The only effect of the winter winds would be to destroy the tender twigs on the exposed portion of the "flag." The tendency would be to remove any twigs that may have been pushed farther to the right by the twisting during the summer. Thus the twigs would be built up on the left or south side of the "flag" in summer and be beaten off the right or north side in winter. During the lifetime of the tree it might mean the complete rotation of the upper part of the trunk. It is not uncommon to see branches twisted back over the top of the tree like huge arms pointing away from the wind. These may have been forced into this position by the process described above.

Twisting is not common in trees standing in thick timber, but occasional twisted trees are found at the edge of such stands. These trees may have been subjected to tornado twisting when young or may have been subjected to unequal strain when covered with drifted snow. This latter theory may account for left-handed twisting which is so infrequently observed. A few left-twisted trees were observed at timberline and with one exception these were protected in such a way by rocks as to receive the strong winds of summer at an angle which would cause the tree to be twisted to the left. This one exception stood out alone, but there were stumps of other trees near by which must have influenced its early growth. Both this tree and the dead stumps were protected from the northwest storms.