SUGGESTIONS TO AUTHORS

OF

PAPERS SUBMITTED FOR PUBLICATION BY THE UNITED STATES GEOLOGICAL SURVEY

WITH

DIRECTIONS TO TYPEWRITERS

BY

GEORGE McLANE WOOD, EDITOR

DEPARTMENT OF THE INTERIOR

UNITED STATES GEOLOGICAL SURVEY

GEORGE OTIS SMITH, DIRECTOR

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WASHINGTON

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NOTE.

The first pamphlet containing suggestions to authors for the preparation of manuscript intended for publication by the Geological Survey was published in January, 1888. This pamphlet was revised and reprinted in 1892. In 1904 the Survey published suggestions for the preparation of geologic folios, and in 1906 suggestions for the preparation of reports on mining districts. All matter of present value that was included in these publications, with much additional material, has been incorporated in the pamphlet here presented. It is hoped that these suggestions will be of general service in improving the form of manuscripts submitted and, by diminishing the work of editorial revision and correction, in expediting their publication.

G. M. W.

March 13, 1909.

CONTENTS.

SUGGESTIONS TO AUTHORS.

CLASSES OF PUBLICATIONS.

The publications of the Geological Survey consist, besides topographic maps and miscellaneous circulars and pamphlets, of (*a*) annual reports, relating chiefly to administrative affairs; (*b*) monographs, exhaustive treatises on restricted or special subjects; (*c*) professional papers, mainly of a technical character, adapted to larger illustrations than can be conveniently put into bulletins; (*d*) bulletins, the most numerous class, comprising all papers not assigned to one of the other classes; (*e*) water-supply papers; (*f*) annual statistical volumes on mineral resources; and (*g*) geologic folios. If it seems doubtful whether a particular paper should be published in one or another of these classes, the author may make a recommendation, and the chief of branch, when he transmits a paper, will state the class in which it should be published.

COURSE OF MANUSCRIPTS.

Every paper should be transmitted to the Director by the chief of the branch in which it originated, whose recommendation for publication will be regarded as an approval of the paper from a scientific or technical point of view. If a paper originating in one branch, say the water resources, contains matter pertaining to the work of another branch, say the geologic, the chief under whom the paper originated should, before transmitting it to the Director, refer it to the chief of the other branch for approval (after revision if necessary) of the portion germane to his work.

When a manuscript is received it will be referred to the editor, who, after giving it a preliminary examination and ascertaining that it is complete in form and ready for his action, will lay it before the Director for his personal consideration. When the Director approves the paper for publication he will return it to the editor for critical examination and preparation for printing.

The final editorial work is largely literary and typographic in character. It includes suggestions to the author concerning the correction of faults or errors in grammar or rhetoric, in paragraphing, or in arrangement of matter—in short, suggestions affecting correctness, clearness, and conciseness of expression. It comprises also the examination of many other details, such as the form and use of geographic

and geologic names, the form of tables and sections, and the various minutiæ of printing, including sizes and styles of type, capitalization, punctuation, spelling, etc. The determination of such details is usually made in accordance with prescribed rules, such as those of the Government Printing Office Manual of Style, or mandatory decisions, such as those of the United States Geographic Board or of the Survey's committee on geologic names.

After editorial revision the manuscript will be returned to the author whenever practicable, in order that he may examine the suggestions or corrections made. If any of the editorial changes seem to him to be inadvisable, he should confer or correspond with the editor and endeavor to reach an agreement without delay. If the edited manuscript is acceptable to the author, he need only write his initials and the date on the back of the title-page.

FORM AND FEATURES OF MANUSCRIPT.

THE BEST PRINTER'S "COPY."

The best "copy" for the printer is typewritten matter on letter paper (sheets about 8 by 10½ inches) of ordinary thickness. Thin "manifold" paper should not be used. If two copies of the manuscript are made, the original (not the carbon) should be transmitted. All the sheets should be of uniform size and the typewriting should be on only one side of the paper, in lines rather widely spaced, not "solid." The practice of pasting sheets together to form a sheet or strip that is longer than letter paper and then folding it to letter size is objectionable. It is not important that every sheet should be completely filled with writing. Room for wide tables can be obtained by pasting additional sheets at the side only, but this plan should not be employed for additions to the text. Copy for tables should not be crowded, and it is not necessary that the whole of a table should appear on one sheet. Matter for bibliographies or other similar works may be written on cards, and in some papers large sheets bearing tables or geologic columns will be accepted as copy.

Just before the manuscript is transmitted, after all inserts and additions have been made, the pages should be numbered consecutively from beginning to end. Manuscript should not be folded or rolled, but should be kept "flat" and transmitted in a secure envelope or cover. Drawings or photographs that are intended for use as illustrations should be kept distinct from the manuscript, not inserted in it.

GENERAL TREATMENT.

Before preparing a paper for publication an author should, by examination of the Survey's printed reports, familiarize himself with the details of their form, many of which are set forth herein. He

should at the outset carefully consider the arrangement or order of presentation of the matter of his paper. Special suggestions as to the preparation of geologic folios and of reports on mining districts are presented on pages 24–36, and will be serviceable in indicating the proper treatment in many papers of other kinds. They are, of course, only supplemental to the suggestions given in the first part of this pamphlet, which apply to all Survey publications.

Each paper should include a short bibliography of the subject discussed.

CONCISENESS OF STATEMENT.

The author should express his meaning concisely and avoid unnecessary repetition. Direct, simple statement of facts is more to be desired than rounded periods, rhetorical flourishes, or studied originality of expression. An author can avoid unnecessary repetition only by logically subdividing his material under proper heads before commencing the final writing.

On the other hand, a certain kind of repetition is permissible and even desirable. Thus each chapter or major subdivision of a report should be fairly complete within itself—that is, if necessary, it should contain very brief statements of the main conclusions reached in other chapters, so that the reader may, if he desires, be able to read that chapter understandingly without reference to other chapters. Therefore, instead of saying that "this point is explained in another part of the report," it is better to state briefly the explanation, which can generally be presented in but few more words than are required for the reference, thus saving the reader much time and annoyance.

METHOD OF WRITING.

It is bad practice, especially for young writers, to dictate offhand from field notes, with the intention of rearranging and polishing the typewritten material thus obtained to form a final report. Reports prepared in this way almost invariably bear indications of slovenly work. As far as possible, the final writing should be preceded by a complete study of material. This study should include mineralogical, chemical, and microscopical examinations of specimens, and the preparation of geologic maps and of sketches for illustrations from studies of field notes. During this preparation notes and memoranda should be made in such form that they can be sorted and classified under the different subject heads adopted.

TABLE OF CONTENTS AND LIST OF ILLUSTRATIONS.

The manuscript should include a table of contents and a list of illustrations. The table of contents should be a transcript of the headings appearing in the manuscript, so arranged as to show their

relations—their coordination and subordination. The table of contents given below shows the method of indicating by indention the rank and relations of the headings that appear in the text.

CONTENTS.

The page numbers should be those that have been finally assigned, after the manuscript is complete.

Suggestions in regard to the list of illustrations are given on page 22, under the heading "Illustrations." This list, like the table of contents, should be filled out with manuscript page numbers.

HEADINGS.

It is undesirable and generally unnecessary to provide headings of more than four or five grades. Excessive refinement in subdividing the text of a paper is confusing rather than enlightening to the reader. The headings of the lowest grade are as a rule italic side headings, the others center headings. Only a small amount of text—not more than a page, or at the most two pages—should be covered by a side heading. In the text or body of the paper the rank of the center headings will be shown by printing them in distinctive faces of type, properly graded as to size. It is not necessary to prefix numbers or letters to headings, either in the table of contents or in the text. All coordinate or similar groups of matter should be provided with headings of similar rank, and no group or part should be left without a suitable heading. A proper scheme of headings is essentially a rational classification of the material embodied in the paper, as may be seen by reference to the specimen table of contents given above. It is preferable that the text be complete in itself, independent of

the headings, so that it will be perfectly intelligible even if read without them. Each heading should contain a substantive. The use of adjectives alone for headings (as "Topographic," "Geologic," "Historical") is undesirable.

PARAGRAPHING.

An author should carefully consider the paragraphing of a paper before submitting it for publication, and all paragraphs should be clearly indicated. Faulty paragraphing is expensive to correct in proof, and such corrections can usually not be allowed.

FIRST OR THIRD PERSON.

A paper may be prepared in either the first or the third person, but both "I" (or "we") and "the writer" should not be used indiscriminately. Many reports may advantageously be written in impersonal form.

CROSS REFERENCES.

The use of numerous cross references throughout a paper is not desirable. References to "another part of this paper," "a subsequent connection," etc., are especially unsatisfactory and undesirable. It is better to cite, by title or number, the heading or chapter covering the matter to be indicated, or to restate briefly the facts to which reference is made. References to pages by number may in some places be necessary, but page numbers can be supplied only when the paper has reached the stage of page proof. The number of such references should be reduced to a minimum.

TABLES.

Every table, geologic section or column, and chemical analysis should be provided with a concise heading. The name of the analyst (with initials) should be given in connection with an analysis. If tables must be numbered, arabic numerals should be used, as Table 1 (not Table I, nor Table No. 1).

The proper arrangement of tables is dependent on many factors, and may be a difficult matter. Few general rules can be given, and if a table is complicated or the author is in doubt as to its form, he should consult the editor in advance, before finally preparing it.

Well or drill-hole records should appear in the following form:

Record of Winters well, Southwest City, Mo.

	Thickness.	Depth.
	Feet.	*Feet.*
Surface and coarse rock	48	48
Blue flint	30	78
Light-gray rock	20	98
Dark-brown flint	12	110

In tables of analyses use 1. 2. 3., etc., over the columns (not I. II. III.). The term "per cent" is not necessary above the figure column. If chemical constituents are denoted by both words and symbols, as "Silica (SiO_2)," "Alumina (Al_2O_3)," the symbols should be written between parentheses, as here.

The word "Total" should be omitted before the footing in any table where the numbers are obviously totals.

In sections use "Feet" or "Ft. in." over the figures.

GEOLOGIC NAMES.

All geologic names must be approved by the Survey's committee on geologic names before they can be printed in a publication of the Survey. As that committee's approval of the particular use in any paper of names of members, formations, groups, series, systems, and periods, even if only a casual reference is made, must be obtained, it is necessary that the committee examine the manuscript and also such illustrations as bear geologic names. This examination must be made *before* the paper is transmitted for publication, and the author must procure from the committee a letter containing a list of the names used and indicating the action taken on them, to be transmitted with the manuscript. A few of the general decisions of the committee are here given.

The following is a table of accepted names for eras, systems, and series:

Geologic eras, systems, and series.

Era.	System. (Period)	Series. (Epoch)
Cenozoic	Quaternary	Recent.
		Pleistocene (replaces "Glacial").
	Tertiary	Pliocene \ Neocene may be used when it is impossible to differ-
		Miocene / entiate the Pliocene and Miocene.
		Oligocene.
		Eocene.
Mesozoic	Cretaceous	Upper (Gulf may be used provincially).
		Lower (Comanche and Shasta may be used provincially).
	Jurassic	Upper.
		Middle.
		Lower.
	Triassic	Upper.
		Middle.
		Lower.
Paleozoic	Carboniferous	Permian.
		Pennsylvanian (replaces "Upper Carboniferous").
		Mississippian (replaces "Lower Carboniferous").
	Devonian	Upper.
		Middle.
		Lower.
	Silurian.	
	Ordovician	Upper (Cincinnatian may be used provincially).
		Middle (Mohawkian may be used provincially).
		Lower.
	Cambrian	Saratogan (replaces "Upper Cambrian").
		Acadian (replaces "Middle Cambrian").
		Georgian (replaces "Lower Cambrian").
Proterozoic	Algonkian. } pre-Cambrian.	
	Archean. } pre-Cambrian.	

The following names, if used in a titular sense, are permissible only when put in quotation marks:

"Coal Measures" (subdivision of the Carboniferous).
"Calciferous" (subdivision of the Ordovician).
"Corniferous."
"Juratrias."
"Lignitic."
"Magnesian" (subdivision of the Ordovician).
"Permo-Carboniferous."
"Red Beds" (Permo-Triassic rocks of the West).

The foregoing decisions are not intended to preclude the use in a common-noun sense of coal measures, calciferous, lignitic, magnesian, and red beds.

The adjectives upper, middle, and lower, when used with ~~Cambrian,~~ Carboniferous, Tertiary, or Quaternary, are not to be capitalized unless the term is quoted. With the names of the other systems they may be capitalized if the term is used in a definite sense. When applied to subdivisions of series or to indefinite or local subdivisions of stratigraphic units they should not be capitalized. Examples: Saratogan ("Upper Cambrian"); upper Cambrian; Upper Cretaceous; Lower Devonian; Mississippian ("Lower Carboniferous"); middle Miocene; lower Colorado.

GEOGRAPHIC NAMES.

In the spelling of geographic names preference will be given to (1) decisions of the United States Geographic Board; (2) atlas sheets of the United States Geological Survey (latest editions); (3) Century Atlas of the World and Century Dictionary of Names; (4) Rand, McNally & Co.'s Atlas.

HYPHENS IN PETROGRAPHIC TERMS.

The Survey has adopted a uniform scheme for the use of hyphens in petrographic terms, based on the single principle that like names are connected by a hyphen and unlike names are not. The names used in such terms are of four classes—(*a*) rock names, (*b*) mineral names, (*c*) textural names, and (*d*) names expressing the kind of clastic aggregation. Any two or more names of either class are connected by a hyphen; others are not. The principal names of classes *c* and *d* are as follows: (*c*) Felsophyre, gneiss, porphyry, schist, vitrophyre; (*d*) agglomerate, breccia, conglomerate, sand, tuff.

The subjoined list is not complete, but will serve to illustrate the principle. To avoid confusion, a term that, according to this prin-

ciple, is not hyphenated should remain without the hyphen when it becomes a compound adjective modifying some other word—for example, bostonite porphyry, bostonite porphyry dike.

List of rock names, showing use of hyphens.

actinolite-magnetite schist
acmite trachyte
adamellite gneiss
ægirite-augite
ægirite granite
ægirite granite porphyry
alaskite porphyry
albite diorite
albite schist
alkali syenite porphyry
amphibole-biotite granite
amphibole granite
amphibole picrite
analcite basalt
andalusite hornfels
andalusite schist
andesite-basalt
andesite breccia
andesite vitrophyre
anorthite andesite
apatite syenite
augite andesite porphyry
augite-biotite andesite
augite-bronzite andesite
augite diorite
augite-hornblende gabbro
augite latite
augite-mica syenite
augite-microcline granite
augite monzonite
augite peridotite
augite porphyry
baryta feldspar
basalt tuff
biotite-augite latite
biotite diorite
biotite gneiss
biotite-hornblende-quartz latite
biotite mica
biotite mica gneiss
biotite-pyroxene andesite
biotite-quartz monzonite
biotite rhyolite
biotite schist
biotite tinguaite
bostonite porphyry
breccia-agglomerate
breccia-conglomerate
bronzite norite
bronzite-olivine aleutite
brucite-serpentine
cancrinite syenite
chiastolite schist
clay shale
clay slate
cordierite andesite
cordierite hornfels
cordierite norite
corundum anorthosite
corundum pegmatite
dacite tuff
diabase-aphanite
diabase-gabbro
diabase porphyry
diopside hornstone
diorite-gabbro
diorite porphyry
diorite schist
elæolite syenite
enstatite diabase porphyry
epidote-chlorite schist
essexite porphyry
feldspar porphyry
felsite tuff
gabbro-diabase
gabbro-diorite
gabbro porphyry
gabbro-pyroxenite
gabbro-syenite
garnet norite
glaucophane schist
granite-diorite
granite gneiss
granite-monzonite
granite-syenite porphyry
greenstone conglomerate
greenstone schist
grünerite-magnetite schist
haüyne phonolite
hornblende andesite
hornblende andesite agglomerate
hornblende andesite porphyry

hornblende-augite andesite
hornblende gneiss
hornblende granite
hornblende-mica andesite
hornblende-mica diorite
hornblende-mica granite
hornblende peridotite
hornblende porphyry
hornblende-pyroxene-biotite-quartz latite
hornblende-quartz andesite
hypersthene-augite andesite
hypersthene gabbro
ilmenite norite
keratophyre tuff
labradorite-bytownite
labradorite porphyry
latite-andesite
latite-phonolite
lava breccia
leucite absarokite
leucite basalt
leucite basanite
leucite granite porphyry
leucite tephrite
leucitite tuff
lime feldspar
lime-soda feldspar
lithia mica
magnesia mica
magnetite gabbro
melaphyre tuff
melilite basalt
melilite monchiquite
melilite-nephelite basalt
mica dacite
mica diorite
mica diorite porphyry
mica gabbro porphyry
mica gneiss
mica-hornblende norite
mica hornblendite
mica peridotite
mica schist
monzonite porphyry
muscovite mica
natrolite phonolite
nepheline basalt
nepheline-melilite basalt
nephelite basalt
nephelite basanite
nephelite felsite
nephelite syenite porphyry
nosean-leucite tephrite
nosean sanidinite
oligoclase feldspar
olivine andesite
olivine-augite andesite
olivine diabase
olivine melaphyre
orthoclase feldspar
orthoclase gabbro
orthoclase gabbro-diorite
picrite porphyry
plagioclase basalt
plagioclase feldspar
plagioclase gneiss
porphyry tuff
potash feldspar
pseudoleucite-sodalite tinguaite
pseudoleucite syenite
pyroxene andesite breccia
pyroxene-biotite andesite
pyroxene-mica andesite
pyroxene-mica diorite
pyroxene porphyry
quartz-augite diorite
quartz-augite syenite
quartz-biotite-garnet gneiss
quartz diorite-aplite
quartz diorite gneiss
quartz diorite porphyry
quartz gneiss
quartz-hornblende-mica monzonite
quartz keratophyre
quartz-mica-hornblende diorite
quartz-mica latite
quartz monzonite
quartz monzonite gneiss
quartz monzonite-pegmatite
quartz monzonite porphyry
quartz norite
quartz norite gneiss
quartz porphyry
quartz porphyry tuff
quartz-pyroxene diorite
quartz schist
quartz syenite porphyry
quartz-tourmaline porphyry
quartz trachyte
rhyolite-dacite
rhyolite-latite
rhyolite porphyry
saussurite gabbro
sericite schist
soda feldspar

soda granite
soda microcline
soda minette
soda orthoclase
sodalite porphyry
sodalite syenite
sodalite tephrite
syenite-diorite porphyry
syenite felsophyre
syenite-monzonite
syenite-pegmatite
syenite porphyry
talc schist
tephrite tuff
theralite porphyry
tourmaline-biotite schist
tourmaline granite
tourmaline porphyry
trachyte-andesite
trachyte tuff
tridymite trachyte
tuff-agglomerate
tuff-breccia
uralite diorite
uralite porphyry
zoisite-hornblende diorite

QUOTATIONS AND REFERENCES.

Responsibility for the accuracy of references and quotations must rest with the author; they will not usually be verified in the editorial revision. In reprinted matter the exact words of the original should be preserved, but it is not necessary to reproduce typographical errors or details of printer's style, such as spelling, capitalization, and punctuation, except in citations of a controversial nature and in extracts in which, for obvious reasons, quaintness of form should be preserved. Omissions in quoted matter should be indicated by stars.

PERSONAL TITLES.

Titles of honor, office, distinction, or address (Dr., Prof., Mr., etc.) should be used only where the mention is personal in character, as in acknowledgment of courtesies or services. Such titles should be omitted from the names of authors cited and, if first name or initials are given, from names of co-authors or scientific collaborators.

Mr. G. W. Jefferson kindly guided the writer to the place.
Van Hise says * * *
George Otis Smith's work on * * *
The economic geology is discussed by Mr. Ransome in part 2.
Analyst, W. F. Hillebrand. This rock was analyzed by Dr. Hillebrand.

FOOTNOTES.

Before making a footnote an author should carefully consider whether the matter does not belong in the text. Proper footnotes consist chiefly of references to the literature of the subject discussed. For reference marks superior underscored letters ($\underline{a}$, $\underline{b}$, $\underline{c}$, to be printed as italic superiors) should be used, and each footnote should be written immediately below the line in which the reference mark appears and be separated from the text above and below by lines.

Personal names, unless the persons are well known, should include initials, to make certain identification possible, especially for indexing. The initials need not be given in the text; in citations they belong

properly in the footnotes. Standard forms of footnotes are given below. The details of capitalization, abbreviation, punctuation, etc., should be carefully noted and followed.

Van Hise, C. R., The iron-ore deposits of the Lake Superior region: Twenty-first Ann. Rept. U. S. Geol. Survey, pt. 3, 1901, pp. 318–327.

Dutton, C. E., Tertiary history of the Grand Canyon district: Mon. U. S. Geol. Survey, vol. 2, 1882, p. 63.

Diller, J. S., and Patton, H. B., The geology and petrography of Crater Lake National Park: Prof. Paper U. S. Geol. Survey No. 3, 1902, p. 26.

Peale, A. C., Mineral springs of the United States: Bull. U. S. Geol. Survey No. 32, 1886, p. 20.

Wilson, H. M., Pumping water for irrigation: Water-Supply Paper U. S. Geol. Survey No. 1, 1896, p. 45.

Weeks, J. D., The manufacture of coke: Mineral Resources U. S. for 1886, U. S. Geol. Survey, 1887, p. 382.

Cross, Whitman, Rico folio (No. 130), Geol. Atlas U. S., U. S. Geol. Survey, 1905, p. 2.

Dana, J. D., Volcanic eruptions of Hawaii: Am. Jour. Sci., 2d ser., vol. 10, 1850, p. 235.

Geikie, Archibald, Text-book of geology, 4th ed., vol. 1, 1903, p. 49.

It will be noted that the order observed in the foregoing forms is (1) name of author, with initials after the surname; (2) title of paper, article, or book; (3) series or periodical title, with standard abbreviations (see list below); (4) serial or volume number; (5) date; (6) page number. If the reference is to a book not published in any series, item 3 and usually item 4 of the above are not pertinent, but the other items should always be given. The date should be the year of publication.

The following brief list of standard abbreviations will indicate the style to be used in footnote citations. Forms for the Survey's own publications are given above. It should be noted that names of countries, States, cities, etc., and other proper nouns are spelled out; that "Geol." is used for geological, but not for geology or geologist; that "Am." is used for American, but not for America; and that the usage of foreign languages in regard to capitalization is followed, except that a capital is always used in the abbreviation of the first word of a society's name.

Abhandl. K. Akad. Wiss. Berlin
Allg. Jour. Chemie
Am. Geologist
Am. Jour. Sci., 4th ser. (Do not omit the series number.)
Am. Naturalist
Annals and Mag. Nat. Hist.
Annals Carnegie Mus.
Annales chim. phys.
Annales des mines
Annals New York Acad. Sci.
Ann. Rept. Geol. Survey Canada
Ann. Rept. Indiana Dept. Geology and Nat. Res.
Ann. Rept. Ohio Acad. Sci.
Ann. Rept. Smithsonian Inst.
Annales Soc. géol. Belgique
Atti R. accad. Lincei
Ber. Deutsch. chem. Gesell.
Bol. Sec. fomento, Mexico
Bol. Soc. geol. mexicana
Bull. Am. Geog. Soc.
Bull. Am. Mus. Nat. Hist.
Bull. Colorado Min. Bur.

Bull. Connecticut Geol. and Nat. Hist. Survey
Bull. Dept. Geology Univ. California
Bull. Geol. Soc. America
Bull. Illinois State Lab. Nat. Hist.
Bull. Lab. Nat. Hist. Iowa Univ.
Bull. Mus. Comp. Zool. Harvard Coll.
Bull. Minnesota Acad. Nat. Sci.
Bull. Mississippi Agr. and Mech. Coll.
Bull. Montana Univ.
Bull. Philos. Soc. Washington
Bull. Sci. Lab. Denison Univ.
Bull. Soc. géol. France
Bull. Texas Univ. Min. Survey
Canadian Min. Rev.
Canadian Rec. Sci.
Centralbl. Min., Geol. u. Pal.
Chem. Zeitung
Compt. Rend.
Contrib. Geol. Dept. Columbia Univ.
Econ. Geology
Eng. and Min. Jour.
Eng. Mag.
Geog. Jour.
Geol. Mag.
Geol. Survey Illinois
Jahrb. K.-k. geol. Reichsanstalt
Jahresber. Chemie
Jour. Assoc. Eng. Soc.
Jour. Canadian Min. Inst.
Jour. Cincinnati Soc. Nat. Hist.
Jour. Elisha Mitchell Sci. Soc.
Jour. Franklin Inst.
Jour. Geography
Jour. Geology
Jour. prakt. Chemie
Jour. Victoria Inst.
Kansas Univ. Geol. Survey
Kansas Univ. Quart.
Louisiana Exper. Sta.
Maryland Geol. Survey
Min. and Sci. Press
Min. Mag.
Min. pet. Mitt.
Mineralog. Mag.
Monatsber. Gesell. Erdkunde Berlin
Nat. Geog. Mag.
Neues Jahrb.
Petermanns Mitt.
Pop. Sci. Monthly
Proc. Acad. Nat. Sci. Philadelphia
Proc. Am. Acad. Arts and Sci.
Proc. Am. Assoc. Adv. Sci.
Proc. Am. Philos. Soc.
Proc. Biol. Soc. Washington
Proc. Boston Soc. Nat. Hist.
Proc. California Acad. Sci.
Proc. Colorado Sci. Soc.
Proc. Davenport Acad. Sci.
Proc. Eng. Club Philadelphia
Proc. Lake Superior Min. Inst.
Proc. Roy. Soc. Canada
Proc. Yorkshire Geol. and Polytech. Soc.
Quart. Jour. Geol. Soc. London
School of Mines Quart.
Sci. Am.; Sci. Am. Suppl.
Tech. Quart.
Trans. Am. Inst. Min. Eng.
Trans. Canadian Inst.
Trans. Inst. Min. and Met.
Trans. Inst. Min. Eng. (England)
Trans. Manchester Geol. Soc.
Trans. Wagner Free Inst. Sci.
U. S. Dept. Agr.
U. S. Geog. Surveys W. 100th Mer.
U. S. Geog. and Geol. Survey Rocky Mtn. Region
U. S. Geol. and Geog. Survey Terr.
U. S. Geol. Expl. 40th Par.
U. S. Nat. Mus.
Verhandl. Polytech. Gesell. Berlin
Zeitschr. anal. Chemie
Zeitschr. Deutsch. geol. Gesell.
Zeitschr. prakt. Geologie

"Op. cit." or "loc. cit." may be used if the footnote giving 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. "Loc. cit." should be used only where the page cited is the same as in the previous reference. "Idem" (not id., ibid., nor ibidem) may be used only for a second citation of the same work immediately following the first.

TYPOGRAPHIC STYLE.

The Survey publications conform, in general, to the Government Printing Office Manual of Style. A few of the more important rules are given below.

Capitalize the following terms, singular form only, when immediately following name; also the words "hills," "islands," "mountains," or "springs" when immediately following the name of a group:

Archipelago	Delta	Hill	Park
Borough	Forest	Hollow	Plateau
Branch (stream)	Fork	Island	Range
Butte	Gap	Mesa	Reservation
Canyon	Glacier	Mountain	Ridge
County	Gulch	Narrows	River
Crater	Harbor	Ocean	Run
Creek	Head	Parish (La.)	Spring

Capitalize the following, singular form, when used either before or after the name; also plural form when before name:

Bay	Desert	Mount	Port
Bayou	Falls	Oasis	Sea
Camp (military)	Fort	Pass	Strait
Cape	Isle	Peak	Valley
Dalles	Lake	Point	Volcano

Capitalize Basin if the term means a structural depression, but not a drainage basin. (Denver Basin, Colorado; Perry Basin, Maine; Bighorn Basin, Wyoming; but Potomac basin; Kennebec basin.)

Lower-case canyon and valley in such expressions as Rock Creek valley, Green River canyon; also aqueduct, canal, ditch, flume, reservoir, etc., referring to ~~irrigation~~ works; ranch, station (railway).

Capitalize State and Territory, singular or plural, and terms applied to groups of States, as North Atlantic, South Atlantic, Middle Atlantic, Gulf, Middle, Western, Northwestern, and Southwestern; also terms denoting sections of the United States, as the West, the South, the Far West, the Middle West.

The capital letters in the words and phrases below should be noted:

Allegheny Front
Atlantic Coastal Plain
Badlands (in South Dakota and Nebraska); but as a common noun, badlands
Coastal Plain region
Continental Divide
Driftless Area (upper Mississippi Valley)
Eastern Shore (Chesapeake Bay)
Falls (Niagara)
Gulf Coastal Plain
High Plains
Lower Peninsula and Upper Peninsula (Michigan)
Piedmont Plain (or Plateau)
Staked Plain
the Gulf (of Mexico)
the Isthmus (of Panama)
the Lakes (the Great Lakes)
the Plains (Great Plains)
the Sound (Long Island Sound)

Capitalize titles of organized surveys (North Carolina Geological Survey, Maine State Survey Commission, etc.; the Survey), also such designations as Fortieth Parallel Survey, Hayden Survey.

Use the following contractions for names of States and Territories after names of post-offices, counties, forts, reservations, Indian agencies, or military or naval stations:

Ala.	Ga.	Minn.	N. Y.	Tenn.
Ariz.	Ill.	Miss.	N. C.	Tex.
Ark.	Ind.	Mo.	N. Dak.	Vt.
Cal.	Kans.	Mont.	Okla.	Va.
Colo.	Ky.	Nebr.	Oreg.	Wash.
Conn.	La.	Nev.	Pa.	W. Va.
Del.	Md.	N. H.	R. I.	Wis.
D. C.	Mass.	N. J.	S. C.	Wyo.
Fla.	Mich.	N. Mex.	S. Dak.	

Idaho, Iowa, Maine, Ohio, and Utah should be written in full.

St. should be used for Saint, but Fort and Mount should not be abbreviated.

In references to public-land divisions use the following forms: In the NE. ¼ SW. ¼ sec. 25, T. 5 N., R. 14 E.; in the N. ½ sec. 25; in sec. 25; secs. 2 and 3; Tps. 4 and 5; Rs. 14 and 15. Note use of "the."

Names of railroads should not be abbreviated. Care should be taken to use the correct form—railroad or railway. If it seems necessary to employ a name no longer in use, the present name should be given also. The railway guide will usually settle any doubts as to such points.

Decimals, degrees, dimensions, distances, enumerations, money, percentage, weights, and like matter should be expressed in figures. (10°, 45 miles, 3 cubic feet, 24 pages, 100 bushels, 17 per cent, 41 pounds, $1,000, etc.) But if the matter is not statistical spell out isolated numbers less than 10; also length of time. (Nine stamp mills; fourteen days; but the cement was tested at 4, 28, and 160 days.)

Use "per cent" only with figures. (A small percentage or proportion; 20 per cent.) Do not use %.

Avoid a mixture of common and decimal fractions.

Use "short and" (&) only between names of persons in firm names or to connect a name with Co., Bro., or Bros., as Woodward & Lothrop, J. P. Morgan & Co. Names of persons who are associated in literary or other similar companionships should be connected by "and," as Gilbert and Brigham, Meek and Hayden, *Mactra formosa* M. and H.; also Eng. and Min. Jour.

Names in the singular (including proper names) ending in s take the apostrophe and s in the possessive case, as Jones's, Stokes's.

In text use "feet" and "inches" not ′ and ″. Over a figure column use "Feet" or "Ft. in."

Write "above sea level," not "above tide" nor "A. T."

The degree mark should be used with figures in statements of dips and strikes: A dip of 10° SE., or 10° S. 35° E.; the strike is N. 45° E.; but the dip is southeast—that is, terms of direction should be spelled out unless figures are given.

"The" should be omitted before full names of rivers, creeks, runs, etc. (as Green River, Missouri River, Pohatcong Creek, Fourmile Run), but "the Mississippi," "the Potomac" are acceptable forms for designating rivers.

Webster's International Dictionary is the authority adopted by the Government Printing Office for spelling and compounding and will be generally followed; but the form of the words given below should be noted.

acidic
acre-foot
afterward
aluminum
arrastre
asbestos
backward
badlands
base-level
briquet
can not
canyon
cerusite
clue
downward
draft
employee
eolian
esker
farther (distance)
further (other than distance)
fluorspar
forward
gage
groundmass
head-gate
headwaters
laccolith
perlite
pneumatolytic
poikilitic
Professor (with surname only)
Prof. (with full name)
reconnaissance
reinforce
second-foot
upward
volcanism
vug
wasteway
watercourse
waterworks

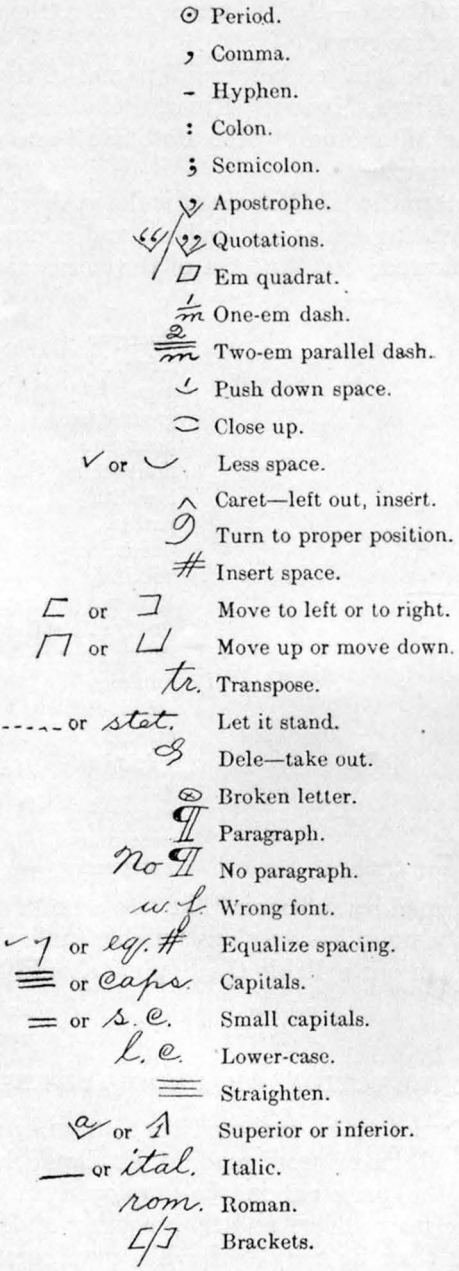
Adjectives formed by suffixing "like" to a noun should be written as one word if the noun has only one syllable (unless it ends in f or l); if it has more than one syllable the hyphen should be used.

business-like	eel-like	leaf-like
childlike	homelike	warlike

CORRECTION OF PROOF SHEETS.

Although it is not to be expected that an author will be familiar with the technicalities of proof reading, he should know the use and significance of the principal marks employed in correcting proof, in order that he may understand the meaning of the signs made on his proofs and that he may make his own corrections properly. A list of proof reader's marks and a sample of proof marked for correction are given on pages 20–21. Suggestions concerning some of these marks are given on page 22.

The following are the marks commonly used by proof readers to indicate corrections:



TYPOGRAPHICAL ERRORS.

It does not appear that the earliest printers had any method of correcting errors before the form was on the press. The learned ~~The learned~~ correctors of the first two centuries of printing were not proof readers in our sense; they were rather what we should term office editors. Their labors were chiefly to see that the proof corresponded to the copy, but that the printed page was correct in its latinity, ~~that the words were there,~~ and that the sense was right. They cared ~~but~~ little about orthography, bad letters, or purely printers' errors, and when the text seemed to them wrong they consulted fresh authorities or altered it on their own responsibility. Good proofs, in the modern sense, were impossible until professional readers were employed, men who had first a printer's education, and then spent many years in the correction of proof. The orthography of English, which for the past century has undergone little change, was very fluctuating until after the publication of Johnson's Dictionary, and capitals, which have been used with considerable regularity for the past 80 years, were previously used on the miss or hit plan. The approach to regularity, so far as we have, may be attributed to the growth of a class of professional proof readers, and it is to them that we owe the correctness of modern printing. More errors have been found in the Bible than in any other one work. For many generations it was frequently the case that Bibles were brought out stealthily, from fear of governmental interference. They were frequently printed from imperfect texts, and were often modified to meet the views of those who published them. The story is related that a certain woman in Germany, ~~who was~~ the wife of a printer, ~~and~~ had become disgusted with the continual assertions of the *superiority* of man over woman which she had heard, hurried into the composing room while her husband was at supper and altered a sentence in the Bible, which he was printing, so that it read Narr instead of Herr, thus making the verse read "And he shall be thy fool" instead of "and he shall be thy lord." The word not was omitted by Barker, the king's printer in England in 1632, in printing the seventh commandment. He was fined £3,000 on this account.

6-pt. ital. caps.

stet.

tr.

w.f.

lead.

lead.

Out; see copy

l.c. who

over.

4/2

Every change or correction desired should be indicated by marks on the margin of the proof, not in the body of the printed matter, except as here noted. To indicate that something should be taken out, a line is drawn through it and the "dele mark" (ꝺ) placed in the margin of the proof. The dele mark should not be employed when something else is to be substituted for the matter expunged; in this case only the substituted matter should appear in the margin. To indicate that something should be inserted a caret (∧) is placed at the point in the text where the insertion should be made and the matter to be inserted is written in the margin. It is not necessary or proper to put a caret in the margin also. Punctuation and other marks which might be obscure if written alone are placed to the left of the "stop mark," thus: '/ (comma), ;/ (semicolon), -/ (hyphen). The stop mark is used also to separate one correction from the next when they are crowded in the margin. A period to be inserted should be placed in a circle ⊙. The space mark (#) indicates that a space, such as is used between two words, should be inserted at the place noted by a caret in the body of the proof. It is important that all marks of correction be made conspicuously and legibly, without possible ambiguity. When a considerable amount of matter is to be added it should be written on a sheet or slip, which should be pinned (not pasted) to the galley proof, the place at which the added matter is to be inserted being clearly indicated.

Only reasonable corrections can be made in the galleys, not radical alterations; and only slight, inexpensive changes will be permitted in the pages.

Galley proof will ordinarily be sent to the author; also page proof if desirable and practicable. These proofs will bear suggestions and queries made by proof readers and editors, which should be carefully noted. Special attention should be given to "queries"—question marks on the margin of proof sheets opposite points at which doubt is indicated, inconsistencies are noted, information is wanted, or blanks are to be filled. Failure to note and answer such queries may necessitate the return of the proofs to the author.

Proof should be corrected and returned to the editor of the Survey promptly.

ILLUSTRATIONS.

Publications of any class may be illustrated, but illustrations can not be used for mere embellishment; every one must serve a definite scientific or practical purpose and must be distinctly described or mentioned by number at the proper place in the text. The numbers should be assigned in the order in which such references appear. It should be noted, however, that an incidental men-

tion of an illustration need not determine its position, which should be near the place where it is principally mentioned or discussed.

Drawings and photographs intended for use as illustrations should not be inserted in the manuscript, but should be kept distinct from it, in a separate envelope or package, and the material for all the illustrations for a report should be submitted at one time.

Illustrations that bear geologic names should be submitted to the Survey's committee on geologic names with the manuscript.

Before any work is done on illustrations in the division of book publication they must be approved by the Survey's committee on illustrations, to which they will be submitted when received by the division. The author should carefully verify all references to illustrations after the numbers have been finally assigned, seeing that all references give the correct numbers and that no references to illustrations that have been cut out are left. The classification of the illustrations into plates and figures will be made in the division of book publication, and the author should, if possible, confer with the chief of the section of illustrations on this point before finally numbering his plates and figures. Most reproductions of photographs of landscapes and of drawings for colored maps will be plates, but diagrams, graphic sections, and most other line drawings will appear as figures. Figures are printed with the text; plates are, as a rule, printed separately from the text, on one side of the paper only, and are bound into the book at the proper places or put in a pocket at the end of the book.

The list of illustrations should consist of brief titles of the plates and text figures, grouped separately and arranged in order. The plate numbers should be in roman, as Plate IV; the figure numbers in arabic, as figure 4. Subdivisions of plates should be lettered with italic capitals, as Plate VI, *A;* subdivisions of figures with italic lower-case letters, as figure 1, *a*. The number of the manuscript page on which each plate or figure is described or principally mentioned should be written opposite its title in the list. Detailed explanation of parts or features of illustrations should not be given in the list, but should be incorporated in the text or in the legends or titles. The legends for the text figures should be written in the manuscript at the places where the figures are to appear. These legends should include not only the title, but all necessary details, such as explanations of symbols or letters that appear on the figure. Full descriptions of the plates, comprising the matter to be printed on or opposite them, should be written on separate sheets if the brief titles given in the list of illustrations are not sufficient.

Two identical copies of the list of illustrations should be made after the numbers have been finally assigned, and both should be transmitted with the manuscript.

GEOLOGIC FOLIOS.

Authors of geologic folios should note the following suggestions, which are condensed from a pamphlet issued in 1904.

GENERAL SUGGESTIONS.

It is neither desirable nor possible to make all folio texts conform strictly to a single type, but the point of view, the scope, and the general arrangement should be fairly uniform.

Point of view.—The author should have constantly in mind the primary object of the folio, which is the presentation of a clear picture of the region described. He should therefore endeavor to put himself in the mental attitude of a person—not necessarily a trained geologist—who has never seen the region and who must form his conceptions of it chiefly from the written report. Too much dependence should not be placed on the cartographic picture, for most laymen do not read maps with facility.

Scope.—Although the folios are intended for both laymen and geologists, the descriptive text should not trespass on the subject-matter of a geologic text-book. The folio-cover text includes most of the definitions that are necessary. With reference to the needs of the layman, it will ordinarily be better to explain the technical ideas connected with the local descriptions than to define technical terms, but in some folios the need for repeated use of the idea will be best met by first defining and afterward using the corresponding technical term. It is manifestly impossible to make provision for any but the educated layman, and some material may be admitted which even he will not readily understand, provided the text as a whole is fairly intelligible to him. With respect to the needs of the geologist, those technicalities of the specialist which are not understood by the body of geologists, or by specialists in other departments, are in general to be avoided. Important matters of particular interest to the specialist may be concisely stated, without descriptive details.

So far as possible, the text should be devoted to the discussion of facts of permanent interest. For example, in the discussion of mineral resources, mode of occurrence should receive fuller treatment than amount of development. Also, more attention should be given to the accurate description of the phenomena of the area than to hypotheses of origin and history of development. Such hypotheses should be stated tersely and clearly, and not in controversial or argumentative form. If the hypothesis is unverified, or supported mainly by phenomena outside the area discussed, whatever doubt may exist as to its validity should be mentioned.

Arrangement.—The material should be arranged under a few main heads; five or six will generally suffice, though more may be used if

exceptional importance of special features makes their coordinate treatment necessary.

The classification of material indicated by the specimen table of contents on page 8 is suggested as applicable to most folios.

INTRODUCTION.

The introduction should include a brief statement of the location of the quadrangle in respect to latitude and longitude and to State and county boundaries. The area should be stated exactly, to the nearest whole number of square miles, which can be ascertained by reference to "Geographic Tables and Formulas," published by the Survey as Bulletin 234 and also as an unnumbered pamphlet.

If practicable, there should be a brief description of the main geographic and geologic features characterizing the natural province of which the quadrangle forms a part. This may be repeated with little change for all the quadrangles in the province. Being intended chiefly to supply the layman with the necessary background for the detailed discussion to follow, it should be written in language as free as possible from technical expressions. The exact relations of the quadrangle to the natural province should be clearly stated.

TOPOGRAPHY.

The description of the topography should be general in character, its principal purposes being (*a*) to furnish a local nomenclature to be used in the descriptive geology; and (*b*) to direct attention to features represented on the topographic map which would be likely to escape the attention of the untrained map reader.

The origin of the topographic forms can be most advantageously treated after the stratigraphy and the structure have been described. It naturally forms a part of the historical geology. The fact that relief is discussed in this section and physiography in a later one need not prevent the treatment of physiographic expression as a part of the description of rock formations.

DESCRIPTIVE GEOLOGY.

Stratigraphy.—The description of the sedimentary formations should generally be systematic, though varying in detail for different regions. If the formation units have been long established and are well known the description may be relatively brief. If they are newly established the definition should include (*a*) lithologic character; (*b*) physiographic expression, provided that is characteristic; (*c*) paleontologic character; (*d*) name and correlation; (*e*) thickness; (*f*) areal distribution; (*g*) relation to adjacent formations, especially character of upper and lower limits, whether by gradual passage or unconformity.

Under "paleontologic character" at least three cases will arise requiring somewhat different treatment. (1) If the fauna or the flora is well known it will be sufficient to give, in a brief paragraph, a broad classification of the fossils, with mention of a few species that may be useful in identifying the formation. (2) If the fossils are of doubtful significance or if the life of the epoch is not well known a somewhat more explicit statement is desirable. (3) If the fauna or the flora is very scant or poorly known or if the investigation has added valuable new material a still more detailed reference to specific forms may be made, especially when the assigned age has been determined on this newly discovered evidence or when divisions are based on paleontologic difference. If the geologist is not also a paleontologist he should procure a concise statement from the paleontologist and quote it.

The description of igneous rocks should be treated primarily as an explanation of the cartographic units adopted. A generalized pen picture of the rock, giving its obvious characters, should be followed by a more technical description showing which characters are general and due to the type of the magmas erupted and which represent local conditions of consolidation. A concise characterization for the petrographic specialist is desirable, but no extended description or discussion of details, such as would interest the specialist only, should be given. In general those features of the rock which have a bearing on and are essential to a discussion of the geology of the region should be described. Chemical analyses should be given, if available, with brief comment as to their significance, but with no detailed or technical discussion.

The method of treating metamorphic formations should depend on the relative prominence of their original and their acquired characteristics. If the original characteristics are the more important the treatment should be similar to that of sedimentary formations; if the acquired characteristics are the more pronounced the treatment should be the same as that of igneous rocks.

Structure.—The descriptions of the geologic structure should be clear, concise, and as free as possible from technicalities and from theoretical discussion of the causes producing it. The importance of this subject will vary greatly in different regions, and its treatment will be determined by its importance. In some regions the geologic structures, though inconspicuous, are highly important by reason of their influence on the accumulation or exploitation of mineral deposits, such as oil, gas, and coal. The discussion of such structures should be sufficiently full and explicit to form a groundwork for the subsequent discussion of the mineral resources. The relation between structure and mineral deposits should be pointed out in connection with descriptions of those deposits.

Areal geology.—Information regarding the areal distribution of the formations should be given as a part of the stratigraphy. In many folios, however, it will be desirable to summarize this information under the heading "Areal geology."

HISTORICAL GEOLOGY.

The discussion of the historical geology should present a connected history of the area according to the recognized periods and the intervals of uplift and erosion which have been important in their effects. The subdivision into "Sedimentary record," "Igneous record," and "Physiographic record" is suggested as being generally applicable, but in many folios the sedimentary and igneous history will necessarily be combined in a chronologic treatment of events. The "Physiographic record" should include a discussion of the origin of the present topographic forms.

ECONOMIC GEOLOGY.

In general the detail devoted to economic geology should be roughly proportional to the importance of the resources and the need of information. Particular care should be taken to record such general facts in regard to the mineral resources as will enable the reader to make an intelligent estimate of the value of both the developed and the undeveloped deposits. Where the mineral resources are extensive and where a large amount of detailed information that is of economic value is collected, the material should be prepared for publication as a bulletin and the treatment of the economic geology in the folio text should be confined largely to a statement of the purely geologic relations of the mineral deposits.

More attention should be devoted to water resources in a folio that relates to an agricultural or ranching country than in one that describes an area where mining is the dominant industry, and, similarly, in a folio that treats of an arid or semiarid region than in one that treats of a region which is well watered and in which the problems of water supply are well understood. The discussion of the underground water supply should include (*a*) an enumeration of the water-bearing formations or beds and descriptions of their character supplementary to those given under "Descriptive geology;" (*b*) a description of the geologic structure of the water-bearing beds, with statements of depth and of elevation of outcrop; (*c*) a description of quantity and character of water.

In the treatment of soils and forests due care should be exercised not to trespass on the field occupied by other Government bureaus.

REPORTS ON MINING DISTRICTS.

The following suggestions and definitions, condensed from a pamphlet issued in 1906, are offered to Survey writers on the economic geology of mining districts as representing the practice which is most commonly approved, and therefore that to which they should endeavor to conform.

GENERAL SUGGESTIONS.

Point of view.—The remarks on the point of view given in the suggestions to authors of geologic folios (p. 24) are equally applicable here, and need not be repeated.

Geology in its economic bearing.—The writer should bear in mind that an economic report is used principally by readers who are not technical geologists, and should therefore avoid as far as possible technical words with which they are not likely to be familiar. When the use of such words is unavoidable it may be desirable to explain briefly their meaning.

Stress should be laid on geologic facts that have a direct economic bearing. Purely theoretical or technical material, such as petrographic discussions of rocks, may often best be reserved for separate technical papers. If it seems desirable to include such material in an economic report, it should, by paragraphing in smaller type, be kept distinct from the main body of the report.

Order of treatment.—The order of treatment should follow the principle of first giving the reader a general idea of the subject under consideration before proceeding to a detailed description—the reverse of the process by which the author usually arrives at his results. This suggestion applies not only to the whole report, but also to the treatment of individual topics. Thus, before describing the geology of the ore deposits of a district one might give a brief characterization like this: "It is an area of granite intruded by andesite, which is in turn cut by phonolite dikes," or "The deposits are narrow, vertical veins cutting granite, andesite, and phonolite, and conforming in general direction with the phonolite dikes." In this way the reader starts with a general idea of the subject and is able to see the bearing of the facts observed and presented by the author. Such an introductory statement is not intended to replace the summary of conclusions with which the author should end his paper. The summary should be full and completely reasoned out, whereas the introduction should be a bald statement of general facts without proof.

SUBJECT ORDER.

The general order of treatment here recommended is applicable to a complete report on a mining district, and a paper of less scope may

well follow a similar general order, so far as it can be applied to the facts presented. The actual titles of the headings may be modified according to the varying conditions in different regions and the taste of the author, the main point being that he should have some definite order in his mind before he commences to present his facts. The general heads may comprise the following:

1. Introduction, or prefatory matter.
2. Geography and history.
3. Geology.
4. Ore deposits.
5. Detailed descriptions.
6. Conclusions and summary.

Introduction.—The introduction may comprise a statement of the conditions under which the work was done, acknowledgment of favors, and mention of previous work in the same field, the matter under this heading ending with a bibliography, if the literature on the district discussed is sufficient to warrant it. Bibliographies are more useful if the title of each paper is followed by a brief abstract of its contents.

Geography and history.—The section on geography and history should include (*a*) geographical position, including routes of approach, physiography, climatic conditions, vegetation, etc.; (*b*) history, including discovery of ore, progressive development of mines, and present condition of hoisting and reduction works; (*c*) production, including annual and aggregate output in useful metals so far as obtainable, as well as sources of information.

Geology.—The discussion of the geology should cover general geologic information with regard to the region, in the following order: (*a*) Character and composition of different rock formations in order of age, commencing with the oldest and distinguishing sedimentary from igneous; (*b*) distribution and structural relations of the formations.

Ore deposits.—The description of the ore deposits should form the principal part of the report. In this description the subdivisions suggested below may be enlarged or condensed according to the necessities of the case, but the general order of subjects should be preserved.

(*a*) General character of deposits—fissure veins, replacement deposits, contact deposits, etc.

(*b*) Ore minerals—enumeration and brief description of gangue minerals, of original metallic minerals, in order of value of metal or other distinctive feature, and of secondary minerals or products of alteration, in the same order; also paragenesis or succession of minerals, and its bearing on genesis.

(*c*) The deposits—distribution and geologic features, structural relations, primary deposition, secondary deposition and alteration of ore and country rock, distribution of ore in the deposits, age of original

and secondary deposits, value of ores and its dependence on geologic conditions, probable genesis of ores, and any other theoretical deductions that may be made.

Detailed descriptions of mines.—In the detailed descriptions of the individual mines or groups of mines the same general order of treatment should be preserved. It is well to select one or more of the principal or characteristic mines as types to be described in considerable detail. The amount of detail for the others should depend somewhat on the importance of the mines and the degree in which their deposits vary from the type.

Summary of conclusions.—The summary of results or conclusions is necessarily the last part to be written. It is good practice to make it a very concise abstract, which condenses into a few pages the main results of the whole work. This abstract may include both theoretical and practical conclusions. The former may point out the bearings of the deductions on theories of ore deposition; the latter may indicate their practical significance to the miner in working his ore bodies or in searching for new ones.

DEFINITIONS.

The following definitions of certain terms in common use are sanctioned by the practice of the Survey, and it is desirable to adhere to them in Survey reports, as a lack of uniformity in the use of such terms is liable to cause misunderstanding.

MATERIALS.

Ore.—Ore may be defined as a natural association of minerals from which one or more of the useful metals may be extracted. That profitable extraction should be possible under existing conditions is not essential. Ores that can not be profitably worked to-day may become of great economic value a year or ten years hence without any change in the character of the ore itself.

Gangue.—The term "gangue" is properly applied only to the earthy or nonmetallic minerals that are of common occurrence in ore deposits, such as quartz, barite, chlorite, fluorite, calcite, and dolomite. The practice of regarding as gangue any metallic minerals that may happen to be of no economic value is not advisable, even if they be called metallic gangue, for it permits no uniform distinction between ore and gangue.

In describing the various minerals found in an ore deposit it is well to distinguish the gangue minerals that are exogenous—those that have been brought in from some outside source—from those that are the product of alteration of the wall or country rock.

Vein material.—As a collective term to describe the aggregate of materials which make up the ore body the phrase "vein material" or "vein stuff" may be used. "Vein stone" is less desirable, for the reason that "stone" is widely used among mining men as a technical term for valuable ore, and in England "vein stone" is synonymous with "gangue."

Gouge.—Gouge or selvage is a soft, clayey material found in some places between a vein and the country rock and usually formed by the trituration of the country rock by motion subsequent to the formation of the vein. The term should not be loosely used for any soft, crushed material.

Country or country rock.—"Country" is the miner's term for the rock which incloses an ore deposit. The term "country rock" has been criticised as tautological; nevertheless, it is sanctioned by very general usage, and its use is considered advisable where the single word "country" might lead to confusion in the mind of the nontechnical reader.

FORMS.

Vein, lode, vein system.—An ore-bearing vein is a single body of metalliferous minerals occupying or following a fissure, both walls of which generally, but not invariably, are well defined. Where several veins are so closely spaced that the ground between them becomes in places ore bearing and in its whole width constitutes an ore body, the assemblage is called a lode. The term "vein system" may be used for a larger group of vein fissures, which may include several lodes. The fractures of the earth's crust that admit of ore deposition are so multiform that it is not possible to give a stricter definition. Usage may differ somewhat in different districts, but the general order from simpler to more complicated deposits will be vein, lode, vein system. The more subordinate deposits, such as little veins that cross the material included between vein walls, may be called veinlets or stringers.

Shear zone.—It is well to avoid a too general use of the term "shear zone." In one sense any vein could be called a shear zone, for its fissure was probably formed under some sort of shearing stress. The term belongs more properly to general geology, being used to define the zone along which the rocks have been sheeted or laminated by a shearing stress with some lateral movement, but which is by no means necessarily, or even commonly, mineralized. If the term is used to designate mineral-bearing fissures in general, this distinction is lost. It is therefore advisable to restrict its use to deposits formed along geologic shear zones where the resulting water channels were so irregular that they can not be defined by any of the other terms already given.

Sheeting.—The term "sheeting" or "sheeted zone" may be used where the movement has resulted in parallel fissures that have left thin sheets of country rock between them.

Bedded deposit.—As rock fractures are independent of and generally cut across the bedding, the alternative form of deposit, as contrasted with a vein deposit, is one that conforms with the bedding, and has hence been called a bedded deposit. Among miners the term "blanket vein" is usually applied to any nearly flat deposit.

Gash vein.—The term "gash vein" has been employed to describe a vein that fills joints or fissures in limestone in the lead deposits of the Mississippi Valley region. A gash vein does not extend beyond a single bed or similar rock mass.

True fissure vein.—Whitney (Metallic Wealth of the United States) used the term "true fissure vein" to describe a true vein as distinguished from a gash vein, the latter being limited in extent, whereas the former, according to him, "may be presumed to extend for an indefinite distance downward." From this statement apparently has sprung the idea common among miners that a "true fissure vein" is the most desirable form of mineral deposit, because of its indefinite extension. This is a popular delusion that it is not desirable to perpetuate; hence the use of the term should be avoided. "True vein" was the term in use before Whitney's publication, and among the earlier writers on ore deposition signified an ore body filling a fissure; hence the term "fissure vein" is in a strict sense pleonastic and should not be used in classification.

Structure of vein material.—The following forms of structure may be recognized in the material filling a fissure opening:

1. Banded structure, where the vein materials show a banding approximately parallel to the wall. This may be subdivided, according to origin, into—

(*a*) Banded structure by filling, where the filling is evidently the result of successive deposition of vein materials on the walls of an open space. If the layers are symmetrically arranged on either side of a central band containing druses with crystals pointing inward, this is called comb structure.

(*b*) Banded structure by subsequent movement, which is produced by a simple sheeting of the vein material after original deposition, and is called ribbon structure. Such movement may result in a reopening along the new plane of movement and the deposition of new material in the opening.

(*c*) Banded structure by replacement, where the original fissure consisted of a number of parallel openings separated by thin bands of country rock and where, during or subsequent to the filling of these openings, the intervening bands of country rock have been more or less completely replaced by vein material.

2. Breccia structure, where the friction breccia or dragged-in fragments of country rock constitute a considerable portion of the vein filling and the ore has been deposited in the spaces between the fragments, perhaps in more or less concentric shells or layers around them. Breccia structure may occur in any vein; hence it is not desirable to use "brecciated vein" as a term of classification.

Linked veins.—Deposits filling approximately parallel and overlapping fissures, arranged en échelon, and connected or linked by small, irregular cross stringers, are called linked veins. As the deposit pinches out on one fissure it is taken up on one of the overlapping fissures.

Stringer lode.—A stringer lode is made up of irregularly branching and anastomosing stringers or veinlets. In many lodes the rock between the veinlets is so much mineralized as to constitute ore, and the whole is worked as a single vein.

Chimney, stock.—The term "chimney" is applied to ore bodies which have not the tabular form of a vein but are rudely circular or elliptical in outline horizontally and have a very considerable vertical extent. A similar body of still greater irregularity of outline is called a stock.

Ore shoot, pay shoot.—An ore shoot or pay shoot is that part of a deposit which is rich enough to exploit. Although its outlines are not generally well defined, the shoot, as a rule, has a longer axis that forms a large angle with a horizontal plane. The inclination of the longer axis to this plane is called the plunge and is measured in a vertical plane erected along the axis. The angle made by this axis with a horizontal line, measured in the plane of the vein, is called the pitch. In an ore shoot that is part of a vein the dip of the vein and the plunge of the ore shoot coincide when the pitch is 90°. (See *Dip, pitch*, p. 36.)

The true dimensions of an ore shoot would be given by the length of its longer axis and the area of one or more cross sections normal to such axis. Inasmuch, however, as its true form can rarely be determined, it is common practice to speak of its length and width or thickness as those of a horizontal section of the body on a given level of the mine. These are evidently not true dimensions unless the longer axis of the body is strictly vertical. It is advisable to follow the usage adopted by Lindgren and Ransome in their Cripple Creek report and call the longer axis "pitch length" and the horizontal dimensions along the level "stope length."

Contact deposits.—The term "contact deposits" should be restricted to deposits which have been formed by contact metamorphism and which carry the minerals characteristic of such action. Such use eliminates from this category many forms of deposit that

have been so termed simply because they happen to occur at the contact of two different kinds of rock, without regard to their origin. Contact deposits, as thus restricted, occur mostly in limestone at or near its contact with an intrusive igneous rock. They are supposed to have been formed by gaseous or aqueous emanations from the cooling intrusive mass. They are very irregular in form and many of them are cut by eruptive dikes. Mineralogically they differ from other deposits by the contemporaneous formation of oxides and sulphides, principally of iron, and the association of the metallic minerals with the various lime-silicate minerals that ordinarily result from contact-metamorphic action. It must be borne in mind, however, that this mineral association may also result from regional metamorphism, but the resulting deposits differ from contact deposits in that the metamorphic processes have not introduced new or foreign material, but have simply altered or concentrated that which is already present.

Segregated vein.—The term "segregated vein," which has been used to define materials that have been concentrated in a sedimentary bed, would be more appropriately used for the material gathered together from a molten magma. In either sense it is not sufficiently distinctive to be used to characterize any single type of deposits.

Impregnation.—As a general rule care should be taken to avoid using the name of a process as the definition of a type of deposit. The term "impregnation," for instance, has been used by different writers in many and conflicting senses. It properly signifies the introduction of mineral substances in a finely disseminated condition into rocks, either as a filling of open spaces or as a replacement of certain minerals. To describe ore occurring in small, irregular, disconnected patches throughout the mass of a rock, "disseminated deposits" is a preferable term, for it has no genetic signification.

PROCESSES.

Metasomatism.—Metasomatism may be defined as the process by which, through chemical interchange, a mineral or an aggregate of minerals undergoes partial or complete change in chemical constitution. The term "metasomatism" is of wider application than "pseudomorphism," in that the process does not necessarily involve the preservation of the crystalline form of the original mineral. In large rock masses, as, for instance, in limestone that is metasomatically replaced by dolomite or by metallic sulphides, it often involves a change in volume, the resulting mass being more or less cavernous.

Replacement.—As a general term synonymous with "metasomatism," "replacement" is preferable to "substitution," which is a chemical term strictly defined as "the replacing of one or more elements or radicals in a compound by other elements or compounds," a re-

stricted usage to which "replacement" is not confined. Replacement may be either partial or complete, according as only a part or the whole of one rock or mineral has been replaced by another.

Alteration.—The term "alteration" applies to the partial change of substance in a rock or mineral which does not necessarily involve its replacement by another. The process is purely chemical.

Decomposition.—The term "decomposition" signifies a dissolution of a rock or mineral into its component parts, which involves a physical as well as a chemical change, and occurs most commonly during the process of weathering.

Weathering.—The term "weathering" should be confined to changes in cohesion and composition of rocks near the surface that are due to the decomposing and oxidizing action of surface waters, to variations in temperature, and to other atmospheric and surface agencies. The tendency of such changes is to destroy the rock as a geologic unit.

MINING TERMS.

In commencing the description of a mine it is well to state concisely the extent and character of the mine openings. In describing these openings the terms in general use, given below, should be employed. If a local term, not in general use, is employed its meaning should be stated.

Shaft, incline, winze, raise, chute.—The term "shaft," when not qualified, means a vertical opening starting at the surface. A shaft that follows the inclination of a vein or bed that is not quite vertical is called an inclined shaft, or simply an incline. Passages within the mine designed to connect one level with another, without reaching the surface, are called winzes if they are vertical and driven down from the level, and upraises or raises if driven upward. If they follow an inclined bed or ore body they are called inclines. Chutes or ore chutes are similar openings used only for sending ore down to a working level from stopes or higher levels.

Tunnel, adit, drift, level, lateral.—Properly defined, a tunnel is an underground drift or gallery open to the air at both ends, an adit is open at only one end, and a drift or level is a horizontal gallery that does not reach the surface. In the United States, however, the term "tunnel" has come into use among miners in a sense more or less synonymous with "adit," and in this sense it is recognized by the mining law; hence it can not be confined to its original meaning.

The following are distinctions made by some miners, which it is well to observe in writing: An adit level and a drift are galleries running on the vein or in the strike of the ore body; a tunnel is intended to crosscut several veins or ore bodies, and hence runs at an angle to their strike. A drift that runs at an angle to the strike is called a crosscut drift, or simply a crosscut. Levels are assemblages of drifts

running from stations established at certain intervals (generally about 100 feet) in a shaft, hence may include both drifts and crosscuts. A lateral is a drift in the country rock outside of and parallel to the ore body, used for tramming ore from stopes to shaft.

Dip, pitch.—Dip is the angular divergence of a bed or deposit from a horizontal plane. The term "pitch," originally used to signify the inclination of the axis of a fold from a horizontal line, has come into use among miners to express the inclination of the longer axis of an ore body or pay shoot within the plane of the vein. It should not be confounded with dip. (See *Ore shoot*, p. 33.)

Mine, prospect.—It may be difficult to decide whether a given property shall be called a mine or a prospect, and no hard-and-fast rule can be laid down to cover all cases. In general, shafts that are less than 100 feet in depth, with less than 100 feet of drifting, and that have not produced ore in commercial quantity should be termed prospects. The essential feature of a mine is the production or presence of ore in marketable quantity, but the development and equipment of some unproductive properties are so extensive and complete as to warrant the application of the term "mine," on the ground that it is less misleading than "prospect."

CHEMICAL SYMBOLS.

The following list of chemical elements and symbols is taken from a report of the international committee on atomic weights, 1909.

Chemical elements and symbols.

Element.	Symbol.	Element.	Symbol.	Element.	Symbol.
Aluminum	Al	Hydrogen	H	Ruthenium	Ru
Antimony	Sb	Indium	In	Samarium	Sa
Argon	A	Iodine	I	Scandium	Sc
Arsenic	As	Iridium	Ir	Selenium	Se
Barium	Ba	Iron	Fe	Silicon	Si
Bismuth	Bi	Krypton	Kr	Silver	Ag
Boron	B	Lanthanum	La	Sodium	Na
Bromine	Br	Lead	Pb	Strontium	Sr
Cadmium	Cd	Lithium	Li	Sulphur	S
Cæsium	Cs	Lutecium	Lu	Tantalum	Ta
Calcium	Ca	Magnesium	Mg	Tellurium	Te
Carbon	C	Manganese	Mn	Terbium	Tb
Cerium	Ce	Mercury	Hg	Thallium	Tl
Chlorine	Cl	Molybdenum	Mo	Thorium	Th
Chromium	Cr	Neodymium	Nd	Thulium	Tm
Cobalt	Co	Neon	Ne	Tin	Sn
Columbium	Cb	Nickel	Ni	Titanium	Ti
Copper	Cu	Nitrogen	N	Tungsten	W
Dysprosium	Dy	Osmium	Os	Uranium	U
Erbium	Er	Oxygen	O	Vanadium	V
Europium	Eu	Palladium	Pd	Xenon	Xe
Fluorine	F	Phosphorus	P	Ytterbium (Neoytterbium)	Yb
Gadolinium	Gd	Platinum	Pt	Yttrium	Y
Gallium	Ga	Potassium	K	Zinc	Zn
Germanium	Ge	Praseodymium	Pr	Zirconium	Zr
Glucinum	Gl	Radium	Ra		
Gold	Au	Rhodium	Rh		
Helium	He	Rubidium	Rb		

SUGGESTIONS AS TO EXPRESSION.

> Certainly it is excellent discipline for an author to feel that he must say all that he has to say in the fewest possible words, or his reader will be sure to skip them; and in the plainest possible words, or his reader will certainly misunderstand them. Generally, also, a downright fact may be told in a plain way; and we want downright facts at present more than anything else.—*Ruskin.*

GENERAL OBSERVATIONS.

No general rule as to the intellectual plane or the literary style or quality of the Survey's reports can be given. In determining these features the subject discussed, the nature of the report, and the kind of readers it will probably find should be considered. A report that is likely to be of popular interest may differ in style from a technical discussion, yet both may be written correctly and clearly, with all necessary spontaneity and naturalness—qualities that, as a rule, are the result of long practice in writing.

A careful writer will not only consider the general order of the matter of his report and its arrangement under appropriate headings, but will divide it properly into paragraphs, and will choose deliberately the subject and the subject nominative of each clause, preferring concrete terms in discussions of concrete things and beginning and ending each sentence in such a manner as to give important words and phrases the place of emphasis. He will not write very long or extremely involved sentences, nor, on the other hand, will he allow his style to be made "choppy" by a succession of sentences that are too short. He will choose words of certain, definite meaning, preferably familiar words, will arrange them in proper order, and will try to write in such a way that the reader's attention will be held by the matter of his story and not distracted by the manner in which it is told. In short, recognizing the fact that writing is an art, he will try to cultivate it, observing not only its larger demands but even its smaller proprieties, assured that the reader will reap the reward of his care and patience.

Correctness, clearness, and conciseness are ideal qualities of good scientific writing. Clearness alone is not sufficient, for a statement that is entirely clear may contain serious grammatical errors or may be expressed in terms that are not well adapted to a scientific report; and conciseness may be gained at the expense of both clearness and correctness. The attempt, however, to conform strictly in all respects to the recognized standard of correctness—present good usage—may involve tedious and inconclusive research as to points in question. Current dictionaries and grammars afford the readiest means of determining most doubtful questions, but in addition to these the Survey has provided a shelf of manuals of instruction or criticism which are at the service of its writers.

Under the following headings some of the common smaller faults appearing in the manuscripts of Survey reports are noted, with the hope that they may be avoided.

COMMON VERBAL FAULTS.

WORDS MISUSED OR OVERUSED.

The word "occur," meaning to appear or to be present, is very much employed in geologic literature, in many relations with doubtful propriety, where better words may be substituted. "Occur" is a useful word, but when Survey authors write "Trees occur on these slopes," and "The mines occur in Pope and Hardin counties," a critic may properly wish that other words had been used in these sentences.

"Data" (in many papers wrongly qualified by "this" or "much" or other term of singular number) is also greatly overused by some writers, appearing in places where synonyms can easily be found.

The verb "secure" is by many used in the sense of assure, insure, procure, obtain, or get, as well as in its other senses, with a range of meaning far too wide for scientific exactness.

"Inaugurate" or "initiate" is used for "establish" or "begin," as, "Work was inaugurated in June," "The investigation was initiated in 1908;" and "inauguration" is used for "beginning," as in the phrase "previous to the inauguration [before the beginning] of Cretaceous sedimentation."

"Limited" and "restricted" are improperly used in the sense of "slight" or "small."

"Quite" is by some writers used for "very," "somewhat," or "rather," or is used superfluously. Phrases like "quite large," "quite a distance," "quite a few" should be avoided. It is suggested that "quite" be used (if used at all) in its primary sense, to mean "entirely" or "completely," as in the phrases "quite conclusive," "not quite finished." If used generally in this sense its significance in a phrase like "white, plastic clay quite free from sand" would be unmistakable, whereas, owing to the uncertain value of the word as employed by many writers, the exact meaning of the phrase quoted is doubtful.

"Horizon" is used for "bed" or "stratum," as in the sentence "This horizon is 4 feet thick." The term "horizon" when properly used expresses only position. Instead of "This horizon is oil bearing in all parts of the field" a writer may better say, "Oil is found at this horizon in all parts of the field."

The phrase "in question" is used by some writers concerning matters that are not at all in question, as, "The lake in question," for "The lake mentioned" or simply "This lake."

The phrases "from the standpoint of" and "from the viewpoint of" are overused by some writers, who employ them in connections

where their propriety may be questioned, as, "from the standpoint of coal mining," "from the viewpoint of road building," where "coal mining" and "road building" are used for "the coal miner" and "the road builder." "From the point of view of farming" means "from the farmer's point of view;" the farmer, but not farming, may occupy a point of view. "Viewed from the standpoint of age these rocks are * * *" is a bad equivalent of "Considered as to age * * *" or, preferably, "In age these rocks are * * *."

The phrase "is responsible for" is improperly used where no responsibility is involved: "The uplift of the Ben Lomond block is responsible for this escarpment;" "An earthquake was responsible for this fault;" "A flood in the eighties was responsible for this damage."

Adverbs or adverbial phrases that by a strict definition should apply to time—such as "sometimes," "at times," "frequently"—are by some writers used instead of words or phrases denoting place. Examples: "Pyrite is less common than marcasite, although it does occur at times, as, for instance, at the H. P. mine;" "This sandstone is usually gray but sometimes red in color;" "This rock is sometimes soft and sometimes well consolidated." The sentence "These crystals are sometimes an inch in diameter" was intended to mean "Some of these crystals are an inch [or "as much as an inch"] in diameter." The sentence "These terraces are frequently covered with gravel" was written to convey the idea that certain terraces of a group are now covered with gravel, not that frequent floods cover all the terraces with gravel; the idea in the writer's mind can be readily expressed by the sentence "Many of these terraces are covered with gravel." "These fissures often intersect" was written to mean "Many of these fissures intersect." "The surface is now hilly, now smooth" might with advantage have been "here hilly, there smooth." As some writers find it difficult to avoid the use of words expressing time for words expressing place or number, the subjoined list of substitutes may be helpful. It should be understood, however, that these substitutes must be used with discrimination, care being taken to select one that will convey the meaning.

Sometimes: Some of; in some places (or localities); in places; locally. *Usually:* As a rule; in general; generally; commonly; for the most part; mostly; mainly; chiefly. *Often* or *frequently:* Many of; in many places; much of. *Frequent:* Abundant; common; numerous; many. *Occasionally:* Locally; in places; here and there; some of. *Seldom* or *rarely:* Few of; in few places; generally not; little of. *Never:* Nowhere; none of. *Always:* Invariably; everywhere.

The words "cases" and "instances" are used for "places" or for other words, or are used superfluously. "In many cases these well records have been carelessly kept" probably means "Many of these well records have been carelessly kept." In the sentence "This coal

has been measured in several instances," "instances" is used for "places." "Sometimes these reservoirs are lined with clay; in other cases they are unlined" is equal to the simpler statement, "Some of these reservoirs are lined with clay; others are unlined." "In certain cases these sink holes have been utilized by farmers as water reservoirs" means "Some of these sink holes * * *." The following sentences, quoted from manuscripts submitted for publication, contain undesirable "instances" and "cases:" "In some cases there are instances of faults." "In no instance was the displacement greater than in this case." "Instances of gradation from one phase to the other are not common, but do, in rare instances, occur." "Other cases of flowing wells are common." "Instances of similar deposits were noted in several other cases." An author who had learned to make clear, simple, direct statements would have written instead of the last sentence, "Similar deposits were noted elsewhere," or "Similar deposits were observed at other places."

A "proposition" is something proposed. The expression "a good commercial proposition" for a business venture that is likely to be profitable is newspaper slang that should have no place in a scientific report. "The project will probably pay" is shorter and better than "The project is a good commercial proposition."

"Former" and "latter" are convenient terms that are liable to be overused. They should not be employed in a sentence that is so long and involved that the reader will have to look back to find what the words mean. As a general rule it is better to repeat the words to which they refer. Of course "former" and "latter" can not be used if there are more than two antecedents. By some writers these words are used unreasonably, as in the sentences "This lake, as well as Snowy Creek, drains into the Youghiogheny, *the latter carrying* [which carries] more or less drainage from adjacent farms;" "One of the purposes of the reconnaissance was to examine certain prospects containing ores of uranium and vanadium, and it is to *the latter* [these ores] that this report is confined." (The context shows that the phrase "the latter" means the ores of both uranium and vanadium.)

"While" is too much employed by many writers, being used for "although," "whereas," "but," and "and," as well as in its primary time sense. Where it is a simple connective, carrying no idea of contrast or concession, it can advantageously be replaced by "and" or a semicolon. Instead of "The strike is N. 40° E. while the dip is 10° NW.," write "The strike is N. 40° E.; the dip is 10° NW."

"In the vicinity of" or "in the neighborhood of" are unnecessarily used for "about" or "nearly," as in the following sentences: "The cost of production is in the vicinity of 50 per cent of the selling price;" "Its population is in the neighborhood of 1,500." "Something like half a mile" shows a similar fault.

"Following" is undesirably used for "after," as in the sentences "Following this there was a second period of uplift;" "Following the completion of this work nothing further was done."

WORDS AND PHRASES TO BE DISCRIMINATED.

Terms of compass direction—as "west," "western," "westerly," "westward," "westwardly"—are by many writers used indiscriminately. "Five miles westerly from this place" is not so good as the familiar form "Five miles west of this place." The adverb "westward" means toward the west, or in a general westerly direction, the suffix "ward" having here its usual value, as in "homeward," "seaward," "skyward." In the clauses "This extends for an indefinite distance westerly" and "The stream here turns westerly" the word "westerly" may better be "westward." In like phrases some writers use undesirably not only "westerly" but "westwardly" and "to the westward," and even "toward the westward." On the other hand, in such sentences as "Clay is abundant in this formation at Newton and westward" and "The dip diminishes westward," the adverb should be replaced by "farther west" or "to the west."

A similar variety of form is seen in phrases like "the southeast [or southeastern] corner of the quadrangle." Either of the terms here given may be admissible, but it is desirable that throughout a single paper such words should be used uniformly or consistently, or according to some principle or method. Indefinite or general terms of broad application may perhaps end in "ern," as, "in the western part of the State;" terms of definite designation need not, as, "on the south bank of the stream," "in the northeast corner of the quadrangle."

In some manuscripts the terminations "ic" and "ical" are used indiscriminately, as, "topographic, topographical;" "geologic, geological;" "petrographic, petrographical;" "paleontologic, paleontological." Uniformity is desirable in a single paper, and the prevailing tendency is toward the shorter form.

By some writers "watershed" is used in the sense of "drainage basin," but as "watershed" primarily means the divide separating one drainage basin from another and is generally used with that meaning the use of this word in two senses results in uncertainty and confusion. It is therefore suggested that "watershed" be used for the divide and "drainage basin" for the area drained. The use of "drainage" for "drainage basin" should be avoided. The use of "watershed" in the sense in which it is employed in the following sentence should also be avoided: "These hills form a divide between watersheds that flow east into the Tennessee and west into the Mississippi."

"Apparently" is by some writers used for both "seemingly" and "obviously," words of opposite or widely different meaning.

"Between" and "among," "each other" and "one another," "beside" and "besides," "balance" and "remainder," "economic" and "economical" may be wisely discriminated.

The adjective "due" may be misused for the participle "owing" and "owing" may be misused for "due," as in the sentences "The Whittier school was injured by the earthquake, due to the fact that the building stood on made ground;" "The injury was owing to the earthquake."

It should be noted that "admit" but not "permit" may be followed by "of."

"Something" is used for "somewhat," as in "something more than 5 miles;" "similar" is used for "the same," as in the phrases "a similar distance," "a similar height," and "the same" for "similar," as in the sentences "The same rocks form the foot wall of the Jumbo vein, a thousand feet to the east," "The same gravels are seen at Norwood, 2 miles farther south;" "vary" is used for "differ," as, "The wells vary in depth;" "evidenced" (a word to be avoided) is used for "evinced," "shown," "indicated," or "proved."

Distinction may be made between the prepositions "in" and "into" in phrases like "comes into contact" and "lies in contact." No clear distinction can be made between "on" and "upon;" the tendency is toward the use of the shorter form. "By" and "with" in phrases like "was covered by ice" (agency), "is covered with ice" (condition), may perhaps be discriminated, but no general rule can be formulated for the use of these prepositions. "With" is much misused, especially for "and." An example of its misuse is seen in the sentence "At San Marcial the average rainfall is 4.84 inches, *with a* [and the] minimum *of* [is] 1.17 inches."

"Over" is used in many phrases where "more than" would be preferable, as it obviously would be in the sentence "This coal is under the Lee conglomerate and over 4 feet thick."

SUPERFLUOUS WORDS.

The word "found" intrudes without reason in phrases like "These rocks are found exposed at many places" and "The principal lakes found in this region." In the sentence "These lands *are known to* contain valuable deposits" the words in italic may be easily spared. "Known to be," "found to be," and "seen to be" are generally superfluous, as in the sentences "The St. Peter sandstone is *known to be* jointed in places;" "In this region the deposits are *found to be* more arenaceous." On the other hand, these phrases may be improperly omitted where they are required to complete the sense of a statement, as, "Under the microscope the grains of sand are [seen to be] completely coated with iron."

After phrases following "for instance," "for example," "such as," and like expressions "etc." is not only superfluous but improper, as

in the sentences "Deposits of this type occur in several mines of the district; for example, the Telegraph, Commercial, Old Jordan, *etc.*;" "The solution contained mineralizers, such as fluorine, boron, *etc.*, in limited amount."

Superfluous and improper words are italicized in the following sentences and phrases:

"A series of broad, parallel ridges resembling in *their* form and distribution * * *." "Throughout the *entire* area." "This kind of *a* deposit." "This was designated *as* barren ground." "They are *both* alike." "There can be no doubt *but* that it is Cretaceous." "The steamer brings mail and freight to the *different* towns in the region." "Equally *as* well." "The Survey has not *as* yet done any work in this region." "The problem is *a* difficult *one*." "This field is *located* 3 miles north of Bristol."

The use of two prepositions together is awkward and as a rule unnecessary. The expression "a thickness of 2 to 4 feet" is displacing "a thickness of from 2 to 4 feet." Prepositions are doubled badly in the following sentences: "They are in, in fact, in some instances;" "The cost of thawing is reported at from 9 to 12 cents a yard;" "This is equivalent to coal at at least $18 a ton." In the sentence "The water rises to [or "comes to"] within 10 feet of the surface" the "to" is redundant and improper.

SOME TYPICAL ERRORS.

The following quotations from manuscripts submitted to the Survey for publication contain some typical errors and afford examples of thoughtless and careless writing:

"With few exceptions this township is well wooded."

"These two deposits probably succeeded each other only after a lapse of time."

"As one goes south the land slopes downward."

"This was expected to be found * * *."

"This fault extends along the border of the valley until about 5 miles north of Richfield."

"Just west of the map."

"This plain connects with that described in the Driftless Area."

"The great majority of the rock quarried here * * *."

"This placer seems similar to the conditions prevailing farther upstream."

"Numerous large bowlders are abundant."

"The thickness of the residual soil varies considerably, and it is at some times of no thickness whatever."

"At this place there are two deep wells, which flow 2 and 3 gallons per minute, respectively."

"The resemblance is not so close as to be called identical."

"This coal bed is divided by 0 to 2 inches of bone."

"Observations covering some time were made."

"This exposure occurs shortly below Eureka."

"This is the only town of any size in the area."

"The project will cost *upwards of* [more than] a million dollars."

"*A large per cent* [A large proportion, or Most] of these pebbles are well rounded."

"About 200 feet long and 3 feet *in width*." [3 feet wide; to agree with "long."]

"The slopes of the western part of the Rio Grande region are much more varied than *they are* [those that lie] east of the river."

GRAMMATICAL AND RHETORICAL ERRORS.

Few writers, fortunately, need to be cautioned against making statements like "Lake Superior is the largest of any lake in the United States," or "The timber in this area is the least marketable of any in the region," but as these sentences are quoted from manuscripts of Survey reports they show that errors of an elementary nature may be committed by some authors.

The "hanging participle," another elementary error, a violation of the rule of grammar that a sentence beginning with a participle should include the substantive to which the participle relates, is common enough to justify the citation of a few bad examples: "Recognized as a bureau of information, the services of two men are required to answer questions relating to topography alone." "Going westward the dip becomes steeper." "Looking closer chatter marks were seen." "Examined carefully no fossils were observed." "Hurrying coastward the goal was soon reached." "Approaching the vein through the tunnel the serpentine is seen to be decayed." The same fault is seen in the following sentences: "Not satisfied with this result, the well was drilled deeper." "When fully explored other workable coal beds may be found here."

The phrase "and which [or who or whose]" requires a preceding relative to justify the "and." If none can be supplied the connective should be omitted and the sentence may need to be rearranged. In the sentence "This formation, a thick mass of shaly sandstone, and which preserves its character throughout the area" the "and" is redundant and improper and should be omitted, or the sentence might be written "This formation, which is a * * * and which * * *."

The "split infinitive" should be avoided unless its avoidance involves the use of strange or unusual forms of expression. "Splitting" may be required for clearness or for emphasis.

Adverbs and adverbial phrases are by some writers commonly misplaced, especially the adverb "only," which should be placed as near to the word it qualifies as the proper construction of the sentence will

permit. The sentence "Their presence can only be determined by actual tests" contains a misplaced "only." Phrases beginning with prepositions also become misplaced, as, "Under such conditions it is easy to see that the commercial development of these deposits * * *." "In 1909 it is probable that this region may be reached by railway."

Verbs that should be auxiliaries are by some writers used as principal verbs, as, "The copper produced in Montana is [derived] almost entirely from the mines of Butte." "These explorations were [made] for military purposes." "This work was [done] for the State Survey." Note also, "The work done was under the supervision of Thomas Brown" for "The work was done under * * *."

The use of "are" with a singular predicate and of "is" with a plural predicate is awkward: "The stony matter is largely angular blocks of limestone." Better: "The stony matter is made up largely of angular blocks of limestone."

The reflexive pronoun "myself" should not be used for "I" or "me:" "Long, Williams, and myself held a consultation;" "The place was named by myself."

The following sentences show undesirable transition from active to passive verbs: "These creeks flow through broad valleys until [they reach] the brink of the Clealum Valley *is reached.*" "Water absorbed at the surface percolates downward until [it reaches] the zone of saturation *is reached.*"

"The coal ranges in thickness from 0 to 6 feet" and similar phrases appear in some papers. Careful writers avoid such expressions. The sentence quoted may be rewritten: "The coal ranges from a feather edge [or "a knife-edge," or, better, perhaps, "a thin film"] to a bed 6 feet thick."

The repetition of some particular word in a sentence may be undesirable, but the attempt to avoid this well-known fault should not lead to the substitution of a synonym in a place where the word first used should be repeated, as in the sentence "Its scientific part forms the basis of its economic portion."

There is no generally accepted difference in meaning between "partly" and "partially" in the sense of "in part," but as "partially" has also the meaning "with partiality," the shorter form may be preferred.

The formation of plural nouns from adjectives, as "sedimentaries," "crystallines," "Paleozoics," "volcanics," "pyroclastics," "alluvials," is undesirable.

"Not so large a deposit" is better than "not such a large deposit."

"Excepting" is, as a rule, not so good as the shorter word "except."

Parenthetical phrases should be made as brief as possible.

The use of a verb plus a preposition to express an idea that may be conveyed by some other verb alone may lead to the undesirable doubling of prepositions: "This can be dispensed with with advantage" ["can be spared with advantage"]. "The conditions met with in the field" ["prevailing," "seen," or "observed"]. "A large production is not to be looked for from these gravels" ["expected"]. "Placer mining has been carried on on this stream."

It is better not to "carry along" a singular verb to a second subject in the plural nor a plural verb to a second subject in the singular: "The region was uplifted and the streams [were] rejuvenated."

The distinction between the pronouns "which" and "that" should be borne in mind, though critics may differ as to its importance. "That" is the "restrictive" pronoun, to be used where the clause that it introduces is necessary to complete the meaning of its antecedent; "which" introduces some added or incidental information, which is not needed to complete the sense. This distinction is illustrated in the foregoing sentence. Rigid adherence, however, to this distinction need not be required. "Which" may be substituted for "that" without impropriety, though "that" can not take the place of the relative "which." As a rule the use of "that" in restrictive clauses makes the meaning clearer.

"Whose" may be used for things as well as persons, as, "The only State whose production exceeded * * *."

"Here 20 feet of sandstone is exposed" or "20 feet of sandstone are exposed" may both be defended, perhaps, but the singular form is generally used.

Care should be taken in the use of "it;" there should be no uncertainty as to the noun to which it refers, and the use of this word in two senses in the same sentence should be avoided. Some bad examples follow:

"Owing to the lapse of time between the storm and the collecting of the information it is incomplete." "It should be noted that it is very near it." "The water found here, coming through the gravel beds, is cool, clear, and delicious, and the natural drainage renders it a most desirable place of residence." The inventor of a new feeding bottle for infants sent out the following among his directions for using: "When the baby is done drinking it must be unscrewed and laid in a cool place under the hydrant. If the baby does not thrive on fresh milk it should be boiled."

FOREIGN WORDS AND PHRASES.

Foreign words and phrases are by many writers unnecessarily used where suitable English words can be employed. Among these words and phrases are videlicet (viz), id est (i. e.), exempli gratia (e. g.), rôle, débouchure, in situ, brochure.

SPECIAL POINTS.

As numbers are not printed in figures at the beginning of a sentence it may be desirable to avoid placing them first. In the sentence "Four thousand eight hundred and fifty tons was produced in 1906 and 5,180 in 1907," convenience of comparison, if no other consideration, would require that both quantities be expressed by figures.

Arrangements of figures or numbers shown in the examples that follow should also be avoided: "This makes the total mileage of levels run in 1906, 212,149 miles;" "In 1906, 464 tons was produced."

According to the general American practice a single initial is not used before a personal name: "John Smith," not "J. Smith;" but "J. W. Smith."

DIRECTIONS TO TYPEWRITERS.

Typewriters who are engaged in preparing matter that is to be printed should read carefully the foregoing suggestions to authors and familiarize themselves with such as are pertinent to their work. Especial attention should be given to the sections headed "The best printer's copy," "Table of contents and list of illustrations," "Tables," "Geographic names," "Hyphens in petrographic terms," "Quotations and references," "Footnotes," "Typographic style," and "Correction of proof sheets." They should also examine recent Survey publications, noting the style of contents, footnotes, and other details, and conforming their writing to that style. A few additional hints and some repeated directions are given below.

Use ordinary letter paper (about 8 by 10½ inches), not foolscap, and leave a margin of at least an inch at top of page and of at least half an inch at bottom. For the printer's purposes it is desirable that every page should begin with a paragraph. Temporary page numbers should be placed at bottoms of sheets.

Title of paper should appear not only on title-page, but at top of first page of text, with author's name below it. The title-page, of which two identical copies should be made (one to be used as "copy" for the cover), should contain only the title of the paper and the author's name, written within a vertical space of about 3 inches, at the center of the page.

In table of contents, which should be headed "Contents," write main heads "flush"—that is, start them at the left margin of the writing; indent the others 5, 10, 15, or 20 spaces, according to their relations. Capitalize in the table of contents only such words as would be capitalized in the text. Use leaders to page numbers (see p. 8), which should be given, the pages being those on which the headings appear in the manuscript. If page numbers can not be supplied when the table of contents is written they may be inserted later.

In list of illustrations, which should be headed "Illustrations," use short titles only. Use capital and small letters, leaders, and page numbers as in contents. In this list write Plate and Figure in full, but write these designations with the first plate and figure only. Observe and follow style of recent printed Survey reports. Make separate list for full titles, containing explanations of details.

For all headings in text use capitals and lower-case (small) letters. The relative rank of the headings should be shown by indention in the table of contents (see p. 8); it is not necessary in either contents or text to underscore or number the center headings to indicate their rank. Side headings should be underscored in the text for italic, with period and dash after each heading. (See italic side headings in this pamphlet, pp. 24–36.)

Write quoted matter or extracts of more than three lines "solid"—that is, with but half the usual space between the lines. Write all other matter openly, with usual space or more.

Write each footnote in the line immediately below the line of text in which the reference mark occurs, separating it from the text above and below by lines running across the page; but do not break the text at the reference mark if it comes in the middle of a line.

For reference marks use "superior" lower-case letters, underscored for italic, as ^{a}, ^{b}, ^{c}, not asterisk (*), dagger (†), etc., nor figures (^{1},^{2}).

Follow Webster's International Dictionary in the use of hyphens, but observe especially the rules for the use of hyphens in petrographic terms and the accompanying list of names on pages 11–14. Note also the hyphens used in the list of words on page 19.

Use a comma after the word preceding "and," "or," or other connective in a series of three or more words or phrases like "clay, sand, and gravel;" "the upper coal is 21 inches thick, the parting 12 inches, and the lower coal 18 inches." Use a semicolon before "and" if the other members of the series are separated by semicolons.

References in parentheses to pages or illustrations should be inclosed within the sentence unless "See" is used: "Shown on the map (Pl. VI);" "the accompanying diagram (fig. 6);" "referred to in another place (p. 72)." "The limestone is dolomized here as at some other places. (See p. 42.)" Use "p.," "Pl.," and "fig." for page, Plate, and figure in parentheses, as shown above, but write in full in text: "This is described on page 53." Note also: "Shown *in* [not *on*] Plate XVI." Use "on" only with reference to a map.

Observe that every table and section is provided with a heading, which should be underscored for italic, and observe also that units of measurement (as feet, inches, pounds, tons) are written at heads of columns of figures representing such units. If dimensions are given in feet and inches use the form "Ft. in." for the units.

Use etc., not &c. nor et cetera.

Observe the general rules given on page 18 for use of figures and of words to express numbers.

Write "one-half mile" or "half a mile," not "a half mile" nor "½ mile." Spell out fractions that stand alone, as "one-half," "three-fourths;" but write "3½," "1¾," where the fraction does not stand alone but is joined to a whole number.

Typewriters using keyboards bearing no figure 1 should use lower case l for this numeral. If capital I is used confusion results, Vol. II appearing instead of vol. 11, for example.

Write 16 by (not x) 24 inches.

Use arabic numerals except for plate numbers.

Observe the directions given on page 17 in regard to capitalization and note the list of abbreviations of names of States and Territories given on page 18.

Use B. t. u. for British thermal units, c. c. for cubic centimeter, sp. gr. for specific gravity, F. for Fahrenheit, and C. for Centigrade where it is necessary to abbreviate these terms.

Write June 20 (not June 20th), but the 20th of June.

Write 2d and 3d, not 2nd and 3rd, for the abbreviations of second and third.

Note carefully the following "Don'ts:"

Don't capitalize any words except proper nouns or proper adjectives in text, table of contents, list of illustrations, italic side headings, or legends or titles for illustrations.

Don't use comma or period at end of line of matter that is followed or should be followed by leaders. (See sample table of contents, containing leaders, given on p. 8.)

Don't underscore foreign words for italic.

Don't underscore names of fossils when they are arranged in lists or in tables. Those in the text should be underscored.

Don't attempt to put footnotes at bottom of page.

Don't paste sheets together except to make a table that must be wider than letter paper.

Don't write anything "solid" except literal extracts or quotations.

Don't rewrite matter for the purpose of filling a sheet with typewriting. The printer will not leave blank spaces where they may happen to occur in "copy." The rules that apply to letters in this respect need not be applied to manuscript intended for printing. The presence of erasures or of plainly written interlined words or phrases may be tolerated, and pages containing these need not be rewritten. A complicated table that has been prepared in ink need not be typewritten if the writing is plain in every part, but fine, crowded writing or pale blueprints can not be accepted. The prime requisite is that the matter should be clearly legible.

Don't crowd *anything* to economize paper. It is impossible to make "copy" too plain, and room must be left for editorial marking. This applies to tables and footnotes as well as to text.

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