SUGGESTIONS TO AUTHORS

OF

PAPERS SUBMITTED FOR PUBLICATION BY THE UNITED STATES GEOLOGICAL SURVEY

WITH

DIRECTIONS TO TYPEWRITER OPERATORS

BY

GEORGE McLANE WOOD, Editor

DEPARTMENT OF THE INTERIOR
Franklin K. Lane, Secretary

UNITED STATES GEOLOGICAL SURVEY
George Otis Smith, Director

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NOTE.

The first pamphlet containing suggestions to authors of manuscripts 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 and much additional material has been incorporated in the pamphlet here presented. The first edition of this pamphlet was published in 1909, the second edition in 1913. The edition now published contains some new material and discusses in greater detail several suggestions made in the first and second editions. In the compilation of all three editions valuable aid has been rendered by Mr. Bernard H. Lane, assistant editor.

G. M. W.

JUNE, 1916.

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ADDITIONAL COPIES

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SUGGESTIONS TO AUTHORS.

By GEORGE MCLANE WOOD.

GENERAL REQUIREMENTS.

Suggestions as to the form and character of geologic field notes are given in the Survey's "Handbook for field geologists," on pages 45–60. Though his field notes may with advantage include carefully written descriptions that can be transcribed literally into the manuscript of his report, the geologist should generally not attempt to dictate offhand from his notebook with the intention of rearranging and polishing the typewritten matter thus obtained to form a final report but should study and classify his notes and material before he begins to write. He should also remember that the facts he desires to express may be presented to the reader not only by the text but by geologic sections, tables, diagrams, or maps, as well as by halftone plates produced from photographs. Some complex relations can be best shown by a diagram or a map, which should, of course, be supplemented in the title or legend or in the text by all necessary explanation.

The author's preliminary study of material should include the examination of specimens and samples collected in the field and the preparation of maps, sketches, and photographs for illustrations, and it may involve the reexamination of earlier reports, which should have been freely consulted before the field work was begun. He should at the outset carefully consider the general arrangement of the matter of his paper. The notes, memoranda, and extracts made in his preliminary study should be sorted and classified under the subject heads adopted, which should be set down in proper order in a provisional table of contents.

Before preparing a paper for publication an author should examine the Survey's printed reports on like subjects or areas and familiarize himself with the details of their form, many of which are set forth in this pamphlet. Special suggestions as to the preparation of reports on mining districts, paleontologic papers, and geologic folios are given on pages 30–46 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 elsewhere in this pamphlet, which apply to all Survey publications.

The title of a paper should be as brief as it can be made and, with the name of the author, should appear not only on the title-page but at the top of the first page of text.

It is generally not necessary to use the term "chapter" as a heading for the divisions of a report, nor is it necessary to prefix numbers to headings.

The use of numerous cross references, especially references to "another part of this paper" or "a subsequent connection," is not desirable. It is better to cite the heading over the matter to be indicated or to restate briefly the facts to which allusion is made. It may be necessary to give, in another connection, a statement that has already been made or that is to be made farther along in the report, but such a statement should not generally be accompanied by a phrase like "as has been noted earlier," or "as will be explained later," especially as "earlier," "later," and like terms indicating past or future time do not well apply to places in a book in which they are used. References to another part of a report should preferably give page or pages by number, but page numbers can be supplied only when the paper has reached the stage of page proof, and such references should be reduced to a minimum.

Every paper should include a preface by the chief of the division or section in which it originated, a summary of its principal results or conclusions, and a bibliography of the subject or area discussed. An annotated bibliography, in which the title of each book or paper listed is followed by a brief summary of its contents, may be preferable to a mere list of titles, but the annotations should be skillfully prepared and should emphasize the parts of the works listed that are especially pertinent to the subject or area under consideration. Citations in a bibliography should be written in the style prescribed for footnotes on pages 21–29.

The author should read carefully the final draft of his report—the completed manuscript—before he submits it to the chief of his section or division.

Every paper should be transmitted to the Director by the chief of the branch in which it originated, whose recommendation for its publication will be regarded as an approval of its scientific or technical features. If a paper originating in one branch contains matter pertaining to the work of another, the chief under whom the paper originated should, before transmitting it to the Director for publication, refer it to the chief of the other branch for approval (after revision if necessary) of that part of it which pertains to the work of his branch.

All Survey manuscripts are prepared for the printers by the editors and editorial clerks in the section of texts. The editorial work includes the examination of the character and gradation of headings, the form of footnotes, the use of geographic and geologic names, the form of tables and sections, and the various features of typographic style—such as sizes and styles of type, capitalization, punctuation, and spelling—as well as many other details. (See pp. 100–107.) Much of this work is done according to prescribed rules, such as those of the Government Printing Office Style Book, or mandatory decisions, such as those of the United States Geographic Board or of the Survey's committee on geologic names.

The editorial work includes also suggestions to the author concerning the arrangement of matter, paragraphing, the correction of faults or errors in grammar or rhetoric, and other features, such as are discussed under the general heading "Suggestions as to expression" on pages 50–98 of this pamphlet.

After editorial revision the manuscript will be returned to the author in order that he may examine the suggestions or corrections made. If any of the editorial changes seem to him to be undesirable he should confer or correspond with the editors and endeavor to reach an agreement without delay. If the edited manuscript is acceptable to the author he need only write "O. K.," 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. A carbon copy of the manuscript should be made and retained by the author, and the original (not the carbon) should be transmitted for publication. The sheets should be of uniform size, and the typewriting should be on only one side of the paper, in lines rather wide apart, not "single spaced." 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. If new matter is inserted it should be written on a separate sheet, and the sheet in which it is to be inserted should be cut apart at the proper place and each part pasted on a blank sheet of regular size. It is not necessary to fill every sheet completely 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 the whole of a table need not appear on one sheet. Matter for

bibliographies or other similar works may be written on cards, and large sheets bearing tables or geologic columns that can not conveniently be condensed will be accepted as copy.

Temporary numbers may be placed at the bottoms of the pages, but 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, but should generally be transmitted at the same time.

TABLE OF CONTENTS AND LIST OF ILLUSTRATIONS.

The manuscript should include a table of contents (headed "Contents") and a list of illustrations (headed "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 approved method of indicating (by indention) the rank and relations of the headings that appear in the text.

CONTENTS.

The page numbers to be given as indicated should be those that have been finally assigned, after the manuscript is complete. Only words that should be capitalized in the text should be capitalized in the table of contents.

In classifying the illustrations for his report into plates and figures the author should remember that the plates will consist principally of colored maps, other maps larger than a single page, and halftone views reproduced from photographs, and that the text figures will be reproductions of sketch maps and other line drawings. The list of illustrations should contain only brief titles. Two copies of this list should be furnished—one for use in editing the text and one (a carbon copy) for use in preparing the drawings for the illustrations. This list should show the number of the page of the manuscript on which each illustration is described or first mentioned. (See specimen list of illustrations below.) The full title and explanation of every figure will be printed below it in the report and should be written in the manuscript of the text at the place where the figure will appear; the titles and legends of the plates will generally be printed on the plates themselves and should not be written in the manuscript of the text. Descriptions of plates showing fossils, photomicrographs, and similar objects, if too long to be printed on the plates themselves, are printed on pages facing the plates. Such descriptions, written on separate sheets, should be furnished with the manuscript. Full titles for all plates (except as just indicated) must be given in a separate list of plates, which should accompany the manuscript, to serve as "copy" for the printers when they set the type below the illustrations. A carbon copy of this list should also be furnished, for use in preparing the illustrations. A typical list of illustrations is given below:

ILLUSTRATIONS.

It should be noted that the words "Plate" and "Figure" are each written only once, that the numbers are aligned as shown, and that only such words as would be capitalized in the text are capitalized in the list.

To recapitulate, the author should furnish four lists of illustrations—one complete list with short titles, such as the list given above, one list of plates containing full titles and all necessary explanations, and a carbon copy of each of these two.

HEADINGS.

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 on page 10. 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.

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 are 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, and the word or words that immediately follow a side heading should preferably not consist of a mere repetition of the heading itself. 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 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 noun. The use of adjectives alone for headings (as "Topographic," "Geologic," "Historical") is undesirable.

Headings should preferably indicate the thing or things described or discussed in the text, not the text itself; the italicized words in the following quoted headings are therefore superfluous: "*Description of the* Cretaceous rocks," "*Discussion of* ore deposits," "*Statement of theories of* origin of the ore," "*Description of* the mines," "*Table showing* lead produced in 1915." The heading "General features," if it is applicable, is preferable to "General statement." Headings like "Introduction" and "Summary" are exceptions to this rule, but some reports contain too many headings of this kind, especially "Introduction," which stands over numerous subordinate groups of paragraphs in the body of many reports and can with advantage be replaced by headings denoting the features considered in the text beneath them. One "Introduction" and one "Summary"

are enough for a single report. If a summary of one of the subdivisions seems desirable the heading should be so worded as to indicate the subject discussed—for example, "Summary of conditions affecting ore deposition."

GEOLOGIC NAMES.

All geologic names are considered by the Survey's committee on geologic names before they are printed in a publication of the Survey. As it is necessary to obtain that committee's approval of the particular use in any paper of names of members, formations, groups, series, systems, epochs, and periods, even if only casual references are made to them, the committee examines the manuscript and also such illustrations as bear geologic names. This examination should be made before the paper is transmitted for publication. A few of the general decisions of the committee and some other pertinent matter are given below.

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

Geologic eras, periods, systems, epochs, and series.

Era.	Period or system.	Epoch or series.
Cenozoic	Quaternary	Recent. Pleistocene (replaces "Glacial").
	Tertiary	Pliocene. 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 (or Upper Cambrian). Acadian (or Middle Cambrian). Waucoban (or Lower Cambrian).
Proterozoic	Algonkian...\pre-Cambrian. Archean...../	

The symbols used on maps to indicate the periods or systems are given below.

Q Quaternary	Tr Triassic	O Ordovician
T Tertiary	C Carboniferous	Є Cambrian
K Cretaceous	D Devonian	A Algonkian
J Jurassic	S Silurian	AR Archean

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" (Permian and Triassic rocks of the West).

The foregoing decisions are not intended to preclude the use of coal measures, calciferous, lignitic, magnesian, and red beds as common nouns or adjectives. Use the forms glacial, preglacial, postglacial.

The adjectives upper, middle, and lower, when used with Carboniferous, Tertiary, or Quaternary, should not be capitalized unless the term is quoted. When used with the names of 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: 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) reports of the Census of the United States, (4) United States Postal Guide, (5) United States Land Office maps, (6) Century Atlas of the World and Century Dictionary of Names.

Names whose form is doubtful and proposed new names should be submitted to the Geographic Board for determination. As the board must consider evidence in passing on new names time must be allowed for its action; the names should be submitted as long as possible before the report is to be transmitted for publication.

"The" should be omitted before full names of rivers, creeks, and runs (as Green River, Missouri River, Pohatcong Creek, Fourmile Run), but "the Mississippi," "the Potomac" are acceptable terms for designating rivers. For other features of geographic names see pages 100–102.

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. If a name is used only as an adjective, as in potash feldspar, it is not followed by a hyphen.

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

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

greenstone conglomerate
greenstone schist
grünerite-magnetite schist
haüynite phonolite
hornblende andesite
hornblende andesite agglomerate
hornblende andesite porphyry
hornblende-augite andesite
hornblende-biotite-quartz latite
hornblende gneiss
hornblende granite
hornblende-mica andesite
hornblende-mica diorite
hornblende-mica granite
hornblende peridotite
hornblende-quartz andesite
hypersthene-augite andesite
hypersthene gabbro
ilmenite norite
keratophyre tuff
labradorite-bytownite
latite-andesite
latite-phonolite
leucite absarokite
leucite basalt
leucite basanite
leucite granite porphyry
leucite tephrite
leucite 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
natrolite phonolite
nepheline basalt
nepheline-melilite basalt
nephelite basalt
nephelite basanite
nephelite felsite
nephelite syenite porphyry
noselite-leucite tephrite
noselite sanidinite
olivine andesite
olivine-augite andesite
olivine diabase
olivine melaphyre
orthoclase gabbro
orthoclase gabbro-diorite
picrite porphyry
plagioclase basalt
plagioclase gneiss
potash feldspar
pseudoleucite syenite
pyroxene andesite breccia
pyroxene-biotite andesite
pyroxene-mica andesite
quartz-augite diorite
quartz-augite syenite
quartz-biotite-garnet gneiss
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 porphyry
quartz norite
quartz norite gneiss
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-lime feldspar
soda microcline
soda minette
soda orthoclase
sodalite syenite
sodalite tephrite
syenite-diorite porphyry
syenite felsophyre

syenite-monzonite	trachyte-andesite
syenite porphyry	trachyte tuff
talc schist	tridymite trachyte
tephrite tuff	tuff-agglomerate
theralite porphyry	tuff-breccia
tourmaline-biotite schist	uralite diorite
tourmaline granite	zoisite-hornblende diorite

Expressions like "granite-syenite contact" should be avoided, as the hyphen seems to indicate a single rock. Say "granite and syenite contact" or, preferably, "contact of the granite and syenite."

TABLES AND "LEADER WORK."

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, below the heading, in the form "[W. F. Hillebrand, analyst.]" It is not necessary to number tables unless the numbers are needed for convenience of reference in other parts of the text. If they are numbered, arabic numerals should be used, as Table 1 (not Table I, nor Table No. 1).

A typical geologic section is given below:

Generalized section of formations in Ouachita Mountains, Ark.

	Feet.
Carboniferous: Stanley shale	6,000
Unconformity.	
Age unknown:	
Fork Mountain slate	100
Arkansas novaculite	800
Missouri Mountain slate	300
Probable unconformity.	
Ordovician:	
Blaylock sandstone	1,500
Polk Creek shale	100
Bigfork chert	700
Stringtown shale	100
Unconformity.	
Ouachita shale	900
Crystal Mountain sandstone	700
Probable unconformity.	
Age unknown: Collier shale (observed thickness)	200
	11,400

Note that the section is "right side up" (or top side up)—that is, that the printed items representing the beds are arranged in the order

in which the beds would be shown in a "graphic section" or drawing, the youngest at the top, the oldest at the bottom.

If both feet and inches are given the section should be in the form shown below.

Section on southwest side of Maulden Mountain, Md.

	Ft.	in.
Clay loam	8	0
Pebble conglomerate and loose pebbles	2	0
Fine greenish-gray sand with finely disseminated glauconite	5	6½
Glauconite sand, lighter gray than overlying bed, very micaceous, with small pockets of glauconite and some iron concretions	15	0
Persistent layer of ironstone		1
Gray iron-mottled sand, less glauconitic, micaceous	10+	

Observe that the use of a plus or plus-minus mark after a number indicating feet obviates the use of a cipher in the column provided for inches.

The following form indicates the style preferred in some sections of the Survey. The rock term is given first and is followed by the descriptive adjectives.

Section of rocks underlying the Dakota sandstone in sec. 9, T. 21 S., R. 8 E.

	Ft.	in.
Shale, bluish gray	1	3
Sandstone, brownish gray, cross-bedded, somewhat carbonaceous	2	0
Clay shale, bluish gray; contains leaves of several species (unidentified)		8
Shale, sandy, coarse grained, conglomeratic	1	10
Shale, drab		3
Clay, white, calcareous, lenticular		2
Shale, drab, with yellow iron concretions	1	0
Shale, sandy, bluish		3
Shale, sandy, drab, yellow, and gray	1	6
	8	11

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.

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

It is desirable that a table should be introduced by some statement in the text, but such a statement should not be a duplicate of the matter in the table heading, and if no other pertinent introductory matter can be provided the table should be inserted without an introduction.

The heading to a table should be concise and clear and should indicate the principal items of information set forth in the table, but it is not necessary to include in the heading minor items that are incidental to the main features. The words "Table showing" should not be used in the heading. Headings for statistical tables, such as those in Mineral Resources, should generally begin with the concrete rather than the abstract term—for example, "Feldspar marketed in 1915" is better than "Marketed production of feldspar in 1915."

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

The proper arrangement of a table may be difficult. Few general rules can be given, and if a table is complicated the author should consult the editors to ascertain its proper form. This instruction applies to all tables except those that are not complex and that can be arranged like the simpler printed tables in recent Survey publications. The time necessary for this consultation will be far less than that required to correct a table that is improperly prepared.

The author should remember that tables are to be set in type by men who are not geologists or engineers and that the prime requisite of a manuscript table is legibility. The printers should not be compelled to guess at the matter in the table or at the way in which it should be arranged. The writing should not be crowded. Paper is cheaper than the time of anyone who has to handle the table after it is written.

CHEMICAL TERMS AND SYMBOLS.

The preferred chemical terms relating to valency are univalent, bivalent, trivalent, quadrivalent, quinquivalent—not monovalent, divalent, tervalent, tetravalent, pentavalent.

Write columbium, columbic, columbate—not niobium, niobic, niobate. Write glucinum, glucina—not beryllium, beryllia. Write aluminum (uniform with alumina)—not aluminium.

The following list of chemical elements and symbols is taken from the annual report of the international committee on atomic weights, 1916:

Chemical elements and symbols.

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

In the text of chemical or geochemical papers either chemical symbols (as "H_2O") or terms (as "water") should be used; terms and symbols should not be mixed indiscriminately. For some chemical combinations, however, no terms are available. In tables of analyses symbols alone or in less technical papers both terms and symbols may be used, the symbols to be written between parentheses, as "Silica (SiO_2)," "Alumina (Al_2O_3)."

PERSONAL TITLES.

Titles of honor, office, distinction, or address (such as Dr., Prof., Mr.) should be used only where the mention is personal, 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 coauthors or scientific collaborators. In personal mention of a member of the Survey use "Mr."

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.

The invertebrate fossils were identified by Mr. Stanton and the fossil plants by Mr. Knowlton.

QUOTATIONS AND CITATIONS.

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 typographic errors

or details of printer's style, such as spelling, capitalization, and punctuation, except in extracts in which, for obvious reasons, quaintness of form should be preserved. Omissions in quoted matter should be indicated by three stars, but it is not necessary to use stars at the beginning or end of an extract.

Examination of the original sources of many unintelligible quotations has shown that numerous errors are made in copying printed matter. The typewritten copy of every extract or quotation should be carefully compared with the original.

FOOTNOTES.

FOOTNOTES TO TEXT.

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. Some authors have the "footnote habit"—the habit of putting into a footnote any matter that came to mind after the sentence or paragraph in which it properly belongs was first written, as shown in the subjoined extracts from manuscripts presented for publication:

"These were analyzed[1] and the original supposition was confirmed."

[1] By Mr. Wheeler.

"I have already described the fauna of the [Mutt] limestone as it occurs at [Jeffersonville]. The present paper describes a fauna which was found at the same locality[1] in the overlying bed.

[1] Railroad cut 1½ miles west of the depot."

For reference marks in the text superior figures ([1], [2], [3]) 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. The reference mark should preferably be placed immediately after the name of the author cited, but not if the name is in the possessive form ("Gilbert's theory[1]") or if the matter is complicated by containing references to two or more papers by the author cited or to different parts or statements in a single paper. Personal names, unless the persons are well known, should include initials, to make identification certain, especially for indexing. The initials need not be given in the text; they may appear in the footnotes.

The items of a footnote should be written in the order prescribed below:

1. Name of author cited (surname first, initials or given name next), followed by a comma. If there is only one given name, write it in full, as Lindgren, Waldemar; if more than one, write only initials, as Brooks, A. H.

2. Title of work or paper cited, which should be given exactly and as a rule in full. Begin first word of title with capital letter; begin all other words except proper nouns or adjectives with small letters. If the paper or report cited appears in a periodical or serial publication, put colon after title; if it is an independent work, put comma after title.

3. Name of periodical or of series of publications in which paper cited appears, with volume or number (in arabic numerals), page (roman or arabic, as in work cited), plate or figure (arabic), and, finally, date of publication. If place of publication and publisher's name seem necessary for identification, put them just before the date. Give page or pages on which matter cited appears, not the first page of the paper cited. If the matter covers more than one page, give the limiting pages, using the form "pp. 172–173" (not "p. 172–3").

The following typical footnotes should be examined in detail:

Gilbert, G. K., Recent earth movement in the Great Lakes region: U. S. Geol. Survey Eighteenth Ann. Rept., pt. 2, p. 639, 1898.

Van Hise, C. R., A treatise on metamorphism: U. S. Geol. Survey Mon. 47, p. 697, 1904.

Lindgren, Waldemar, The Tertiary gravels of the Sierra Nevada of California: U. S. Geol. Survey Prof. Paper 73, p. 44, 1911.

Shaler, N. S., The geology of Nantucket: U. S. Geol. Survey Bull. 53, pp. 42–47, 1889.

Leighton, M. O., and Tavernier, René, The public utility of water powers and their governmental regulation: U. S. Geol. Survey Water-Supply Paper 238, p. 75, 1910.

Hayes, C. W., U. S. Geol. Survey Geol. Atlas, Pikeville folio (No. 21), p. 3, 1895.

Emmons, S. F., Progress of the precious-metal industry in the United States since 1880: U. S. Geol. Survey Mineral Resources, 1892, pp. 46–94, 1893.

McGee, W J, Soil erosion: U. S. Dept. Agr. Bur. Soils Bull. 71, 1911.

Chamberlin, T. C., The diversity of the glacial period: Am. Jour. Sci., 3d ser., vol. 45, pp. 171–200, 1893.

Williams, E. H., jr., The heating in the Culebra Cut: Science, new ser., vol. 35, pp. 892–893, 1912.

Becker, G. F., Schistosity and slaty cleavage: Jour. Geology, vol. 4, p. 445, 1896.

Brooks, A. H., Applied geology: Washington Acad. Sci. Jour., vol. 2, pp. 43–44, 1912.

Branner, J. C., The phosphate deposits of Arkansas: Am. Inst. Min. Eng. Trans., vol. 26, p. 584, 1896.

Willis, Bailey, Oil of the northern Rocky Mountains: Eng. and Min. Jour., vol. 72, pp. 782–784, 1901.

Tarr, R. S., and Von Engeln, O. D., A laboratory manual of physical geography, p. 312, 1910.

Clarke, J. M., The origin of the Gulf of St. Lawrence: New York State Mus. Bull. 164, pp. 132–137, 1913.

Wright, W. B., The Quaternary ice age, p. 374, London, Macmillan Co., 1914.

Dana, J. D., Manual of geology, 4th ed., p. 207, 1895.

In citing papers contained in the Survey's annual volumes of "Contributions" to general and economic geology and hydrology or other similar collections of separate papers, give the author and title of the particular paper cited, not the title of the volume.

The matter after the colon in a footnote citing a Survey publication should begin "U. S. Geol. Survey," and the matter after the colon in a footnote citing a periodical published by a society or other organization should begin with the name of the organization, written in the style indicated by examples given on pages 24–29. The name of a State organization should begin with the name of the State, written in full.

To recapitulate, the prescribed order of the items in a footnote citing a paper from a serial publication is as follows: Name of author, title of paper (followed by a colon), name of journal, volume, part (if necessary), pages, plates, and figures (if necessary), place of publication (if necessary), publisher (if necessary), date of publication. If, however, the serial has no other distinctive numeral designation of volume than the year of publication, the designation of the year should be written in the place of the number of the volume and not repeated at the end of the citation. For example, the Neues Jahrbuch takes for a distinctive number the year of publication and is issued in two volumes (Band 1 and Band 2) each year. In citing this publication the date should be inserted before "Band 1" or "Band 2" ("Neues Jahrb., 1914, Band 1") and not repeated at the end. The Beilage Band of the Neues Jahrbuch, however, does bear a distinctive volume number and in citing that publication the date (the year) should go at the end of the footnote ("Neues Jahrb., Beilage Band 15, p. 150, 1902"). Some annual reports have no distinctive number and are designated by the year covered in the report but may not be published in that year. In citing such a report both dates should be given; for example: "U. S. Geol. and Geog. Survey Terr. Ann. Rept. for 1874, pp. 271–365, 1876."

The order of items in a footnote citing an independent work (a book that is not one of a series, though it may be in several volumes or parts) is the same as that indicated above so far as the items given are applicable—that is, name of author, title of work (followed by a comma), volume or part (if necessary), pages, plates and figures (if necessary), place of publication (if necessary), publisher (if necessary), date of publication.

The prescribed abbreviations for names of States (see list on p. 102) should be used after names of counties, cities, towns, reservations, or national forests and after names of rivers, lakes, or other natural features, but no other abbreviations should be used in the quoted title of a paper or book except such as are given in the original title itself. In the name of a periodical or of a series of publica-

tions in which a paper cited appears the abbreviations indicated below should be used.

Use "U. S." in "U. S. Geol. Survey" or in names of other Government bureaus, offices, or departments, but spell in full all names of countries, States, and cities in citations like "Illinois Geol. Survey," "New York Acad. Sci.," "Cincinnati Soc. Nat. Hist.," "Geol. Soc. America," "Roy. Soc. Canada."

Use "First," "Second," "Third," etc., for serial number of State or other reports, as "Vermont State Geologist Eighth Rept.," "U. S. Geol. Survey Twenty-first Ann. Rept.," but write "U. S. Geol. Expl. 40th Par.," "U. S. Geog. Surveys W. 100th Mer.," "2d ed." (not "2nd ed."), "3d ser." (not "3rd ser." nor "ser. 3").

Follow the work cited in the use of the German terms "Band," "Heft," "Abt." (Abteilung), and "Lief." (Lieferung); do not attempt to translate such terms into "vol." or "pt."

The words in parentheses in the following list explain the abbreviations and are not to be used in the footnotes:

Abh. (Abhandlungen)
Abt. (Abteilung)
Acad., Akad. (academy, Akademie)
Accad. (accademia)
Agr. (agriculture, agricultural)
Am. (American)
America
Anal. (analytical, analytische)
Ann. (annual)
Annals, Annales
Assoc. (association)
Band
Beitr. (Beitrag, Beiträge)
Ber. (Bericht)
Biol. (biologic, etc.)
Bot. (botanic, etc.)
Botany
Bull., Bol. (bulletin, boletín)
Bur. (bureau)
Chem. (chemical, chemische, chemiker)
Chemistry, Chemie, chimie
Chim. (chimique)
Circ. (circular)
Coll. (college, collections)
Compt. rend. (compte rendu)
Cong. (congress)
Contr. (contributions)
Dept. (department)
Econ. (economic)
Eng. (engineers, engineering)
Exper. (experiment)
Förh. (Förhandlingar)
Gazette
Geog. (geographic, geographische)
Geography, Geographie, géographie
Geol. (geologic, geologische)
Géol. (géologique)
Geology, Geologie, géologie
Gesell. (Gesellschaft)
Handl. (Handlingar)
Heft
Hist. (historical, history)
Inst. (institute, institution)
Internat. (international)
Jahrb. (Jahrbuch)
Jahresb. (Jahresbericht)
Jour. (journal)
Lab. (laboratory)
Lief. (Lieferung)
Mag. (magazine)
Math. (mathematical)
Mem. (memoir)
Min. (mining, mineralogische)
Mitt. (Mitteilungen)
Mon. (monograph)
Monthly
Mus. (museum)
Nat. (natural, national)
Naturalist
p., pp. (page, pages)
Paper
Philos. (philosophical)
pl., pls. (plate, plates)
Paleont. (paleontologic, etc.)
Proc. (proceedings)
Prof. (professional)

pt. (part)
Pub. (publication)
Quart. (quarterly)
Rec. (record)
Rept. (report)
Rev. (review, revue)
Roy. (royal)
Sci. (science, scientific)
Science (the journal so named)
Seismol. (seismologic, etc.)
Soc. (society, société, etc.)
ser. (series); new ser.
Sta. (station)
Survey
Tech. (technical, etc.)
Trans. (transactions)
Univ. (university)
Ver. (Verein)
Verh. (Verhandlungen)
vol. (volume)
Zeitschr. (Zeitschrift)
Zeitung

The following list shows the abbreviations of names of some publications and publishing organizations cited in Survey publications. Names of countries, States, and cities and other proper nouns are written in full. The usage of foreign languages in regard to capitalization is followed, except that a capital is used in the abbreviation of the first word of a society's name. Names of State geological surveys not indicated in the list should be given in the form "Alabama Geol. Survey."

Aargauische naturf. Gesell.
Abh. geol. Specialkarte Preuss.
Acad. nac. cien. Córdoba
Acad. nat. sci., belles-lettres et arts Bordeaux
Acad. Nat. Sci. Philadelphia
Acad. roy. sci. Belgique
Acad. roy. sci.. lettres et beaux arts Belgique
Acad. sci. St.-Pétersbourg
Accad. agr., comm. ed arti Verona
Accad. gioenia sci. nat.
Accad. sci. fis. mat. [Naples]
Accad. sci., lettere ed arti Zelanti
Albany Inst.
Allg. schweiz. Gesell. gesammt. Naturwiss. Bern
Allg. chem. Mineralogie
Allg. Jour. Chemie
Am. Acad. Arts and Sci.
Am. Assoc. Adv. Sci.
Am. Chem. Jour.
Am. Chem. Soc.
Am. Geog. Soc.
Am. Geologist
Am. Inst. Min. Eng.
Am. Jour. Sci., 4th ser. (Give series.)
Am. Mus. Nat. Hist.
Am. Naturalist
Am. Philos. Soc.
Am. Soc. Civil Eng.
Am. Soc. Irr. Eng.
Am. Soc. Naturalists
Am. Waterworks Assoc.
Annaes sci. nat.
Annalen der Chemie
Annalen der Physik
Annales chimie et phys.
Annales des mines
Annales paléontologie
Annales sci. géol.
Annales sci. nat.
Annals and Mag. Nat. Hist.
Archaeol. Inst. America.
Archiv Naturk. Liv-, Ehst- u. Kurlands
Archiv naturwiss. Landesd. Böhmen
Archiv prakt. Geologie
Arch. sci. phys. nat.
Argentina Dept. nac. minas y geología
Assoc. Am. Geographers
Assoc. Eng. Soc.
Assoc. géod. internat.
Assoc. ing. école Liège
Astrophys. Jour.
Ateneo sci., lettere ed arti Bergamo
Australasian Assoc. Adv. Sci.
Australian Mus.
Beitr. Geophysik
Beitr. Paläontologie Oesterr.-Ungarns u. des Orients
Berg- u. hüttenm. Zeitung
Boston Soc. Nat. Hist.
Bot. Gazette

Bot. Jahrb.
B. P. Bishop Mus.
British Assoc. Adv. Sci.
British Mus.
Buffalo Soc. Nat. Sci.
Bull. Am. Paleontology
Bull. services carte géol. France
Bur. Mines
Bur. Soils
California Acad. Sci.
California State Min. Bur.
California Univ. Dept. Geology
Canada Dept. Mines, Mines Branch
Canada Geol. Survey
Canadian Inst.
Canadian Min. Jour.
Canadian Min. Rev.
Canadian Naturalist
Canadian Rec. Sci.
Carnegie Inst. Washington
Centralbl. Mineralogie
Chem. Centralbl.
Chem News
Chem. Soc.
Chem. Zeitung
Chicago Acad. Sci.
Cincinnati Quart. Jour. Sci.
Cincinnati Soc. Nat. Hist.
Colliery Eng.
Coll. Sci. Japan
Colorado Min. Bur.
Colorado Sci. Soc.
Com. géol. [Petrograd]
Com. mapa geol. España
Comm. Danmarks geol. Undersögelse
Comm. geog. e geol. Minas Geraes
Comm. géol. Belgique
Compt. Rend. (only for Comptes Rendus of Paris Académie des sciences)
Cong. géol. internat.
Connecticut Geol. and Nat. Hist. Survey
Contr. Biology Hopkins Seaside Lab.
Dansk geol. Foren.
Davenport Acad. Nat. Sci.
Denison Univ. Sci. Lab.
Deutsche chem. Gesell.
Deutsche geol. Gesell.
Dingler's polytech. Jour.
Econ. Geology
Electrochem. and Met. Ind.
Elisha Mitchell Sci. Soc.
Eng. and Min. Jour.
Eng. Club Philadelphia
Eng. Mag.
Eng. Soc. Western Pennsylvania
Essex Inst.
Faculté sci. Marseille
Fed. Inst. Min. Eng.
Field Mus. Nat. Hist.
Finlands geol. Undersökning
Finska Vet.-Soc.
Franklin Inst.
Gazz. chim. ital.
Geog. Fören. Finland
Geog. Gesell. Hanover
Geog. Jour.
Geol. Centralbl.
Geol. Fören.
Geol. Inst. Upsala
Geol. Mag.
Geol. Rec.
Geol. Rundschau
Geol. Soc. America
Geol. Soc. London
Geol. Survey Great Britain
Gesell. Beförd. gesammt. Naturwiss.
Gesell. Erdkunde Berlin
Gesell. naturf. Freunde
Glasgow Nat. Hist. Soc.
Grossh.-bad. geol. Landesanstalt
Grossh.-hess. geol. Anstalt
Hamilton Sci. Assoc.
Harvard Coll. Mus. Comp. Zool.
Illinois State Lab. Nat. Hist.
Imp. Akad. Nauk
Imp. Earthquake Inv. Comm.
Imp. russk. geog. Obschch. [Petrograd]
Indiana Dept. Geology and Nat. Res.
Inst. geol. México
Inst. Min. Met.
Inst. Min. Eng. [England]
Jahrb. Chemie
Jahresb. Chemie
Jour. botanique
Jour. Botany
Jour. conchyliologie
Jour. Geography
Jour. Geology
Jour. phys. théor. et appl.
Jour. prakt. Chemie
K. Akad. Wetensch.
K. Akad. Wiss. Berlin
K. Akad. Wiss. Wien
Kansas Univ. Geol. Survey
K.-bayer. Akad. Wiss.

K. böhm. Gesell. Wiss.
K. danske Vidensk. Selsk.
K.-geod. Inst.
K.-k. geog. Gesell.
K.-k. geol. Reichsanstalt
K.-k. naturhist. Hofmus.
K.-preuss. Akad. Wiss.
K. preuss. geol. Landesanstalt
K.-sächs. Bergakad.
K.-sächs. Gesell. Wiss.
K. svenska Vet.-Akad.
K.-ungar. geol. Anstalt
Lake Superior Min. Inst.
Liebig's Annalen
Linnean Soc. London
Louisiana Exper. Sta.
Lyceum Nat. Hist. New York City
Maine State Survey Comm.
Maryland Geol. Survey
Massachusetts Inst. Tech.
Meddelelser om Grönland
Michigan Geol. and Biol. Survey
Min. and Eng. World
Min. and Met. Soc. America
Min. and Sci. Press
Mineralog. Mag.
Mines and Minerals
Ministère trav. pub. France
Min. Mag.
Minnesota Geol. and Nat. Hist. Survey
Min. pet. Mitt.
Min. Sci.
Mississippi Agr. and Mech. Coll.
Missouri Bur. Geology and Mines
Monatsh. Chemie
Mus. civico storia nat. Genoa
Mus. hist. nat. Marseille
Mus. nac. Rio de Janeiro
Mus. roy. hist. nat. Belgique
Nat. Acad. Sci.
Nat. Geog. Mag.
Nature
Naturf. Gesell. Halle
Naturf. Ver. Brünn
Naturhist. Ver. preuss. Rheinlände u. Westphalens
Naturwiss. Gesell. Isis in Dresden
Naturwiss. Rundschau
Naturwiss. Ver. Bremen
Naturwiss. Wochenschr.
Nautilus
Neues Jahrb.
New Brunswick Nat. Hist. Soc.
New South Wales Geol. Survey
New York Acad. Sci.
New York State Cab. Nat. Hist.
New York State Geologist
New Zealand Colonial Mus.
North Carolina Geol. and Econ. Survey
Nova Scotia Inst. Nat. Sci.
Oesterr. Zeitschr. Berg- u. Hüttenwesen
Oficina hidr. Chile
Ontario Bur. Mines
Palaeontographica
Palaeontologia Indica
Paleont. Abh. (Dames & Koken)
Paleont. Soc.
Paleont. Zeitschr.
Pennsylvania Second Geol. Survey
Pennsylvania Top. and Geol. Survey Comm.
Petermanns Mitt.
Philos. Soc. Washington
Philos. Trans.
Phys.-ökon. Gesell.
Plant World
Poggendorff's Annalen
Polytech. Gesell. Berlin
Pop. Sci. Monthly
Portland Soc. Nat. Hist.
R. accad. Lincei
Rassegna sci. geol. Italia
R. com. geol. Italia
Rec. trav. chim.
Rev. gén. botanique
Rev. gén. sci. pures et appl.
Rev. univ. mines
Rhode Island Nat. Res. Survey
Riv. ital. paleontologia
Riv. servizio min.
Roy. Geol. Soc. Cornwall
Roy. Soc. Canada
Roy. Swedish Acad. Sci.
R. ufficio geol.
Russ. k. mineral. Gesell.
School of Mines Quart.
Schweizer. paleont. Gesell.
Sci. Am.; Sci. Am. Suppl.
Sci. Monthly
Sci. Progress
Scottish Geog. Mag.
Sec. fomento, México
Seismol. Soc. America
Senckenberg. naturf. Gesell.
Smithsonian Inst.

Smithsonian Misc. Coll.
Soc. agr., sci. ind. Lyon
Soc. belge géologie
Soc. chim. Paris
Soc. cient. Ant. Alzate
Soc. cient. argentina
Soc. cient. Chile
Soc. études sci. Angers
Soc. géog. Québec
Soc. geog. italiana
Soc. géol. Belgique
Soc. geol. mexicana
Soc. géol. Nord
Soc. géol. suisse
Soc. ind. min.
Soc. linnéenne Bordeaux
Soc. neuchâteloise sci. nat.
Soc. sci. Bruxelles
Soc. toscana sci. nat.
South African Mus.
South Wales Inst. Eng.
Sveriges geol. Undersökning
Tech. Quart.
Texas Univ. Min. Survey
Tokyo Coll. Sci.
Torrey Bot. Club
Tschermak. *See* Min. pet. Mitt.
U. S. Dept. Agr.
U. S. Geog. and Geol. Survey Rocky Mtn. Region
U. S. Geog. Surveys W. 100th Mer. ("and Geol." should be added for vol. 3 and some other reports; see Bulletin 222).
U. S. Geol. and Geog. Survey Terr. ("and Geog." should be omitted for some of the earlier reports; see Bulletin 222).
U. S. Geol. Expl. 40th Par.
U. S. Geol. Survey
U. S. Nat. Mus.
U. S. Pacific R. R. Expl.
Ver. Erdkunde Dresden
Ver. Freunde Erdkunde Leipzig
Ver. Naturkunde Cassel
Ver. Naturwiss. Braunschweig
Ver. naturwiss. Unterhaltung
Ver. vaterl. Naturkunde Württemberg
Ver. Verbreitung naturwiss. Kenntnisse
Victoria Inst.
Wagner Free Inst. Sci.
Washington Acad. Sci.
Western Eng.
West Virginia Geol. and Econ. Survey
Wisconsin Geol. and Nat. Hist. Survey
Zeitschr. allg. Erdkunde
Zeitschr. anal. Chemie
Zeitschr. angew. Chemie
Zeitschr. anorg. Chemie
Zeitschr. Berg-, Hütten- u. Salinenwesen preuss. St.
Zeitschr. Elektrochemie
Zeitschr. Gletscherkunde
Zeitschr. Kryst. Min.
Zeitschr. physikal. Chemie
Zeitschr. prakt. Geologie
Zool. Rec.

Some citations that involve difficulties are given below.

Unpublished reports: U. S. Geol. Survey Bull. 735 (in preparation). [Use dash if no number has been assigned. If report has been sent to printer write "in press" instead of "in preparation." Unpublished reports should not be cited unless the date of their publication is near at hand.]

Advance chapters: U. S. Geol. Survey Prof. Paper 98, pp. 41–59, 1916 (Prof. Paper 98–E). [Give author and title of individual paper, then cite the volume in the regular way, and last give in parentheses the letter by which the chapter is designated. After the complete volume is published the last item may be omitted.]

Congressional documents: 62d Cong., 1st sess., H. Doc. 341 [or S. Doc. 341].

Maryland Geol. Survey, Eocene, 1901.

Acad. sci. Paris Mém. sav. étrang.

U. S. Geol. and Geog. Survey Terr. Bull., vol. 1 [1st ser.], No. 1.

Powell, J. W., Report on the geology of the eastern portion of the Uinta Mountains, p. 156, U. S. Geol. and Geog. Survey Terr., 2d div., 1876.

Browne, J. R., Mineral resources of the States and Territories west of the Rocky Mountains for 1867, p. 10, 1868.

Raymond, R. W., Statistics of mines and mining in the States and Territories west of the Rocky Mountains for 1875, p. 10, 1877.

Cong. géol. internat., 12e sess., Guide des exc.

U. S. Dept. Agr. Bur. Soils Field Operations, 1911, pp. 31–67, 1914.

Virginia Univ. Philos. Soc. Bull., Sci. ser., vol. 1, No. 19.

The reports of the Harriman Alaska Expedition are entitled "Alaska" and should be cited according to the following model:

Gilbert, G. K., Glaciers and glaciation: Alaska, vol. 3, Harriman Alaska Expedition, 1904.

"Op. 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. In using "op. cit." the author's name should be given in the footnote if it is not given in the text. "Idem" (not id., ibid., nor ibidem) should be used only for a second citation of the same work immediately following the first, on the same page. "Loc. cit." should not be used.

FOOTNOTES TO TABLES.

For reference marks in a table superior underscored letters (a, b, c), to be printed as italic superiors ($^{a, b, c}$), should be used.

The reference mark in a table should be written immediately after the word or matter to which it relates if the matter is in a heading to a table, in a "box head," in the first column, or in a reading column, and immediately before the matter to which it relates if the matter is in a number or figure column. The reference mark should be written between parentheses if it is unaccompanied by words or figures. (See example in table below.) Reference marks should be written in alphabetic order, beginning in the heading of the table, going across the box heads, continuing across the top line of the table proper, then going across each succeeding line from beginning to end. The footnotes should be written at the bottom of the table. If a table covers several pages the footnotes pertaining to each page should be written at the bottom of the page, except notes from reference marks in the heading or the box heads, which should be given only once. A sample table is given below.

Graphite produced in 1910.

Country.	Quantity (short tons.)	Value.
United States [a]	3,618	$288,455
Ceylon	[b] 30,183	[c] 1,159,529
Chosen (Korea)	(d)	[c] 56,000

[a] Mines and quarries, pt. 4, p. 672, London, 1911.
[b] Figures show exports.
[c] Subject to correction.
[d] Statistics not available.
[e] Approximate only.

REPORTS ON MINING DISTRICTS.[1]

GENERAL SUGGESTIONS.

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

Stress should be laid on those geologic facts that are of direct economic interest. Material that is chiefly of scientific or theoretic value and that has no direct bearing on the economic problems discussed may best be reserved for separate publication. If it seems desirable, for the benefit of specialists, to include such material in an economic report, it may, by paragraphing in smaller type, be kept distinct from the main text, so that it can readily be skipped by those who would not understand it.

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 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, he 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.

SUBJECT ORDER.

General order.—The general order of treatment here recommended is applicable to a complete report on a mining district, and a paper of different scope may well follow a similar general order so far as it can be applied to the facts presented. The titles of the headings may be modified according to the varying conditions in different regions and the taste of the author, but he should have some definite plan in mind before he begins to write. The general heads may comprise the following:

Preface.	Geography.
Outline of the report.	Geology.
Introduction.	Ore deposits.

[1] Prepared originally in 1906 by S. F. Emmons; revised in June, 1913, and in April, 1916, by F. L. Ransome.

Preface.—The preface should be written and signed by the geologist in charge of the administrative unit to which the author belongs. It should indicate the character and purpose of the investigation and call attention to important features or results set forth in the report and to their bearing on regional or other broad problems.

Outline of the report.—The author should write a brief but carefully prepared abstract of the report, with a view not only of giving the reader a preliminary survey of the work but of affording an authoritative outline for the press.

Introduction.—The introduction may comprise a statement of the conditions under which the work was done, acknowledgment of favors, a summary of previous work in the same field, and 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.—The section on geography should describe location, routes of approach, topography, climate, vegetation, and other geographic features. Relief and drainage should be described as present features of the landscape, but their genesis and evolution should be discussed under "Geology."

Geology.—The discussion of the geology should present general geologic information with regard to the region, in the following order: (*a*) The character and composition of different rock formations, in order of age, commencing with the oldest and distinguishing sedimentary from igneous; (*b*) the distribution and structural relations of the formations; (*c*) metamorphism; (*d*) the development of topographic features with special reference to lithology and geologic structure.

Ore deposits.—The description of the ore deposits as a whole and the discussion of their genesis should form the principal part of the report. In this part the subdivisions suggested below may be enlarged or condensed according to the nature of the deposits, but the general order of subjects should be preserved.

(*a*) History of mining development. The author may relate the successive steps in the local progress of the mining art and state the present conditions. In some reports that are essentially economic this history may follow the "Introduction."

(*b*) Production. Annual and total output of mineral products, with sources of information.

(*c*) General character of deposits. Fissure veins, replacement deposits, contact deposits, etc.

(*d*) Mineralogy. 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.

(*e*) The deposits. Distribution and geologic features, structural relations, primary deposition, underground water, 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.

(*f*) Genesis of the deposits. The author should recapitulate the essential facts brought out in his descriptions, show their bearing on the problem of origin, and deduce such theoretical conclusions as they may warrant.

(*g*) Practical applications. The author may point out how his work may aid the miners in developing their ore bodies or in finding new ones and may forecast, if possible, the economic future of the district.

(*h*) The mines. In the detailed descriptions of the individual mines or groups of mines the general order of treatment indicated above should be followed. 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 to which their deposits vary from the type.

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 likely to cause misunderstanding.

MATERIALS.

Ore.—Ore is a mineral or rock from which one or more metals may be profitably extracted. Material that can not be profitably worked to-day may become of economic value a year or so hence without any change in character. Consequently, in using the term "ore" it is necessary to take into account the effect of changing economic conditions and of probable improvements in metallurgic processes. According to the definition given above it is tautologic to use the term "pay ore."

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 describing as gangue any metallic minerals that may happen to be of no economic value is not desirable,

even if they are called metallic gangue, for it permits no uniform distinction between ore and gangue.

In describing the minerals occurring in an ore deposit it is well to distinguish the exogenous gangue minerals—those that have been brought in from some outside source—from the endogenous gangue minerals—those that are the product of alteration of the wall rock 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 a less desirable phrase, for the reason that "stone" is used by some mining men as a technical term for ore, whereas others make "vein stone" synonymous with "gangue."

Gouge.—Gouge is a soft, clayey material that occurs in some places as a selvage between a vein and the country rock and is 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 rock.—"Country" is the miner's term for the rock which incloses an ore deposit. The term "country rock" has been criticized as tautologic; nevertheless, it is sanctioned by very wide 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.—The material filling a fissure, when not injected as molten matter to form a dike, is termed a vein. Most veins are of nearly tabular form. An ore-bearing vein is a single body of metalliferous minerals occupying or following a fissure, both walls of which generally 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, although in legal phraseology lode or lead is in a broad sense synonymous with vein. The term "vein system" may be used for a larger group of veins and 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 stricter definitions. 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.—The term "shear zone" denotes a section of the earth's crust within which the rocks have been closely laminated by

yielding to a shearing stress. It is a structural feature along which ore may be deposited but is not itself a form of deposit.

Sheeted zone.—Where the country rock is traversed by approximately parallel fissures separated by thin sheets of rock it is said to be "sheeted," and the zone affected may be called a "sheeted zone." In a sheeted zone the fissures are generally more widely spaced and there is less crushing than in a shear zone.

Fault.—A fault, in its simplest form, is a fracture in the rock of the earth's crust accompanied by a displacement of one side with respect to the other in a direction parallel with the fracture. A fault is not a form of ore body, but, like shear zones and sheeted zones, it may influence ore deposition or determine the shape of a deposit. There has been much diversity in the nomenclature of faults, and authors are advised to follow the terminology recommended by a committee of the Geological Society of America.[1]

Bedded deposit, bed deposit.—In contrast with veins, which cut across the bedding of the inclosing rocks, some deposits conform with the stratification. Such deposits are frequently called bedded deposits, but this name suggests that they were laid down as members of the stratigraphic series in which they occur—that is, that they are syngenetic deposits. The term "bed deposit" is of broader application; it will cover such deposits as may have been subsequently introduced between the beds—that is, epigenetic deposits. 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 vein.—Whitney[2] used the expression "true or fissure veins" in his tabular classification of ore deposits to distinguish from gash veins those veins which, according to him, "may be presumed to extend for an indefinite distance downward." Although in his text he uses the term "true vein," the expression he employs in his widely quoted table has probably given currency among miners to the term "fissure vein" or even "true fissure vein." "True vein" was the term in use before Whitney's table was published, and by the earlier writers on ore deposition it was employed to indicate an ore body that filled a fissure; hence the term "fissure vein" is in a strict sense pleonastic and should not be used in classification.

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[1] Reid, H. F., and others, Report of the committee on the nomenclature of faults: Geol. Soc. America Bull., vol. 24, pp. 163–186, 1913.

[2] Whitney, J. D., The metallic wealth of the United States described and compared with that of other countries, pp. 34, 49, 1854.

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

1. Banded structure, in which the vein shows in cross section a banding nearly parallel to the wall. This may be subdivided, according to origin, into—

(*a*) Banded structure by filling, in which the filling is evidently a series of layers of vein material deposited successively on the walls of an open space. If the layers are symmetrically arranged on both sides of a medial plane, with crystals pointing inward, comb structure is produced. In the middle part of the vein there may be cavities or vugs (see definition below) lined with crystals.

(*b*) Banded structure by subsequent movement, or ribbon structure, produced by a simple sheeting of the vein material after original deposition. 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, produced 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 extensively replaced by vein material.

2. Breccia structure, in which the friction breccia or dragged-in fragments of country rock constitute a considerable part 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.

The words "vug" and "druse," "vuggy" and "drusy" are used synonymously by many good writers. "Druse" is of Bohemian origin and means brush. It was applied to the closely set projecting crystals that line certain cavities or vugs and is still used in this sense by mineralogists. Discussions of ore deposits would gain in clearness and precision if the word "vug" and its corresponding adjective were used for a cavity and the word "druse" and its corresponding adjective were restricted to their original meanings. Vugs may or may not be drusy.

Linked veins.—Deposits that fill approximately parallel and overlapping fissures, arranged in steplike form 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 most stringer lodes the rock between the veinlets in so much metallized or is so inseparable from the stringers that the whole is worked as a single ore body.

Chimney, stock.—The term "chimney" is applied to ore bodies that 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.

Stockwork.—A stockwork is an ore body of stocklike form made up of innumerable branching and anastomosing stringers.

Ore shoot, pay shoot.—An ore shoot or pay shoot is that part of a metalliferous deposit which is rich enough to exploit. Its outlines are not generally well defined. The ore shoot may be considered as having three axes, at right angles to one another. The inclination of the longest axis to a horizontal 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. 39.)

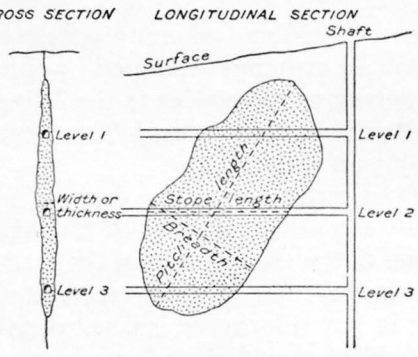

FIGURE 1.—Diagram illustrating application of terms used in describing ore bodies.

The true dimensions of an ore shoot would be shown by giving the length of its longest axis and the area of one or more cross sections normal to that axis. Inasmuch, however, as its true form can rarely be determined until all the ore has been mined, 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 longest axis of the body is vertical. It is advisable to follow the usage adopted by Lindgren and Ransome in their Cripple Creek report and call the longest axis "pitch length" and the horizontal dimension along the level "stope length." (See fig. 1.)

Contact deposits.—The term "contact deposits" should be restricted to deposits which have been formed by igneous 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 between rocks of two different kinds. Contact deposits, as thus defined, occur mostly in limestone at or near its contact with an intrusive igneous rock. They are very irregular in form. Mineralogically they differ from other deposits by the contemporaneous formation of oxides and sulphides, principally of iron, and by the association of these oxides and sul-

phides with silicate minerals, especially with silicates of calcium, magnesium, and iron.

Segregated vein.—The term "segregated vein" has sometimes been used to define materials that have been concentrated in a sedimentary bed. As a general rule, however, the name of a process should not be used as the definition of a type of deposit, and "segregation" is more appropriately applied to the gathering together of material in a molten magma. In either sense reference to a deposit as "segregated" does not sufficiently characterize it as a type.

Impregnation.—The term "impregnation" 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 particles 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," for the process it designates does not necessarily involve the preservation of the crystalline form of the original mineral. It may or may not be accompanied by a change in volume.

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 radicles in a compound by other elements or compounds," a restricted 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 the decay of a rock or mineral into secondary products, usually accompanied by disintegration, so that it involves a physical as well as a chemical change and is most commonly effected by weathering.

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

Enrichment.—In many sulphide deposits the valuable metals have been concentrated by solutions that have descended from the zone of oxidation. As commonly used, the expression "secondary enrichment," although having some justification as an elliptic phrase, is tautologic in form and should be avoided. The idea which this term is intended to convey may be expressed by "enrichment," "secondary segregation," "downward enrichment," or "supergene enrichment," according to choice or circumstances.

The expression "primary ore" is objectionable as applied to material that is of too low grade to be classed as ore. To designate the low-grade material upon which enrichment has acted or which underlies the zone of enrichment, the term "protore" has been suggested. Ore deposited by generally ascending (hypogene) solutions may be termed "hypogene ore" and its constituent minerals "hypogene minerals."

MINING TERMS.

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

Shaft, incline, slope, winze, raise, chute, stope.—The term "shaft," if not qualified, means a vertical opening starting at the surface. A shaft that follows the inclination of a vein or bed that is not vertical is called an inclined shaft, or simply an incline. In coal mines such an incline is commonly termed a slope. Passages within a mine driven upward from a horizontal gallery are called raises or upraises; those driven downward are called winzes. Inclined raises or winzes are often termed inclines. If used for sending ore down from a higher to a lower part of the mine such passages are termed chutes, ore chutes, or mill holes. A stope is an opening made in extracting ore.

Tunnel, adit, drift, crosscut, level.—Properly defined, a tunnel is an underground gallery open to the air at both ends, an adit is open at only one end, and drifts and crosscuts are horizontal galleries that do 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 distinctions are made by miners and may well be observed in writing: A drift follows the general strike of an ore body, vein, or rock structure. A crosscut, as its name implies, crosses the trend of the ore or rock structure. Stations are roomlike enlargements of drifts or crosscuts where they connect with a shaft. All the drifts and crosscuts that connect on approximately the same

horizontal plane with a station or with an adit constitute a level. If the level opens to the surface through an adit it is termed an adit level.

Dip, pitch.—Dip is the angular divergence of a bed or of a tabular deposit, such as a vein, 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 longest 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. 36.)

Mine, prospect.—It may be difficult to decide whether a certain property shall be called a mine or a prospect, and no hard and fast rule can be laid down for universal application. 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 of ore in marketable quantity, but an unproductive property may be so extensively developed and equipped that it can not properly be called a prospect.

PALEONTOLOGIC MATTER.

Some special features of style for paleontologic matter are set forth below.

In center headings the terms class, order, family, and genus should be used with the name—that is, all classific terms of higher rank than species should be given.

It is desirable to use the name of the founder of a species even in his original description: *Cassidulus holmesi* Twitchell, n. sp.

In headings the founder's name should not be abbreviated: *Cinnamomum affine* Lesquereux, not Lesq. nor Lx. The practice of not abbreviating anywhere has some obvious advantages and is recommended for general adoption.

Parentheses should be used to indicate that the founder's generic reference has been changed: *Sequoia langsdorfii* (Brongniart) Heer was described by Brongniart as *Taxites langsdorfii.*

In headings and synonymies the name of a species should be followed by the name of its founder and, if it has been transferred to another genus, the name of the author who transferred it—the combiner. These names should be supplied for all entries in a synonymy, whether the authors cited gave them or not. For example, Williams and Kindle, on page 48 of Bulletin 244, listed "Anoplotheca cf. flabellites" but gave no authority. This reference should be cited in a synonymy as "*Anoplotheca* cf. *A. flabellites* (Conrad) Schuchert." (Conrad first described the species as *Atrypa flabellites*, and Schuchert transferred it to *Anoplotheca.*)

In synonymy it is not necessary to follow the author cited in capitalizing specific names. Citations should be given in the style prescribed on pages 21–29 for footnotes, except that in synonymy it is not customary to give the author's initials unless they are needed to distinguish two authors of the same name. Titles of serials should be abbreviated; titles of independent works (whether in one or more volumes) should be given in full.

Synonymy should preferably be arranged in the style indicated below. The description by the founder of the species is cited first; next references to the species and genus as at present accepted, in chronologic order; next synonyms and misidentifications, also in chronologic order. No punctuation is used between the name of a species and the names of its founder and combiner. A period is used to separate these names from those of other authors cited. Notes as to geologic formation and locality should be run in with the reference, as indicated in the next to the last entry in the following sample synonymy:

Sequoia reichenbachi (Geinitz) Heer.

Araucarites reichenbachi Geinitz, Charakteristik der Schichten und Petrefacten des sächsisch-böhmischen Kreidegebirges, pt. 3, p. 98, pl. 24, fig. 4, 1842.

Sequoia reichenbachi (Geinitz) Heer, Flora fossilis arctica, vol. 1, p. 83, figs. 1d, 2b, 5a, 1868.

Lesquereux, The Cretaceous flora: U. S. Geol. Survey Terr. Rept., vol. 6, p. 51, pl. 1, figs 10–10b, 1874; U. S. Geol. Survey Mon. 17, p. 35, pl. 2, fig. 4, 1892.

Hollick, New York Acad. Sci. Trans., vol. 12, p. 30, pl. 1, fig. 18, 1892.

Newberry, U. S. Geol. Survey Mon. 26, p. 49, pl. 9, fig. 19, 1895 [1896].

Knowlton, U. S. Geol. Survey Mon. 32, pt. 2, p. 657, 1898.

Sequoia reichenbachi longifolia Fontaine, U. S. Geol. Survey Mon. 15, p. 244, pl. 27, fig. 8, 1890. Potomac formation, near Dutch Gap Canal and Fredericksburg, Va.

Sequoia couttsiae Heer. Hollick, New York Acad. Sci. Trans., vol. 12, p. 30, pl. 1, fig. 5, 1892.

The last entry indicates the proper form for citing a misidentification. Entries for homonyms and partial identifications are shown in the following examples:

Productus boliviensis [not D'Orbigny] Nitikin, Com. géol. [Petrograd] Mém., vol. 5, no. 5, pp. 57, 158, 1890.

Productus inflatus [not McChesney] Tschernyschew. Girty, U. S. Geol. Survey Prof. Paper 16, p. 359, pl. 3, figs. 1–1b, 2, 2a, 3, 1903.

cf. *Orthis callactis* [not Sowerby] Murchison, Silurian system, p. 701, 1839.

Leptocoelia acutiplicata [part] (Conrad) Hall, Paleontology of New York, vol. 4, p. 365, pl. 57, fig. 34, 1867.

Exceptionally it may be considered desirable to arrange a synonymy in strict chronologic order. If this plan is adopted it should be used throughout a report. The date is placed at the beginning of

each entry instead of at the end, and the name of the genus and species is repeated for each entry, but in other particulars the style indicated above should be followed. Sample entries for a chronologic synonymy are given below:

1888. *Fenestella tenax* Ulrich, Denison Univ. Sci. Lab. Bull., vol. 4, p. 71. Waverly group, Cuyahoga County, Ohio.

1895. *Fenestella tenax* Ulrich. Keyes, Missouri Geol. Survey, vol. 5, p. 24. (Date of imprint, 1894.) Kaskaskia limestone, Chester, Ill.

1903. *Fenestella* cf. *F. tenax* Ulrich. Girty, U. S. Geol. Survey Prof. Paper 16, p. 339. Hermosa formation, San Juan region, Colo.

1906. *Fenestella tenax* Ulrich. Ulrich, U. S. Geol. Survey Prof. Paper 36, p. 34, pl. 4, fig. 2d. St. Louis limestone, 4 miles northwest of Princeton, Ky.

1906. *Fenestella tenax* Ulrich. Cumings, Indiana Dept. Geology and Nat. Res. Thirtieth Ann. Rept., for 1905, p. 1279, pl. 30, fig. 1; pl. 31, figs. 1–1b. Salem limestone, Bedford, Ind.

The English forms n. gen., n. sp., n. var., s. s., not, part, of authors, are preferable to the Latin gen. nov., sp. nov., var. nov., s. str., non, pars, auct.

The forms *Orthis* cf. *O. umbraculum* (not *Orthis* cf. *umbraculum*) and *Orthis* aff. *O. umbraculum* should be used—that is, repeat the initial of the generic name.

The following example indicates the style to be used in a key to species:

Genus FICUS Linné.

Broad leaves palmately veined:
- Very large:
  - Over 15 centimeters in width ..... *Ficus* sp.
  - Less than 15 centimeters in width ..... *Ficus neoplanicostata.*
- Under 12 centimeters in width:
  - Primaries 5, basilar ..... *Ficus pseudopopulus.*
  - Primaries 3, basilar ..... *Ficus harrisiana.*
  - Primaries 3, suprabasilar:
    - Large leaves ..... *Ficus planicostata maxima.*
    - Small leaves ..... *Ficus occidentalis.*

Narrower and more elongated leaves with pinnate venation:
- Not over 7 centimeters wide:
  - Secondaries remote ..... *Ficus schimperi.*
  - Secondaries closer ..... *Ficus denveriana.*
- Over 7 centimeters wide:
  - Outline regular, secondaries numerous ..... *Ficus monodon.*
  - Constricted medianly, secondaries remote ..... *Ficus vaughani.*

In the text a generic name that has been used once may be cut down to the initial to avoid repeating in full, provided there can be no doubt as to the meaning. If two genera having the same initial have been mentioned the abbreviation may not be clear.

Names of genus and species are italicized, except in lists or tables; other names (family, class, or order) are printed in roman.

A query indicating doubtful reference should follow (not precede) the part of the name to which the doubt relates. It should be written close to the name and should not be inclosed in parentheses: *Martinia glabra?*. In lists, tables, and synonymy no punctuation mark should be used after a query at the end of a name; in text the matter should be punctuated as if the query were not there.

It is not necessary to insert in the text a footnote that would simply repeat a citation given in the synonymy unless it is needed for clearness.

Coined adjectives such as aviculoid, limopteroid, and modiolopsoid should not be capitalized.

The side heading "Description" is generally unnecessary and contravenes the suggestion as to character of headings given on page 12.

In lists of fossils the generic name should be repeated in full, or if that practice would involve much repetition the generic name may be given only with the first species, the others being indented, as indicated below. This style, if adopted, should be used throughout a report.

Myrcia worthenii.
Nectandra lancifolia.
    pseudocoriacea.
    puryearensis.
Nyssa eolignitica.
    wilcoxiana.
Oreodaphne obtusifolia.
    pseudoguianensis.
    puryearensis.
    wilcoxensis.
Oreopanax minor.
Osmanthus pedatus.

In Latin names ae and oe should be printed invariably as two letters, without regard to the derivation of the name.

GEOLOGIC FOLIOS.

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—preferably not 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 textbook. The folio-cover text includes most of the definitions that are necessary. For the layman it will ordi-

narily be better to explain the technical ideas involved in 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. Those technicalities of the specialist which are not understood by the body of geologists or by specialists in other departments should generally be avoided. Important matters of particular interest to the specialist may be concisely stated without descriptive details.

The text should be devoted mainly 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 exploitation. Also, more attention should be given to the description of the phenomena of the area than to theories of origin and history of development. Such theories should be stated tersely and clearly and not in controversial or argumentative form. If a theory is not generally accepted or is supported mainly by phenomena outside of 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. A table of contents that is applicable to many geologic folios is given on page 10.

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 650 and also as an unnumbered pamphlet.

The folio should include a brief description of the main geographic and geologic features of the natural province of which the quadrangle forms a part. This description may be repeated with little change in a folio on another quadrangle in the same province. As it is 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, its principal purposes being (*a*) to furnish a local nomenclature to be used in the descriptive geology and (*b*) to direct attention to the main features represented on the topographic map and thus assist the untrained map reader.

The origin of the topographic forms can be most advantageously discussed after the stratigraphy and the structure have been described. Its discussion naturally forms a part of the geologic history. The fact that topographic relief is discussed in this section and physiography in a later one need not prevent the consideration of the topographic expression of rock formations as a part of the description of them.

DESCRIPTIVE GEOLOGY.

Stratigraphy.—The description of the sedimentary formations should generally be systematic, though it may differ in detail for different regions. If the formation units have been long established and are well known the description may be relatively brief. The definition should include (*a*) lithologic character and name; (*b*) topographic expression, provided that is characteristic; (*c*) thickness and details of section; (*d*) areal distribution; (*e*) paleontologic character; (*f*) geologic correlation; (*g*) relation to adjacent formations, especially character of upper and lower limits, whether by gradual passage or unconformity. These items need not invariably be presented in the order indicated above; peculiar conditions may justify their discussion in a different order.

Under the heading "Paleontologic character" at least three conditions may require 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 if the assigned age has been determined on this newly discovered evidence or if 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 igneous rocks should be described primarily to explain the cartographic units adopted. A generalized pen picture of the rock, giving its obvious features, should be followed by a more technical

description showing which features are general and due to the type of the magmas erupted and which represent local conditions of consolidation. A concise designation or description for the petrographic specialist is desirable, but as a rule no extended description or discussion of details, such as would interest the specialist only, should be given. If petrographic details are considered essential, they may be printed in paragraphs set in smaller type, which can be skipped by the nontechnical reader. In general those features of the rock that 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 without 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 pronounced 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 description 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 differs greatly in different regions, and its treatment should be determined by its importance. In some regions the structural features, 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 features 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.

GEOLOGIC HISTORY.

The discussion of the geologic history should present a chronologic record of the area. The subdivision into "sedimentary record," "igneous record," and "physiographic record" is suggested as desirable where applicable, but in many folios the sedimentary and igneous history will necessarily be combined in a chronologic account of events. The "physiographic record" should include a discussion of the origin of the present topographic forms.

MINERAL RESOURCES.

In general the detail devoted to economic geology should be roughly proportional to the value or quantity 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. If the mineral resources are extensive and if a large amount of detailed information that is of economic value has been collected, the material should be prepared for publication as a bulletin, and the discussion 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 describes an agricultural or ranching country than in one that describes an area where mining is the dominant industry, or in a folio on an arid or semiarid region than in one on 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 statement as to the quantity and character of water.

ILLUSTRATIONS.

Publications of any class may be illustrated, but illustrations may not be used for mere embellishment; each one should serve a definite scientific or practical purpose and should 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 mention 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.

The author and the chief of the branch transmitting the report are primarily responsible for the selection of illustrative material. The chief of the section of illustrations decides the technical questions relating to the preparation of the illustrations and may recommend the rejection of any that do not promise effective or economical reproduction. Illustrations on which geologic names are used should be submitted to the Survey's committee on geologic names with the manuscript of the text.

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 canceling all references to illustrations that have been cut out. The illustrations will be classified

into plates and figures 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 and 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 and can not be larger than the text page; plates are, as a rule, printed separately from the text 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*; details of plates or figures with italic lower-case letters. 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 manuscript list. Detailed explanations of parts or features of illustrations should not be given in the list that is to be printed but should be incorporated in the text or in the legends or titles. The titles and descriptions of the text figures (but not those of the plates) should be written in the manuscript at the places where the figures are to appear and should include all necessary details, such as explanations of symbols or letters that appear on the figures. Full descriptions of the plates, comprising the matter to be printed on or opposite them, should be furnished if the titles given in the list of illustrations are not sufficient. These descriptions should form a separate list (see p. 11), a carbon copy of which should also be furnished. Descriptions of plates showing fossils, specimens or thin sections of rocks, and other objects that must be described in detail on pages facing the plates should be inserted in the manuscript at the proper places, the description of each plate to be written on a separate page or group of pages.

The letter transmitting the manuscript of an illustrated report should mention the illustrations and give their aggregate number, by plates and figures.

The paper used by authors for their original drawings should be of good quality and of a tint that will afford a good photograph. Some of the drawings prepared by authors, if made with care, can be utilized, in whole or in part, for direct photographic reproduction by the lithographer or the engraver. Therefore brown or yellow paper should not be used; white paper or paper having a slight bluish tint is preferable.

Indelible ink of good quality should be used. All the lines of the drawing should be firm and distinct; all lettering should be plainly written in pencil, without effort at ornament.

The original drawing for a text figure should be larger than the figure as it will be printed in the report but should not be so large that the sheet on which it is drawn will be inconvenient to handle. Most figures can be advantageously drawn for a linear reduction to one-half or one-fourth—that is, the distance between any two points in a drawing may be twice to four times the distance between the corresponding points in the printed figure. The size of the printed page in bulletins and water-supply papers is $4\frac{3}{8}$ by $7\frac{1}{2}$ inches (octavo), in monographs and professional papers 6 by 9 inches (quarto). These dimensions include the space allowed for the page heading and the title of the figure. Plates to be folded may exceed these limits, but text figures and as a rule halftone reproductions of photographs should be no wider than the text page and at least half an inch shorter, or if the title of the figure is to be printed the long way of the page the figure should be at least half an inch narrower than the page itself.

Each drawing and photograph should be marked to show the number and title it will have in the printed report for which it is prepared and should bear in addition, if necessary, a memorandum indicating the special feature or features it is used to illustrate. Each photograph should also be marked to show its source, as, for example, with the number of the negative in the Survey's collection or with the name and address of the photographer. Written permission must be obtained for the use of a copyrighted photograph, and credit to the owner of the copyright must be given in the title of the printed reproduction.

In grouping photographs by twos or fours for reproduction as a plate the author should consider the appearance of the group as a whole; for example, a larger or darker photograph should be placed below a smaller or lighter one. Each group of this kind should, as far as possible, be made up of illustrations that are mentioned or described at nearly the same place in the report, in conformity with the rule that illustrations should appear in the order in which they are described.

Every map, whether compiled from other maps or prepared by means of a special survey, should show the sources of all the data it embodies, including the names of the surveyors and the date of the survey. If it is prepared under a cooperative agreement it should bear the name of the cooperating State or organization.

Before an author prepares the material for illustrations he should confer with the chief of the section of illustrations concerning details of the work, especially with respect to the base maps to be used. It is especially desirable that the base map used be the best that is available for the purpose. A map crowded with detail should not be used

if the needs of the report require that only the principal features of the region be shown, and as a general rule the latest map available should be selected; any necessary details that it does not show can be added to it. Detailed written explanations of all illustrations are also desirable. Probably 20 per cent of the time employed by draftsmen in making final drawings is consumed in interpreting the meaning of uncertain features shown in crude original drawings. Authors can prevent this loss of time by adding to their drawings complete memoranda or explanations of features that may be difficult or doubtful of interpretation. These memoranda will also be useful when the author can not conveniently be consulted, and they may be the means of avoiding long delays incident to correspondence.

Certain material, such as illustrations of fossils, that may require expert or special preparation may be submitted to the section of illustrations before the manuscript is transmitted, but authority for the preparation of the drawings in advance of the presentation of the manuscript must be obtained from the Director. If a second installment of such material is sent, the letter transmitting it should refer to the material previously submitted and give the title or subject of the report to be illustrated.

The completed drawings for the illustrations of a report will be submitted for approval or correction to the author, who should indicate his approval by signature. If corrections are necessary he should indicate them clearly on the illustration or on a memorandum to be attached. After the author has thus approved or corrected the drawings he can make no further alterations in them except by authority of the Director.

Proofs of illustrations will be sent to authors when they can be reached without causing much delay in publication. Approval should be indicated by signature, and the proofs should be returned immediately. Changes involving alterations from copy can not be made at this time unless they are of great importance or are necessary to correct conspicuous errors, and such changes can not be permitted without the consent of the Director. Even slight alterations at this stage may make reengraving necessary. Engraved cuts or plates can generally be altered only by cutting off lines or other features; no considerable additions can be made.

The original cuts of illustrations used in Survey reports are preserved for six years and can be used again during that period. An author who may desire to use any such illustration should give its number and the number of the report in which it appeared. If a cut is desired for use in an unofficial paper an electrotype can be furnished at cost. Requests for electrotypes for unofficial use should be addressed to the Director.

SUGGESTIONS AS TO EXPRESSION.

GENERAL COUNSEL.

An eminent critic has said that the ideal of literary style is "the speech of the people in the mouth of the scholar," but this ideal can not be consistently maintained throughout a series of reports that are in large part technical. Some of the reports of the United States Geological Survey are technical contributions to that universal encyclopedia of natural knowledge which is now being compiled by scientific men in all parts of the world. Of the immediate or ultimate practical utility of much of this material there can be no question, but a part of it is of necessity unintelligible to the ordinary reader. Many of the Survey's reports, however, such as those on placer mining in Alaska, mineral deposits or coal beds in the western United States, or water-bearing beds here and there that can be reached by the well digger or well driller, may be written in a simple and somewhat popular style, and simplicity and clearness in both technical and untechnical matter may profitably be cultivated by all Survey writers.

The following extracts from an article written by the Director of the Survey[1] are suggestive and highly significant:

> At its best, science is simple; for science is not much more than arranging facts so as to set forth the truth. Scientific thought is exact and direct, and scientific writing must therefore be accurate and to the point. The scientist should think directly and with the precision of one of the instruments of his trade, and above all his language must present that thought exactly. * * *
>
> Of course, any writer's first duty is to be intelligible. Choice of language thus resolves itself largely into an understanding of the audience. If a scientific investigator desires to announce his discovery to his fellow workers, he does well to use those exact terms that carry the same shade of meaning the world over and indeed may have the same form in several languages; if, on the other hand, his results have immediate value for the mine operator or the prospector, the geologist does not and can not accomplish his purpose unless he writes in plain language, using words possibly less exact but surely more understandable. * * *
>
> It is not a coincidence that some of the deepest thinkers in geological science have also possessed a literary style conspicuous for clarity of expression. On the other hand, some authors whose English needs the most editing are equally careless in the quotation of facts determined by others and, indeed, in the statement of their own observations. I mention this simply to show that I am strong in my belief that plain writing is not something beneath the plane of endeavor of the scientific investigator—indeed, it is something so hard to attain that the most of us need to aim high, to raise our standards of scientific thinking. The use of common words is worthy of any writer if his purpose is to transmit thought. * * *
>
> The Government scientist has at least two obligations—first, that of making his investigations more and more exact in method and direct in result; second,

[1] Smith, G. O., Plain writing: Science, new ser., vol. 42, pp. 630–632, Nov. 5, 1915.

that of making his product, the written report, such as to meet the needs of not only his professional associates but also the general public. It is our ambition that the reports of the United States Geological Survey shall be written in the language of the people.

Many scientific books and papers are obscure or unintelligible to the ordinary reader because their authors have not learned the art of writing plain English, and much of the popular reproach or ridicule excited by some scientific reports is justly chargeable to the authors' indifference and neglect as to forms of expression. An eminent critic,[1] who is also a man of science, writes:

> It is strange that scientific men who habitually work in dimensions of a ten-thousandth of an inch are either blind to gross confusions of argument and to false refractions of meaning or regard them with indifference.

If judged by their literary merit many scientific papers would not deserve publication; only the facts they relate give them value; but unless the facts are stated plainly, in proper order, and with skill to carry conviction the purpose of their publication will not be achieved.

Most of the masters of literature devoted great time and care to the task of writing and rewriting their works. The labor of correction and revision that Fontaine gave to his fables is almost incredible. Buffon rewrote his matter several times and then had it read aloud to him, that he might note where the reader halted or failed to catch the meaning at once, and revised or rewrote accordingly. Macaulay repeatedly rewrote and revised his manuscript, and Robert Louis Stevenson, one of the masters of modern English, who devoted a large part of his life to the study of style, revised and polished his matter until his critical fancy was fully satisfied. The writers of the Geological Survey's reports are not so fortunate in having the privilege of thoroughly revising their manuscripts; the demand for the printed results of their scientific work is immediate and insistent, and the transition from field notes and sketches to finished maps and drawings and complete manuscripts, ready for printing, must be made in the shortest time possible. It is true that the manuscript is revised by the Survey's editors, but the editorial work is done under the same stress and is necessarily hurried and superficial. Many of the refinements of style that are essential to good literature therefore can not reasonably be expected in a Government scientific report, where the chief object should be precision or clearness of statement and where even this object can not be easily attained.

[1] Allbutt, Clifford, Notes on the composition of scientific papers, 2d ed., p. 30, 1905.

Adams Sherman Hill,[1] professor of rhetoric at Harvard University from 1876 to 1904 and afterward professor emeritus, gives the three following rules for good writing:

1. The rule of precision: Of two forms of expression which may be used in the same sense that one should be chosen which is susceptible of but one interpretation. Observance of this rule tends to give each word a meaning of its own.

2. The rule of simplicity: Of two forms of expression which may be used in the same sense the simpler should be chosen. The simpler a word or phrase the more likely it is to be understood, and simplicity in language, like simplicity in dress or manners, belongs to the best society.

3. The rule of euphony: Of two forms of expression which may be used in the same sense that one should be chosen which is the more agreeable to the ear. It is of course wrong to give undue weight to considerations of euphony, but when no sacrifice is involved it is desirable to avoid an expression that is unusually difficult to pronounce or to substitute for an extremely disagreeable word one that is agreeable to the ear.

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. However, all abstract good counsel as to forms of expression is suggestive only, and its ready acceptance by a writer does not imply that he has the detailed knowledge or the skill to apply it in practice; and without that knowledge and skill all faith in good rhetorical doctrine becomes "faith without works." Even the possession of a university degree, such as master of arts or doctor of philosophy, does not warrant the presumption that its possessor is master of expression in English, though he may have taken a course of reading and study leading in historical order from Geoffrey Chaucer to William Dean Howells. A university graduate's inaptitude in the art of writing may be due, however, not to faults in his university course; more likely it is due in part to inefficient methods employed in the schools in which he obtained his earlier training in English. On this subject Prof. Hill[2] is a competent witness:

As regards the results of the teaching of English in some of our best schools and academies I may be pardoned for referring to my own observation. Between 1873 (when Harvard College for the first time held an examination in English) and 1884 I read several thousand compositions written in the examination room upon subjects drawn from books which the candidates were required to read before presenting themselves. Of these a hundred, perhaps—to make a generous estimate—were creditable to writer or teacher or both. * * *

Almost all the writers use the same commonplace vocabulary—a very small one—in the same unintelligent way. * * *

[1] The principles of rhetoric, pp. 18–22, 1895.
[2] Our English, pp. 12–15, 1890.

The authors of these discouraging manuscripts may be justly regarded as the picked youth of the country. They were all boys with blood in their veins and brains in their heads and tongues that could talk fast enough and to the purpose when they felt at ease. Many of them came from the best families in point of culture and breeding and from the best schools we have. * * *

Every year Harvard sends out men—some of them high scholars—whose manuscripts would disgrace a boy of 12; and yet the college can hardly be blamed, for she can not be expected to conduct an infant school for adults.

The technical student's need of better training in English is becoming more generally recognized by professional scientific men. In his preliminary analysis of replies received from 23,000 circular letters sent to engineers to ascertain the needs of the profession Dr. C. R. Mann,[1] of the Carnegie Foundation for the Advancement of Teaching, writes:

In questioning the efficiency of the engineering schools at the present time there are four conspicuous things in which the professional men show a fair degree of unanimity. The first and most important is English. A large majority of the letters received mention the absolute necessity for higher efficiency in the training in English.

Some colleges are trying to supply this need. The Stevens Institute of Technology, for example, in its catalogue for 1916–17, states that "no effort is spared to impress upon the students that their success as engineers will depend largely upon their knowledge and use of language."

The most skillful and thorough training, however, including the attentive reading of models of expression, may fail to make a good writer of a student who is not in some degree naturally qualified to learn the art of writing well. Models are useful, even indispensable, but copy books do not make good penmen, and the literary style of some graduates of the universities resembles that of the masters of literature about as much as their handwriting resembles the models of good penmanship. It has been sadly remarked that in the arrangement of the order or disorder of natural things good health, not disease, might wisely have been made contagious; and the same melancholy reflection may apply to language, for the force of selected example is far less potent than the persistent contagion of misuse. Unhappily, too, a slovenly style that has become habitual is not likely to be much amended by perfunctory self-criticism, and effective self-criticism is extremely difficult. Fortunately for the scientific writer the reader expects far less from him than from the writer of "polite literature," whether of prose or poetry. He looks for no feats of imagination, no flights of fancy, no rhyme or rhythm, and few rhetorical figures of any kind—the fewer the better. All he

[1] Soc. Promotion Eng. Education Bull., vol. 6, p. 100, October, 1915.

asks is a plain description of something seen or inferred—of observations or experiments made and conclusions reached—and the plainer the tale the better he will like it. But this ideal simplicity is hard to attain. A French master of style[1] writes:

> A simple style is like white light. It is complex, but not to outward seeming. In language a beautiful and desirable simplicity is but an appearance, and it results only from the good order and sovereign economy of the various parts of speech.

Economy and efficiency in expression may well be studied by the man of science, not only for his own credit but in the interest of science itself. "Newspaper English" is a term of reproach, but scientific or technical English is no better; and this judgment applies alike to the work of old and young writers. Unfortunately, very little amendment in the ways of the older writers can be expected. It is never too late to learn, but it may be too late to unlearn. A well-known scientific man,[2] who is also a critic of technical English, rather despairfully writes: "It is too much to expect scientific men to make a study of the use of language; in that they continue to be far behind persons of lower intelligence." A former editor of the United States Geological Survey,[3] after many years' experience in his task, estimated that 19 per cent of the Survey's writers could be classed as "good." The estimate was liberal—perhaps too liberal—but its publication, though venturesome, should have helped to increase the percentage. The reports of the Geological Survey are no doubt written in better form than most scientific matter published elsewhere, but they can still be greatly improved. The many examples of bad expression given in this pamphlet are taken literally from manuscripts submitted to the Survey for publication, and these examples could be multiplied a hundredfold. It is hoped that their citation and correction here may stimulate the younger writers to avoid the gross errors exhibited and to devote at least a little time to studying the art of writing plain English.

Only a few satisfactory manuals of instruction in English are available for the use of scientific or technical writers, and even these must be read with full recognition of the fact that present-day English is in some degree in chaos, and that counselors are therefore divided by diverse personal preferences due to diverse usage. The dictionaries, too, must be used with vivid realization that as a rule they do not and can not prescribe usage—they only record it, and they record both good and bad usage.

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[1] France, Anatole, On life and letters, trans. by A. W. Evans, 1914.

[2] Rickard, T. A., A guide to technical writing, p. 46, 1908.

[3] Warman, P. C., A plea for better English in science: Science, new ser., vol. 18, pp. 563–568, 1903.

Sir Clifford Allbutt,[1] one of the few scientific men who have also undertaken literary criticism, writes:

> Certain critics have argued that as such and such a use, which I deprecate, is quoted by the New English Dictionary therefore the use is justified against me. I suspect that no one would be more taken aback by such a protest than the editor of that great work. A dictionary may give select uses or all uses; the editor of the New English Dictionary decided—wisely, in my opinion—to give all uses and to leave to the inquirer the advantage of comparing them and their sources for himself. The dictionary "sanctions" nothing of its contents, but it enables us by consultation of its stores to compare and choose for ourselves. In using this liberty we shall neither be subservient to the prescriptions of age nor scornful of modern freedom; in every use we shall be guided by historical growth, the example of the best authors, and our present necessities.

The scientific writer, above all others, should choose words that have precise meanings or to which precise meanings may be given. He knows how dictionaries are made—he may have helped to make them—and he should use them with discrimination and never forget that English is a live and growing language.

FIRST OR THIRD PERSON AND USE OF "WE."

An author should determine at the outset of his work on a report whether he will write it in the first or in the third person. Both "I" and "the writer" should not be used indiscriminately. If discreetly used the first person is no less modest or becoming than the third. Some reports may be written in impersonal form. The "editorial we," used in newspapers in the sense of "I," should not be employed. The use of "we" as seen in the following sentence should also be avoided: "If with these streams *we* include Deep and Clear creeks *we* have a group of gold-producing streams that flow from what *we* have seen to be the chief area of mineralization." Better "Deep and Clear creeks and the other creeks just mentioned form a group of gold-producing streams that flow from the chief area of mineralization."

If the author decides to write in the first person he should avoid the needless multiplication of "I." The "Argus-eyed" report is a source of vexation to the reader and of reproach to the writer.

ORDER WITHIN THE SENTENCE.

ESSENTIALS OF A GOOD SENTENCE.

It was Charles Lamb who excluded Government reports from the category of books, calling them "books that are no books," but the writer of a Survey report, after he has assembled his matter, must

[1] Notes on the composition of scientific papers, 2d ed., pp. x–xi, 1905.

arrange it in order and must verbally tie its related parts together just as if he were really making a book. If his report is long or intricate the unpracticed writer may find this no small task, especially if he aims to write well. An adequate vocabulary and a keen discrimination of the best meanings and proper uses of words are essential to all good writing, but still more essential is the ability to arrange words properly in sentences that will convey at once, clearly and forcibly, the ideas to be expressed. Three indispensable requisites in the construction of a good sentence are (1) the choice of the best or of a suitable subject nominative, (2) the determination of its proper place, and (3) the selection of an effective closing phrase or word. Order of statement or of arrangement is of primary importance, and related words and phrases should be kept together. Brevity is, of course, always desirable, but brevity should not be gained at the expense of clearness or correctness.

Probably every writer in the Survey has been put through the usual course in rhetoric and has learned some of the elementary principles of writing; he has been taught, for example, that the emphatic phrase or word should stand at the beginning or, better, at the end of the sentence, and that emphasis or force may also be gained by other devices, but the reports of many an author display here and there not his schoolboy knowledge but his adult forgetfulness of the elements of force in expression. So much of that earlier study was fruitless of practical results that many of its supposed lessons might be forgotten without serious loss. Thorough studies of Chaucer, of the obsolete style of the Spectator, or of the sounding periods of Burke's address on conciliation with the colonies are doubtless valuable, but if long continued they diminish the time available for the study and practice of present-day English—the sort of English that should be used by the writer of a report on mineral deposits or geologic structure and processes.

SENTENCES BADLY BEGUN.

Some writers unconsciously get into the habit of beginning sentences with "there is," "there are," "it is," a trick of construction that may not only multiply words but may have the effect of putting in an inferior place a subject nominative that should preferably stand at or near the beginning of the sentence. "There is no quartz in the ash and it is probably andesitic in composition" could be profitably rewritten "The ash contains no quartz and is probably andesitic," with nine words instead of fourteen and with a gain in force and clearness. Some other sentences of this kind are corrected below.[1]

[1] Corrections in the examples quoted in this pamphlet are indicated by italicizing the words that should be omitted and placing in brackets the words that should be added.

"*There are* many other primary minerals contain*ing* phosphorus."

"*There are* many sulphide deposits in low latitudes *that* do not show enrichment."

"*There are* [At] some places *where* lignite beds are exposed" (or "Beds of lignite are exposed at some places").

"*There has been* some faulting [occurred] subsequent to the deposition of the ore."

"*It is believed that* these vugs probably represent openings *which were* formed by recent faulting."

"*It is the belief of* the miners [believe] that the ground now worked may be a slide."

"*There is a probability that* some of the veins may have had their gold content increased by enrichment." Better: "The gold content of some of the veins may have been increased by enrichment." (See comments on next bad example cited.)

"There is some stibnite in the ore" is not so good as "The ore contains some stibnite"; the second sentence is not only briefer than the first but more normal and more forcible; it begins with a concrete term, the proper subject, "The ore," and it ends with the term that should stand at the end of the sentence, in the place of superior emphasis.

"There is little direct evidence from outcrops of the faulting" was written to mean "The outcrops afford little direct evidence of the faulting." "There is also a difference in the grade of the valleys" was replaced with advantage by "The valleys differ also in grade," for the context showed that "grade" was the term to be emphasized.

An initial "there is" or "there are" may also undesirably detach a sentence from one that precedes it, as in the following example: "The Niagara is mainly a light-gray to light-buff fine to medium grained dolomite. *There are* [It contains] both thick and thin beds, and at certain horizons *there is* considerable chert."

The phrases "There are," "There were," "There have been," "It is," "It was," "It has been," and like phrases may, of course, properly and preferably begin many sentences, but the writer who is about to use one of these phrases should consider whether he can not express his thought better in some other way.

WRONG SUBJECT NOMINATIVE.

The sentences quoted below show mischoice of subject nominative, with consequent wordiness and lack of clearness and force.

"*Precipitation of* silver is *accomplished* [precipitated] in many ways."

"*The principal use of* sheet mica is *in the manufacture of* [used principally in making] electrical apparatus."

"The *drainage of the* area is *accomplished* [drained] by three streams."

"The *exploration of the* region was *carried out* [explored] by Smith."

"During this epoch *aggradation of* the lowlands may have *transpired* [been aggraded]."

"The *mapping of the* quadrangle was *accomplished* [mapped] during the field season."

"The *discovery of the* auriferous lode deposits in this region *occurred during the year* [were discovered in] 1896."

"Thus *a sudden inundation of* the desert would be *accomplished* [suddenly inundated]."

"The *movement of the* ore solutions here must have *been* [moved] very slow[ly] or [have remained] practically stagnant."

"The *formation of the* ore deposits *occurred* [were formed] just after the igneous intrusions."

"*Confirmation of* these reports can not be *obtained* [confirmed]."

"The *collection of the* statistics *is done* [are collected] by correspondence."

"*The selection, equipment, and maintenance of* stream-gaging stations are *performed* [selected, equipped, and maintained] according to standard methods."

The writers of these sentences, having "used up their verbs" in their subject nominatives, could find no suitable predicate verbs and were compelled to employ instead mere auxiliaries or inappropriate words, such as the "accomplished" and "performed" seen in the first and the last sentence quoted.

A writer should consider whether an abstract or a concrete term will form the best subject nominative of the sentence he is writing, and also which one will permit the choice of a suitable predicate verb. The sentences quoted above have been corrected by the use of concrete instead of more or less abstract terms as subject nominatives.

UNDESIRABLE CHANGE IN CONSTRUCTION.

Many sentences that should preferably be written continuously through without change in construction are begun with a clause containing an active verb and inaptly broken by the unnecessary introduction of a new subject nominative that leads to the use of a passive verb at the end, with obvious loss of logical continuity and of clearness and force. The following sentences show this undesirable transition from active to passive verbs:

"These creeks flow through broad valleys until [they reach] the brink of the Cle Elum Valley *is reached.*"

"Water absorbed at the surface percolates downward until [it reaches] the zone of saturation *is reached.*"

"These vugs carry no gold and [do not affect] the tenor of the vein *has not been affected by them.*"

"The workings were closed and *examination of them* could not be *made* [examined]."

"The rocks show both bedding and cleavage, but *the amount of* [not much] metamorphism *has not gone far*."

"Perhaps several lobes here coalesced and [formed] a continuous glacier *was formed*."

"The main vein here splits *and* [giving off] a spur vein *is given off*."

"This series is made up largely of shale, *though* [but includes] much sandstone and limestone *are included*."

Occasionally a writer introduces this fault simply by "failing to stop when he gets through," as in the sentences quoted below:

"It contains coal plants and the remains of bivalve crustaceans *are found in it*."

"In June the company took over the Primrose claim and in July the Bluebell claim *was acquired*."

"The limestone contains considerable organic matter and chlorite *is extensively developed in it*."

The break in the continuity of some such miswritten sentences not only puts unemphatic words in the place of emphasis but detaches the final clause from the sentence, so that it hangs apart, without expressed relation to the matter to which it pertains, as in the following sentences:

"The deposits are composed of fairly well stratified rocks but [contain many] large irregular boulders *are numerous*."

"The district has been intensely glaciated and [includes] two distinct types of topography *exist*."

"The rock in this locality is of rather low grade and very little *mining* [of it] has been *attempted* [mined]."

"The coal-bearing beds are not overlain by glacial gravels, *so deeper weathering has taken place* [and have therefore been more deeply weathered]."

In many sentences the passive form does not afford the best means of expression. "It was expected to be found" is distinctly inferior to "I [or "The writer"] expected to find it." "It is believed by many geologists" is no better than the briefer statement "Many geologists believe." Phrases like "It is believed to be" and "It is supposed to be" are generally used only to express the writer's belief or supposition and serve merely to multiply words. The words italicized in the following sentences can easily be spared: "It is *believed to be* probably a stream deposit"; "It *is supposed that it* may be due to a fault." The reader will readily accept "may be," "probably," "perhaps," and like words as an expression of the writer's judgment of the probabilities.

MISPLACED WORDS AND PHRASES.

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." Other adverbs that are generally misplaced are principally, mainly, chiefly, alone, also. An example is seen in the sentence "The sediments were principally derived from quartzite."

Phrases beginning with prepositions also become misplaced, as shown in the following examples:

"Under such conditions it is easy to see that the commercial development of these deposits * * *."

"In 1917 it is probable that this region may be reached by railway."

"In Indiana recent writers have classified the rocks as Utica or Eden."

"On September 21 Mr. Martin stated that the trees waved when there was no wind."

"On level No. 2 it is reported that considerable realgar and orpiment were found."

"The samples were preserved for analysis in a paraffine-sealed flask."

"There is a band of coarsely crystalline limestone carrying bunches of garnet-pyrite rock from place to place."

"Care should be taken to see whether such wells are contaminated by frequent analysis."

Occasionally an adjective is misplaced or is misused for an adverb and misplaced, as in "A careful sample of this rock was taken for chemical analysis"; "The granite was intruded during the great period of structural deformation"; "Separated by a probable unconformity"; "Leaves room for little doubt"; "The luxuriant gray-green of the sagebrush"; "In the early spring of 1914."

Abnormal inversions such as the one shown in the following sentence should be avoided:

"In many places, however, grows the thorny, long-stemmed bush known as *Fouquiera splendens*."

MISLEADING FORMS OF EXPRESSION.

A writer should avoid the use of misleading phrases like "In the Cambrian limestones are found," which appears to lead to something beyond, still to be found, but was written to mean that limestones are found among the Cambrian rocks. Other misleading sentences are quoted below.

"The report represents a large amount of careful work and a comparatively small amount of good work would improve it materially."

"After finishing each well has its own history."

"The river contains many sand bars and several Government appropriations have been made for clearing its channel."

"The waters of collieries in Durham and Northumberland carry barium and barium sulphide has been found in pipes that lead from the coal pits."

These sentences can be improved by inserting commas, but a comma, even if its use is permissible, is generally an inadequate remedy for a miswritten sentence, and the worst remedy is mispunctuation. In the sentence "From the ice water overloaded with glacial débris discharged westward," the insertion of a comma after "ice" is an improper remedy for the unfortunate construction; the best remedy is to transpose the phrase "from the ice" to the end of the sentence and thus throw out the "ice water."

Other misleading expressions are quoted under "While," page 73.

CONTINUITY.

The long sentence need not be a source of vexation to the reader if it is well knit together and continuous. A series of long sentences may become tedious, and a series of short sentences, producing a "choppy" style, should be avoided. Long parenthetic clauses, whether set apart by parentheses, dashes, or commas, are likely to become tiresome and vexatious. If the reader must be halted by an aside the halt should be brief.

Above all things an author, even after he has observed the minor proprieties, should remember that logical order and easy continuity of thought are prime requisites of effective writing. Not only should his words and phrases be well chosen and arranged in sentences in an order that will lead the reader easily forward, but the sentences themselves should be properly grouped in paragraphs, and the paragraphs should be presented in logical sequence under suitable general headings.

REPETITION OF WORDS.

UNDESIRABLE REPETITION.

An author's chief care in writing a sentence, as in writing his report as a whole, should relate to order—he must see that the clauses, phrases, and words are in their proper places—but he must also see that his words are used in unmistakable senses, that unnecessary words are not used, and that words of certain classes are not overused. The psychology of style has not been much studied, but some

of its principles are obvious. A writer may repeat close together without offense any one of certain minor words; he may use again and again an article, a preposition, or a conjunction, like "a," "the," "and," or "of"; but if he often repeats in a single sentence or paragraph a word like "data," or "occurs," or "important," and especially a more unusual word, the repetition at once diverts the reader's attention from the subject matter to the words.

An author should not only avoid the overuse of a word of this class but should especially refrain from using it in two senses in the same sentence or paragraph. A distinguished university professor wrote, in a Survey manuscript: "These do not resemble the diatomaceous remains found in the chalky shale, and their character remains indeterminate."

PROPER REPETITION.

A writer should know, however, where to repeat exactly the same word he has just used and where to employ a synonym. A competent critic[1] writes:

> A notion is prevalent that the repetition of a leading word or words in a sentence or short period constitutes an offense called "tautology." In this false sense of tautology the mathematician might incur censure for the repetition of symbols in an equation. If the word first accepted be precisely the word wanted, to vary it is to vary the sense, to confuse the argument, and to vex the reader. In an able paper I read that "The sign x marks the beginning of * * *; y marks the commencement of * * *; z the occurrence of * * *," and in another: "In the first series the reaction was present on 37 occasions, in the second series it occurred 32 times, while in the third it was observed in 27 instances."

The term first used and farther along replaced by synonyms in the sentences below should be repeated as shown:

"The lowland slopes from an altitude of 200 feet above sea level in the northern part of the county to 170 feet above *the same datum plane* [sea level] in the southern part."

"It includes the southeastern part of Tillman County and the southwestern *portion* [part] of Cotton County."

"This species is based upon a single incomplete specimen; a second *example* [specimen] showing similar sculpture * * *."

"On the west side of the mountain * * * but on the east side of the *same eminence* [mountain] * * *."

A writer should especially avoid the use of the phrase "the same" for a preceding noun, as shown by the following sentences:

"Neither a mere report on the area nor a monograph on the same."

"In appearance it resembles epidote *and is often mistaken for the same* [, for which it is often mistaken]."

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[1] Allbutt, Clifford, op. cit., pp. 127–128.

The need of a synonym may be only fancied, as in the following sentence:

"The ore is commonly high in manganese and low in phosphorus and contains [little or] no titanium, *or at most only a trace of that element.*"

The sentence "Moose tracks have been observed by prospectors, and possibly *this animal* [moose] may occasionally stray into the district" illustrates a double impropriety; the phrase "this animal" in the second clause has no antecedent noun, for "moose" in the first clause is an adjective. Another rather similar sentence follows: "The rocks are termed hornblendite, *from the predominance of that mineral* [because their predominant mineral is hornblende]."

WORDS AND PHRASES MISUSED.

STILTED AND SHOWY WRITING.

Some members of the Geological Survey, if their manuscript reports can be trusted, never go anywhere—they invariably proceed: "From this point the writer proceeded to Oshkosh"; "the party then proceeded westward." Neither do they begin work; they inaugurate or initiate it. Nor do they get or obtain information; they secure it. If the area in which they are working is not large they would call it not small but limited or restricted. If they work in cooperation with State geologists the work is not done; it is conducted. Even some of the older Survey writers prefer the long and the wrong word, and many of the younger men forget their naturally simple and easy ways of speech when they sit down to write a Government report, the change in their mode of expression being similar to that wrought by love in a young man as described by Benedick in "Much ado about nothing":

> He was wont to speak plain and to the purpose, like an honest man and a soldier, but now he is turned orthographer; his words are a very fantastical banquet, just like so many strange dishes.

The writer who is thus under the spell of authorship will write of "superficial circulation," meaning surface water, or of "the vegetational aspect of the vicinity," or of "the ultimate nonanalyzed data of all happenings that may be apprehended"; or he may report that "the high-pressure area which collects over the Great Plains here accelerates the prevalence of westerly winds."

Some of the fantastic or pedantic phrases and ill-used words seen in manuscripts of Survey reports seem to be written to make a show of learning; others are evidently designed to be ornamental; but a

young writer's attempt at literary ornament may be merely ludicrous. A teacher of English [1] writes:

> Showy language, like showy dress, is in bad taste. The essence of artistic language, as of everything artistic, is not abundant ornament but appropriateness. Straining for high-sounding expressions to replace plain English makes a style weak and crude.

"Inaugurate" and "inauguration" may be reserved for use in Washington on March 4 and for other appropriate occasions; "initiate" is a good word to employ in connection with ceremonies in secret societies, for example, or, judiciously, in connection with some other things; and "secure" may properly be wedded to "security," if only to encourage the use of good English, particularly as the word is not needed in the sense of get, obtain, procure, assure, or insure. Even the dictionaries are disposed to proscribe the use of "limited" and "restricted" for "scant" or "small":

> Limited is often faultily used for small, scant, slight, and other words of like meaning, as "He has a limited acquaintance with Milton"; "sold at the *limited* [low or reduced] price of one dollar."—Standard Dictionary, 1913 ed., p. 1437.

The better critics of English, from whom the dictionary makers occasionally take advice, have noted the same fault. One of them [2] writes:

> Limited (from Mid. Eng. limiten=Fr. limiter, from Lat. limes, boundary), is often faultily employed for the plain English adjectives small, slight, scant. "His pecuniary circumstances were likely to be, for some years at least, very limited." This phrase, though not perhaps commendable, might be defended, the notion conveyed by it being the exact reverse of boundless or unlimited wealth. But in the two following passages limited is unquestionably wrong:
>
> "The cost of the volume was formerly five shillings; it is now published at the *limited* [low or reduced] price of one shilling."
>
> "If we may found an opinion on a *limited* [slight] acquaintance with the writings of Tieck." (An "unlimited acquaintance" would be strange.)

FROM THE STANDPOINT OF AND ON THE BASIS OF.

The phrases "from the standpoint of" and "on the basis 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

[1] Woolley, E. C., Handbook of composition, p. 9, 1907.
[2] Hodgson, W. B., Errors in the use of English, p. 43, 1889.

value of the land from an agricultural standpoint" means simply "The value of the land for agriculture," or "The agricultural value of the land." In the sentence "The conclusions stated appear to be warranted on the basis of the data presented" the word "by" may be used in preference to "on the basis of." The italicized words below may with advantage be replaced by the words in brackets:

"*The rocks on the basis of* [If classified by] size of grain [the rocks] may be divided into sandstones and conglomerates."

"If the laws applicable to metalliferous lands were modified in three features they would be reasonably satisfactory *from the standpoint of* [to] the miner and *of* [to] the public."

"The external factors, such as railroad transportation and markets, may determine absolutely *from the commercial standpoint* the [commercial] workability of the coal."

"A small area in Texas was examined *from the oil and gas structure standpoint* [to determine whether the structure was favorable to the occurrence of oil or gas]."

"A rock-cut trail, picturesque in the extreme *from the standpoint of* [in its] ruggedness and [in the] precipitous gorges and rocky slopes [it discloses]."

"*From a genetic point of view* [The genesis of] the coralline limestones *have* [has] been more carefully studied."

"This is too important a matter to be treated *from a careless point of view* [carelessly]."

"*From the mine standpoint* [At the mines] 114,000 tons were sold in 1914."

"*From the standpoint of* [According to] this theory."

"The ridge is symmetrical from a topographic standpoint" (=The ridge is topographically symmetrical).

"It may be questioned which part of the circulating water is the more effective *from the standpoint of* [for] solution and transportation."

"The formation is assigned to the Benton on *the basis of fossil evidence* [evidence afforded by fossils]."

"These three formations are [petrographically] very much alike *from a petrographic point of view.*"

"Let us now consider the [chemical composition of the] important rock-making minerals *from the general standpoint of their chemical composition.*"

"A flora which is of great interest *from a comparative paleobotanical standpoint* [to the student of comparative paleobotany]."

"[Considered geologically] The range may be divided into two parts *from a geological standpoint.*"

"If any such minor folds are present they are important *from the oil and gas standpoint* [in relation to the occurrence of oil and gas]."

"*Based on* [From] measurements made on photographs Brown estimates * * *."

"An attempt to frame a working hypothesis on an atmospheric basis" leaves the reader somewhat "in the air" as to the meaning intended.

ALONG THESE LINES.

"Along these lines" or "along this line" is condemned by the rhetoricians as "trite"; it is generally worse than that—it is not precise or at once clear and it usurps the place of better phrases. The following sentences can easily be improved:

"A large part of the area is irrigable, but *activities along this line have up to the present time been* [the irrigation now practiced is] confined mainly to the stream valleys."

"Investigations along petrographic lines" (=Petrographic investigations).

"These analyses were *conducted along the same lines* [made in the same way]."

In speaking of a certain mineral a geologist writes "Its application along all these lines is expanding," meaning "Its use for all these purposes is increasing."

OTHER MISUSED PHRASES.

The phrase "is responsible for" is improperly used where no responsibility is involved, as in the following sentences:

"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"; "These valleys will be referred to under the heading 'Geologic history,' where the glacial erosion responsible for their characteristic forms is narrated"; "The rock is earlier in age than the period of regional metamorphism that was responsible for the present structure of the inclosing schists."

"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."

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."

FORMER AND LATTER.

"Former" and "latter" are often misused. 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. A good general rule is to repeat the words to which they refer. Of course "former" and "latter" can not be used if there are more than two antecedents, as in the sentence "The granite consists of quartz, orthoclase, and biotite, the former constituting two-thirds of the rock." By some writers these words are used without reason, as in the following sentences:

"This lake, as well as Snowy Creek, drains into the Youghiogheny, *the latter carrying* [which carries] more or less drainage from adjacent farms."

"The quartz veins lie near bodies of muscovite-biotite granite, *the latter being* [which is] probably the latest rock in the region."

"These ores are associated with iron oxide, *the latter having been* [which has been] deposited nearer than the zinc to the lead ore."

These words are used by some writers in a way that absolutely conceals the meaning intended, which must be guessed or inferred from the context. Examples are given below.

"The concentration of the sulphide ion is so greatly affected by change of acidity that *the latter* [this change?] is the principal factor determining the precipitation of sulphides."

"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.)

Other bad examples follow:

"The house and the chimney swing with different periods under the impulse imparted by the movement of the ground, and the *latter* [chimney] is broken off, usually at the roof line."

"The mines and the smelter were operated until the first of November, the *latter* [smelter] treating an average of 360 tons daily."

"Most such deposits contain calcite, and where they carry copper-iron sulphides the latter will oxidize to carbonates, silicates, and oxides." (Most such deposits contain calcite, and any copper-iron sulphides they carry will oxidize, etc.)

In the following sentence there are no proper antecedents for "latter" and "former"; they appear to refer to terms of color instead of to the minerals of the colors named:

"In color the chrysocolla ranges from reddish brown to brownish black; rarely it is light blue. The latter has a vitreous luster and is crystallized, but the former is dull and in most places amorphous or crystalline."

Occasionally an author may employ one of the terms of this misused pair and give the true word for the other:

"When petroleum is forced through a bed of shale it is fractionated into its lighter and its heavier components, the *former* [lighter] passing through the shale and the heavier *parts* remaining."

"The color is probably due to both organic and inorganic material, the organic being doubtless more important than the *latter* [inorganic]."

"The geologic processes involved the intense fracturing of parts of the mass and the subsequent introduction of pyrite and chalcopyrite, the *latter* [chalcopyrite] very finely disseminated and intergrown with the pyrite."

After reading these sentences, all quoted literally from Survey manuscripts, the reader may see why many critical writers decline to use "the latter" and "the former," even where its avoidance is troublesome. Leslie Stephen[1] writes of the "special difficulty of making the 'he's' and 'she's' refer to the proper persons without the help of the detestable 'latter' and 'former.'" An eminent English historian[2] writes:

> I learned from Macaulay never to be afraid of using the same word or name over and over again if by that means anything could be added to clearness or force. Macaulay never goes on, like some writers, talking about "the former" and "the latter," "he," "she," "it," "they," through clause after clause, while his reader has to look back to see which of several persons it is that is so darkly referred to.

The "dean of American letters"[3] writes:

> Why any human being should write "the former" and "the latter" when all are at liberty to repeat with distinction the nouns that these pronominal stuffed images stand for we never could comprehend.

CASES AND INSTANCES.

The words "cases" and "instances" are by many writers habitually used improperly for "places" or for other words, or are used superfluously. Examples follow:

"The lowlands in some *cases* [places] contain lakes, the most conspicuous *instances* being Crystal, Glen, and Portage lakes."

"In a few *instances* [places], as at Clement Point * * *."

"In other *cases* [places], as in the Sharon field of Ohio * * *."

"This coal has been measured in several *instances* [places]."

"The cephalopods are in no *case* [place] abundant."

The author who writes that "Specimens in some cases show veins of calcite" does not intend to refer to specimens in cases; he means

[1] Studies of a biographer, vol. 1, p. 23, 1898.
[2] Freeman, E. A., Internat. Rev., September, 1876, p. 390.
[3] Howells, W. D., Harpers Mag., March, 1914.

simply "Some specimens," which should be denoted clearly by two words instead of doubtfully by four.

The following phrases and sentences contain objectionable "cases" and "instances":

"The appearance of [such specimens of] the ore *in such cases* as were examined."

"The enrichment observed in the *case of the* copper veins."

"*In* most of these *cases it has been found that the* coal beds have certain peculiarities by which they may be recognized."

"In Missouri a number of *cases occur where* coal beds have a thickness of 100 feet."

"*In the case of* the solutions affecting the monzonite *they* were evidently rich in potash."

"A small amount of calcite is in *rare cases* [a few places] associated with the quartz."

"*In most cases* metamorphism is [usually] accompanied by chemical changes."

"The classification was not sufficient *in all cases* to determine the status of [all] the lands."

"*In* many *cases* [of] these well records have been carelessly kept."

"*In certain cases* [Some of] these sink holes have been utilized by farmers as water reservoirs."

"This is the only *instance* [magnetite mine] in the quadrangle *of a magnetite mine* that is wholly in the limestone."

"In one *case* [specimen] of a fresh rock small prisms of augite are fairly abundant, but *in the majority of cases* [generally] the ferromagnesian silicates are represented only by chlorite."

"*In* every *case an* alteration product should be identified with extreme care. *In* each *instance the* supposed *fact* [identification?] should be scrupulously verified."

"If later sediments were deposited upon the Perry formation *as was the case* [in this region, as they were] in parts of New Brunswick, [they have been removed by] erosion *has removed all of them.*"

"*In* a few *instances* [of] the collections contain only two or three doubtful species."

An author who has studied and learned the art of making clear, simple, direct statements will not write "Instances of similar deposits were noted in several other cases"; he will write "Similar deposits were noted elsewhere," or "Similar deposits were observed at other places."

Occasionally an author uses the proper concrete term and farther along in the sentence employs "cases" or "instances" as a synonym, thus at once introducing two faults. (See p. 62.) An example follows: "In some places the conglomerate is composed entirely of

fragments of [gray or greenish-gray] shale, *and in such instances it is gray or greenish gray.*"

The first of the two columns below shows sentences containing undesirable or superfluous "cases" or "instances"; the second column gives interpretations in plainer English.

The fragments in a large number of cases show clear signs of glaciation.	Many of the fragments show clear signs of glaciation.
In some instances a connection is maintained with the ocean by narrow channels.	Some of the bays are still connected with the ocean by narrow channels.
In the great majority of cases where coal exists but has not been found to be workable it lacks one of three things—either quality, thickness, or accessibility.	Most unworkable coals are deficient in quality, thickness, or accessibility.
In the case of malacone the formula proposed is not absolutely certain.	The formula proposed for malacone is not absolutely certain.
As in the case of oil lands, phosphate lands are withdrawn * * *	Phosphate lands, like oil lands, are withdrawn * * *
In the case of Indian lands that are to be thrown open to settlement it is desirable to know beforehand what parts of the lands contain valuable mineral deposits.	Before Indian lands are thrown open to settlement it is desirable to know what parts of them contain valuable mineral deposits.
Grants of public land have in most cases been made through the States. In eight cases, however, grants have been made directly to corporations.	Most grants of public land have been made through the States. Eight grants, however, have been made directly to corporations.
One of the most interesting cases illustrated an instance of what appeared to be a puzzling case of vertical bedding.	One of the most interesting features of the deposit was what appeared to be a puzzling example of vertical bedding.

The habitual use of abstract terms like "cases" and "instances" for concrete, clearly significant terms that can be easily understood constitutes one of the worst vices of technical writing—it is one of the characteristics of "technese," that ill-written lingo that usurps the place of plain English. It not only multiplies words but befogs meanings, imposing unnecessary burdens on the reader. This vicious habit can be cured if taken in its early stages. The victim should ask himself, after he has written "cases" or "instances" or some other abstract term, "What do I mean by this word? What is the concrete thing about which I am writing?" He can generally find it without trouble, or he will discover that his "cases" and "instances" are mere excess verbiage.

The persistent avoidance of the concrete term by some writers who report work in physical science is seen not only in their habitual misuse of "cases" and "instances" but in their unnecessary and undesirable use of other abstract terms. In the sentence "Good

examples, some of them 5 feet in diameter," "good examples" means "typical boulders." The following sentence affords another illustration of this habit: "The degree of induration here is very great, and the rock fractures across the grains like a dense quartzite," meaning "The rock here is very hard and when fractured breaks across the grains like a dense quartzite."

CHARACTER, CONDITIONS, PURPOSES.

"Character," "conditions," "purposes," and like words are by some writers habitually intruded without reason into sentences in which they are superfluous or ridiculous, or both. The italicized words in the sentences below may easily be spared or may be replaced by the words in brackets.

"The surface is *of a* very uneven *character*."

"With proper drainage *conditions* the land could be made suitable for farming *purposes*."

"The deeper deposits have formed under *conditions of* high temperature and pressure."

"The flow of the stream was obstructed by ice *conditions*."

"Most of this petroleum is used for fuel *purposes*."

"*Under* [In] base-leveled *conditions* [regions] underground circulation is sluggish."

"The river here *loses its split-up character and* [is not split up but] flows in a single channel."

"Cypress trees growing in marshy *conditions* [lands]."

"The *soft nature* [softness] of the beds."

"The arkosic character of the beds appears to be prevalent in both regions" (In both regions the beds appear to be arkosic).

"The mesas are arid, and *because of their disconnected character there is* [as they are disconnected they afford] no means of storing water for irrigation *purposes*."

"Some work of an exploratory character" means "Some exploratory work," "under extremely shallow water conditions" means "in very shallow water," "tuffs of an andesitic character" probably means "andesitic tuffs," "public roads of fairly good character" no doubt means "fairly good public roads," and "stone suitable for building purposes" is simply "building stone."

Some other sentences in which "character," "conditions," and "purposes" are used undesirably are given below:

"The specimen of limestone collected is of a rather friable character."

"At later periods under less deep-seated conditions."

"The very thin character of the coal beds."

"The flat or gently rolling condition of the surface here gives way to an area of rugged topography."

"This steel is used for car-wheel purposes."

"The emerged condition of the region gave way to submergence."

"The cessation of operations in the smelter had little influence on the abandoned condition of the camp."

"These events reduced the area to a very low-lying condition."

"DOUBLED UP" HAVE, BE, AND BEEN.

Mark Twain, in his book "A tramp abroad," says:

> Harris said that if the best writer in the world once got the slovenly habit of "doubling up his have's" he could never get rid of it; that is to say, if a man gets the habit of saying "I should have liked to have known more about it" instead of saying "I should have liked to know more about it," his disease is incurable.

The "doubled-up have" is occasionally seen in the manuscripts of the Survey's writers, and "have," "has," and other auxiliary verbs are by some writers doubled badly, as in the following sentences:

"Faulting subsequent to intrusion has been shown to have been subordinate."

"These gravels have the appearance of having been deposited by moving water and have a strong resemblance to the Gila conglomerate."

"These fossils have recently been shown to be precise horizon markers."

"The known geologic history of the region may be said to have been begun in Silurian time."

"It is expected that by March the concrete will be begun to be put in place."

On the other hand, "to be" is often omitted where it should be used, as in "Cap Glacier is reported [to be] a thin névé field"; "The submarine topography appears [to be] chiefly the result of glacial erosion."

"Have" and "has" are used undesirably in the following sentences: "The deep erosion gives evidence that the rocks have a considerable age"; "The alluvial soil has much sand and gravel"; "The rocks have a flesh color"; "The sample had had no exposure to the air"; "This form has the width 2½ times less than the length" (incidental mathematical problem for the reader).

"Have" and "has" should be used as principal verbs with discrimination. "Has" would be a very proper word to use instead of "contains" in the sentence "This water contains a higher mineral content."

In the matter quoted below almost everything mentioned has something or seems to have something:

"The rocks have a typical schistose structure. The planes of schistosity have a dip that seldom departs greatly from the vertical.

The schistosity has a trend that is generally northwestward. The rock has a dark-gray color, and its surfaces have a satin-like luster."

Only one "have" is needed in the corrected matter, and perhaps even that one can be spared: "The rock is typically schistose, and the planes of schistosity generally stand almost vertical and trend northwestward. It is dark gray and its surfaces have [show?] a satiny luster." The author's "choppy" and badly written matter contains 43 words; the edited form contains only 28 words and expresses the same ideas better, without "choppiness," and it therefore shows a decided gain in economy and efficiency of expression, as well as an improvement in literary form.

WHILE.

"While" is too much employed by many writers, who use it as a conjunction instead of "though," "whereas," "but," or "and," as well as in its primary time sense, as an adverb.

Sir Clifford Allbutt[1] writes:

> I note that many of my candidates [for the degree of M. B. or M. D.] are content with one conjunction—"while," which is used indiscriminately for "and," "since," "although," "whereas," "notwithstanding," "nevertheless," "yet."

The same lack of discrimination is shown by some writers in the Geological Survey. These writers learned in their schoolboy days that "though" and "yet" are proper correlative conjunctions, but in Survey manuscripts they correlate "while" and "yet": "While this is the usual arrangement, yet * * *"; "While coal and oil command high prices, yet * * *." The "while" in the last sentence is also misleading, for at first it seems to be the adverb of time.

An author writes, "While this work is in progress it is not completed"—that is, "Before this work is done it is not done"; but the misleading "while" should have been "though." Some recent explorations in Alaska are reported in this fashion: "Martin and Stanton devoted about two weeks to the general geologic problems while Stone spent about a month in studying the coal measures." Time thus seems to have passed more rapidly with Stone than with Martin and Stanton; or a month's work in the coal measures may equal only two weeks' work elsewhere; or perhaps Stanton's two weeks and Martin's two weeks should be added to equal Stone's month.

The word "while" in the following sentences should be replaced by "and":

"In several of the Cretaceous formations they are among the most valuable diagnostic fossils, *while* [and] at a few localities they occur in great numbers."

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[1] Op. cit., p. 98.

"Much uncertainty has existed as to the specific and generic relations of these forms, *while* [and as to] their geologic distribution *has been much in doubt.*"

"While" should be replaced by a semicolon in the following sentences:

"At some places this zone is 4 feet wide[;] *while* at others it narrows to 10 inches."

"The strike is N. 40° E.[;] *while* the dip is 10° NW."

"While" has been so much misused for "though" and other words that one author who had written "while" where he really meant it felt compelled on revising his manuscript to change it to "during a time in which." In the sentence "While the sea was shallow some sand was deposited," "while" is used properly as an adverb of time, but as the word is so generally misused the author's meaning may not have been clear to some readers.

WITH.

"With" is much misused, especially for "and." Examples of its misuse for "and" are seen in the sentences quoted below:

"The vein has a northeast strike *with* [and] a vertical dip."

"The Permian series consists of shale, sandstone, *and* limestone, *with* [and] a few thin beds of coal."

"The rocks have been indurated [,] *and* tilted, *with some slight folding* [and slightly folded]."

"A small fissure striking north *with a dip of* [and dipping] 50° E."

"The ores in the limestone consist of crystalline aggregates of magnetite *with* [and] small amounts of other *associated components* [minerals]."

"At San Marcial the average rainfall is 4.84 inches, *with a* [and the] minimum *of* [is] 1.17 inches."

"With" is used in the sense of "but" and a verb in the following sentences:

"The rocks are mostly gray slate *with* [but include] some graywacke."

"The water is very clear *with* [but has] a faint bluish tinge."

"The surface of the bedrock is fairly even, *with* [but contains] depressions representing temporary channels of the shifting creek."

"With" is sometimes used in place of a verb, as in the following example:

"The rock is even grained, finely laminated, and well bedded and *with* [exhibits] clearly defined **horizontal jointing.**"

"With" is superfluous in the following sentences:

"The term mica *includes* [indicates?] a group of minerals having similar physical properties and *with* related chemical composition."

"The formation is made up of light-green, maroon, or purplish chalky-looking clay and marl, *with* a small amount of gray friable sandstone, and thin beds of gray or drab limestone."

"With" is not well used in the sentences quoted below:

"These strata have been bent into folds with axes running north and south."

"On March 10 there were about 15 inches of snow in the basin with a temperature of 15° above the normal."

The patient reader may correct the following sentences "according to his lights":

"A fine-grained rock which is greenish with blotches of a bright pink color."

"The conglomerate pebbles are well rounded with a very loose cement."

"The top of the mountain is flat with a smooth descent on the south and west."

"He discusses the geology of the county with descriptions of nineteen mining districts."

"New Orleans, a miserable little wooden town with 30,000 people and with 30,000 more in the rest of what is now the State of Louisiana."

The sentence "The adjacent lands and tributary streams are grass covered with scattered oaks" contains problems of vegetation and habitat that may baffle even the patient reader.

"With" and "by" should be discriminated in phrases like "was covered by ice," "is covered with ice." The grammarians and lexicographers say that "by" may indicate the cause or agent and "with" the means or instrument, a generalization that may be helpful but that does not invariably suggest a proper choice between these two prepositions. Write "This bed is overlain by," not "overlain with."

"Merges with" and "merges into" both appear in Survey manuscripts, but "merges into" seems to be the desirable phrase in most sentences, as in "The foothills here merge into the plains"; "These two merge into each other."

"Differ with" is sanctioned to express difference of opinion, as in "I differ with him," but "differ from" should be used to express other differences.

QUITE.

"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 sig-

nificance 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.

DEVELOPED, DEVELOPMENT.

"Develop" and "development" are used by Survey writers in too many senses. "Developed" is used to mean occurred, formed, exploited, worked, mined, or anything else that may happen to be in the mind of a writer who will not take the trouble to think of the word he really wants. A few of the diverse uses of "developed" and "development" are shown below.

"These were *developed* [formed] in greater thickness farther west."

"The only deposit that has been *developed* [worked, exploited]."

"In this district ore bodies of considerable *importance* [value?] have been *developed* [formed?, worked?]."

"Most of the mineral resources there *developed* [formed]."

"Here the vein is *developed in greater thickness* [is thicker]."

"The *large development* [great thickness] of Triassic sediments in this region."

"It is possible that its development was in Tertiary time" (=It was perhaps formed in Tertiary time).

"This differs from the underlying formation in the absence of andesite and in the *development* [presence] of thicker masses of slate."

"The *development* [exploitation] of the deposit will soon be undertaken."

"Barren gossans developed at depth yielded good deposits."

"There is much lateral variation in the *development* [thickness?, character?, composition?] of even the most persistent strata."

"At the crest of the hill the conglomerates are *typically developed* [exposed in typical form?, exposed in typical character and thickness?]."

"These salt pseudomorphs were observed on the south slope of the mountains, where they are *more prominently developed* [more numerous?, more conspicuous?, more nearly perfect?] than elsewhere."

"The body of shale above the Dakota sandstone was named the Mancos shale on account of its *characteristic development* [prominent exposures?] in the Mancos Valley" (=was named the Mancos shale, from Mancos Valley, where it is typically [conspicuously?] exposed).

"In its typical *development* [phase?] the formation is a series of dark clay shales."

"Neither the limestone nor the sandstone layer is *developed with sufficient uniformity* [sufficiently uniform?] to be traced for considerable distances."

"In some *cases* [places?] the quartz *is developed* [occurs?, appears?] in anhedral grains."

"Building stones are *better developed* [more common?, occur in greater quantity?] in adjacent quadrangles, and it seems probable that those of this area will not be much *developed* [exploited?, quarried?]."

"The nonmetalliferous substances *are either better developed* [are better exposed?, occur in larger deposits?] or [are] more easily exploited in adjacent quadrangles. It therefore seems probable that but few of the mineral resources *will receive much development* [will be much exploited?, will be much utilized?] in the near future."

"Here the plants of the century family attain their *greatest development* [largest size?, densest growth and largest size?]."

"These plants are here *present in less abundance and in more stunted development* [less abundant and smaller]."

PROVEN.

"Proved," not "proven," is the preferred form of the past tense and the past participle of the verb "prove."

Proven=proved; an improper form, lately growing in frequency by imitation of the Scotch use in "not proven."—Century Dictionary.

Proven [archaic]=proved; an irregular form, confined chiefly to law courts and documents. Proved is the true English preterit and past participle of prove.—Standard Dictionary, edition of 1913.

The judgments cited above apply to the past tense and past participle. As an adjective "proven" (from the Scotch) has been used by many reputable writers:

"They never abandon a proven falsehood."—W. S. Landor, Imaginary conversations, 1829.

"He had got his proven sword into his hand."—William Morris, An earthly paradise, 1870.

"Ask'd me to tilt with him, the proven knight."—Tennyson, 1872.

"We must accept it as a proven fact."—Sir Clifford Allbutt, A system of medicine, 1897.

VALUE.

A critic of technical writing[1] says, concerning the word "value":

The misuse of this word and its plural is a good example of a colloquialism, harmless enough in a stope or in a mill, but a solecism in literature. It is also an instance of the employment of the abstract for the concrete, one of the primary blunders in poor writing. "This mill is intended to extract the values

[1] Rickard, T. A., A guide to technical writing, p. 47, 1908.

in the ore" is a vague way of saying that it is meant to extract the gold or lead or silver or the valuable metals in the ore. Value is the desirability or worth of a thing; it is an attribute, not a substance. A man that designs a concentrator to "catch the values," might as well build a railroad to pursue a quadratic equation. Nevertheless, this vulgarism of the mining camp has crept into technical literature, and it can be found in articles otherwise well edited. Here are some examples:

"In sinking the values were lost." Meaning that the ore became poor, or that the valuable ore ended.

"The vanner saved all the values in the ore." Meaning the valuable minerals that the ore contained, or all that was valuable in it.

"And then the gold values are precipitated on zinc shavings." No, it is the metallic gold that is precipitated; you can precipitate a panic by reckless banking, but you don't precipitate anything so vague as values on something so tangible as zinc shavings.

In some papers "values" is undesirably used for figures representing quantities, as in the sentence "For part of a month multiply the values for one day by the number of days," "values" meaning "run-off," or "figures showing run-off."

RANGE.

"The coal ranges in thickness from 0 to 6 feet" and similar statements appear in some manuscripts. A reader who is told that two coal beds are "separated by 0 to 6 inches of bone" may wonder how great a separation would be made by 0 inches of bone. The sentence "The coal ranges from a thin film to a bed 6 feet thick" gives something tangible at each limit of the range of the bed; surely it can not range where it has no existence.

In a statement of range in size or price only two limits should be given. "The price ranges from $11 to $17 and $18 a ton" should be corrected to read "from $11 to $18 a ton." One limit only is also unacceptable. The statement that "The pebbles range in size up to 3 inches," or "The pebbles are up to 3 inches in size" gives only the maximum size, not the range; it is equivalent to the statement that the largest pebbles are 3 inches in diameter.

The following sentence, which is only one of many like sentences found in Survey manuscripts, conveys no very exact information: "Its thickness ranges from 35 feet or less to 175 feet or more."

"Range" is a better word to express gradation than "vary," which may well be reserved to indicate variations or fluctuations like those meant by the sentences "The flow of the well varies"; "The stream varies in width"; "The tide here varies greatly in height"; "The temperature in this region varies considerably." The words "range," "ranges," "ranging," however, should be used intelligently. They are not so used in the sentences quoted below:

"The concretions range from fine grains to 2 inches in diameter."

"It ranges in width from a narrow belt to 60 rods."

"Microcline phenocrysts ranging up to 2 inches long."

"The pebbles range in size up to 6 inches in diameter."

"Dikes range from a few inches to 8 feet wide."

"This deposit ranges from a thin veneer to several hundred feet."

"These pebbles range in size from peas to walnuts."

"They occur as nodules ranging in size up to a hickory nut embedded in shale."

SUCH.

"Such" is misused by many writers. "This is not such a large deposit" should have been written "This is not so large a deposit," or "This deposit is not so large."

Note also: "The water occurs in alluvial sand *of such fineness* [so fine] that ordinary screens are of no use," "These boulders *are of such size* [so large]"; "The time expended in the field work was *such* [so short]"; "The deposit is *of such hardness* [so hard]."

"Such" and "so" are erroneously used for "so much." "The rocks have been subjected to *such* [so much] metamorphism"; "The sands have been *so* [so much] disturbed."

THIS AND THESE.

"This" and "these" should not be used alone as subject nominatives where there can be any doubt as to their meaning or where the reader will be compelled to look back to find their antecedents. The missing noun can generally be supplied, with advantage to the reader.

HORIZON.

"Horizon" is improperly 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." In the following sentences "horizon" is used improperly: "Several thin horizons are resistant and stand out prominently"; "The total thickness of the horizon that carries the conglomerate is 20 feet."

IMPORTANT.

"Important" and "importance" are by some writers greatly overused. As a rule "important" is not the most appropriate word unless it is accompanied by some term denoting why or how the thing described is important, as "commercially important." It should not be used for "abundant," "conspicuous," "valuable," or any other word of clearly defined meaning. Note:

"The *most important* [best] route across the region."

"The most *important* [abundant] igneous rock in this area."

"The outcrops are few and are of little *importance* [interest] except for the *interesting* contact they show."

"These streams, named in the order of their *importance* [size], are * * *."

"The quartz is next in *importance* [abundance]."

OCCUR.

The word "occur," meaning to appear or to be present, is very much employed in geologic literature but is used in many places with doubtful propriety, where better words may be substituted. "Occur" is a proper and useful word, but there is no good reason for employing it in such sentences as these: "Trees *occur* [grow] on these slopes"; "The mines *occur* [are] in Pope and Hardin counties"; "Water fowl *occur* [may be found] here in enormous numbers."

SECTION.

"Section" is a word of many meanings, and its use in the sense of "area" or "region" should be avoided. The "section" of one sentence is likely to become the "region" of the next, as in "This mine is in the largest lead-producing section of Canada. This region is mountainous," and so on. In geologic reports "section" may with advantage be reserved to designate a land section, vertical section, cross section, and thin section, and perhaps for a few other uses, and "place," "locality," "area," "quadrangle," "district," or "region" may serve as geographic terms.

PROPOSITION.

A "proposition" is something proposed. The expression "a good commercial proposition" for a business venture that is likely to be profitable is newspaper slang (or "curbstone English") 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." The sentence "These dikes are possible large low-grade propositions" is only one of many such sentences found in Survey manuscripts.

FOLLOWING.

"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." This use of "following" may be due to contagion from bad newspaper practice, as in the sentences "Mr. Kellerman went West following a

prolonged illness"; "O'Brien left the place following his dinner." "Following this sandstone is a layer of shale" means "Upon this sandstone lies a layer of shale."

SUFFERED.

"Suffered" is a favorite word with some writers on geology, who often misuse it, as in the sentences "The deposits have suffered to some extent from erosion"; "The rocks have suffered much less from deformation"; "These rocks have suffered so much from metamorphism."

The following sentence can hardly be called good:

"Other acidic rocks were injected after the schist had undergone most of the metamorphism which it has suffered" (=Other acidic magmas were injected into the schist after it had been metamorphosed almost to its present state).

MAJORITY.

"A majority," a good phrase for use at election time, is improperly used for "most," as in "The large majority of the grains range in size up to a quarter of a millimeter" (an altogether bad sentence) or in "Some of the ore has gone to other smelters, but the majority of it has been treated here."

EFFECTS OF MISUSE.

The misuse of words and phrases by the slovenly writer makes their proper use less effective, for the more careful writer, even with all his care, fails to convey his ideas clearly to some of his readers because their minds have been dulled to the sense of propriety by general misuse. For example, the phrase "In regions approaching base-level" in a paper by a careful writer has a distinct, exact significance, but as used in the paper of the slovenly writer it may mean merely "In regions that lie nearly at base-level." The task of "digging" for the careless writer's meaning, or of inferring it, rightly or wrongly, is thus imposed upon the reader, who, even with all his efforts to interpret obscure words or phrases, may fall into gross misunderstandings.

WORDS AND PHRASES TO BE DISCRIMINATED.

TERMS OF DIRECTION.

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, as an adverb, not only "westerly" (a good adjective) 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" the adverb should be replaced by "farther 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."

Puzzles in direction appear in many reports: "About 8 miles north and a little west of Weatherford"; "About 100 miles south of west of this"; "In a ravine 1½ miles west and a short distance north of Hanover"; "The specimens were obtained along Milk River about 30 miles north and west of Cut Bank and from Two Medicine River at a point about 15 miles south and west of the same town."

TERMS DENOTING TIME AND PLACE.

Adverbs or adverbial phrases that by a strict definition should apply to time—such as "often," "sometimes," "at times," "always"—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 deposit gravel on all the terraces. 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." "In summer these stream beds are often dry" has an obvious meaning,

but it was intended to mean "In summer the beds of many of these streams are dry."

Sentences like "These rocks are often red," "The beds are often thick," "These boulders are often large" can easily be made reasonable by proper correction. A magazine writer, perhaps to promote Pan American good feeling, says "The women of Chile are often beautiful," but he does not mention times or occasions, and if his remark were translated into Spanish, with the temporary form of the verb "to be" (están), which his "often" would require, his reputation among the fair Chileñas would be undone. The boy who was admonished not to eat mushrooms and was told that "people who eat mushrooms often die" may have been justified in asking "How often do they die before they stay dead?"

Some equivocal or undesirable terms appear in the following sentences: "These pebbles almost never have striated faces" (=Few of these pebbles); "These rocks are nearly always red"; "These veins can frequently be recognized at a distance"; "The pebbles are usually light gray, though some are light yellow" (=Most of the pebbles); "These phenocrysts are often deeply corroded" (=Many of these); "As the moraine is rarely less than a mile and in many places 2 miles wide"; "The general tone of the conglomerate is usually dark gray"; "The complexity of the folding is *sometimes* [at some places] very marked, and complete details of structure at such places are difficult of discernment."

"When," "where," and "if," indicating respectively time, place, and condition, are misused by some writers, as in "*When* [Where] the thickness is greatest it is 250 feet," "The ore was richest *when* [where] it was most altered," "The limestones vary from light gray when fresh to pale yellow where exposed to the weather."

Terms denoting time and place are very generally misused in discussions relating to stratigraphy or to geologic history, as in the sentences quoted below:

"The granitic intrusion was probably late Jurassic or *lower* [early] Cretaceous."

"The beds may mark the upper part of this general period of sedimentation."

Note also "This fault can not be assigned to its proper place in geologic time."

PART, PORTION; PARTLY, PARTIALLY.

"Part" is generally preferable to "portion," and "partly" to "partially."

Part, the general term, denotes simply that which is or is regarded as a constituent or fraction of a whole; a portion is a part regarded as more or less independent, or (especially) as assigned or allotted to some particular indi-

vidual, function, or purpose; as, "Divide a minute into a thousand parts" (Shakespeare); "All are but parts of one stupendous whole" (Pope). "The priests had a portion assigned them" (Gen. xlvii, 22). "Father, give me the portion of goods that falleth to me" (Luke xv, 12).—Webster's New International Dictionary, 1910 ed., p. 1572.

The two words are used properly in the following extract:

"The Raton Mesa region is in the southern part of Colorado and the northern part of New Mexico. The Colorado portion is generally known as the Trinidad field and the New Mexico portion as the Raton field."

Partly in the sense of "in part" is preferable to "partially," for partially also means "with partiality."—A. S. Hill, The principles of rhetoric, p. 19.

"Partially" is common in the sense of "not wholly," but good use restricts partially to the sense of "with partiality."—A. S. Hill, The foundations of rhetoric, p. 132.

VERBAL, ORAL.

"Verbal" is misused for "oral," which signifies "spoken." Even the dictionaries make the distinction:

"Oral," "verbal" are often used as equivalent terms. But oral applies only to that which is spoken by word of mouth.—Webster's New International Dictionary, 1910 ed., p. 1512.

"Oral" applies to that which is given by spoken words in distinction from that which is written or printed.—Standard Dictionary, 1913 ed., p. 2642.

"Verbal" is much used for "oral," as "a verbal message"; and sometimes for "literal," as "a verbal translation." It is an old and proper rule of rhetoric that when of two words or phrases one is susceptible of two significations and the other of only one, the latter, for the sake of avoiding obscurity, should be preferred. By this rule we should say "an oral message," "oral tradition," "a literal translation."—Century Dictionary, 1911 ed., p. 6725.

"Verbal" is properly used in the following sentence:

"The differences between the two accounts are only verbal"—that is, the ideas are practically alike.

WATERSHED, DRAINAGE BASIN.

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.

SINCE, AS, AGO.

"Since," which is likely to be understood as an adverb referring to time, is by some writers used where it is misleading, and where the use of "as" would prevent momentary ambiguity. Note the fol-

lowing phrases: "Since these experiments were made to determine the order of solubility of the compounds studied"; "Since the war in Europe has affected ocean transportation"; "The validity of Smith's conclusion is in doubt since Brown found that * * *"; "Since the Snow Storm mine ceased production and the Lost Packer mine shipped only a few cars of matte, the increase during the year was due to * * *"; "Since the duty has been removed" (meaning "As the duty," etc.).

In the following phrase "since" is used in two senses: "Since the conditions since they were laid down."

"Since" and "ago" should also be discriminated, as in "Since the ice uncovered the nunatak, not many decades *since* [ago]."

VARY AND DIFFER; VARIOUS AND NUMEROUS.

"Vary" is misused for "differ," as in "These wells vary in depth," "The boulders vary in size"; and "various" is persistently misused for "numerous" or "many," as in the following sentences: "Gold occurs here and there on the ocean beach and *various* [numerous, many] attempts have been made to recover it"; "Native arsenic was found at *various* [several, many] places"; "Dredging has been done at *various localities* [many places]." (See also matter under the heading "Range," p. 78.)

EVIDENCE AND EVIDENCED.

"Evidenced" (a word to be avoided) is used for "evinced," "shown," "indicated," or "proved," and "evidence" is much overused, especially "fossil evidence." An Alaskan explorer says, "No fossil evidence was found in the limestone," meaning no fossils, or no traces of fossils. Note also "These beds are entirely recrystallized and [contain no traces] *evidences* of organic remains *are lacking*," a badly written sentence in which continuity and proper emphasis are lost by an unnecessary change of construction. (See pp. 58–59.) Instead of saying that a certain conglomerate contained pebbles of limestone a geologist writes "In this conglomerate limestone pebbles were in evidence."

OVER, MORE THAN.

"Over" is used in many phrases where "more than" would be preferable, as it obviously would be in the following sentences: "This coal is under the Lee conglomerate and over 4 feet thick"; "The dolomite dips eastward under over 20 feet of muscovite-biotite schist."

"Upward of" is also used undesirably for "more than," as in "The project will cost upward of a million dollars."

"Above" also may be used awkwardly instead of "more than," as in "Oxidation and segregation of iron oxides by weathering extends to depths *above* [below, of more than] 2,100 feet."

OTHER DISCRIMINATIONS.

"Something" is improperly 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 of the Jumbo vein, a thousand feet to the east"; "The same gravels are seen at Norwood, 2 miles farther south."

"Between" and "among," "each other" and "one another," "beside" and "besides," "balance" and "remainder," "liable" and "likely" may be discriminated according to rules given in the textbooks.

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"; "The line of strike of each fault is very crooked, due to the fact that the faults traverse a rugged country."

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

SUPERFLUOUS WORDS.

FOUND TO BE, KNOWN TO BE.

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," "The rich ore, when examined closely, *consists* [is seen to consist] of fine-grained drusy quartz."

PRESENT, PRESENCE.

"Present" is a prime favorite with many Survey writers but is generally superfluous, as in the sentences quoted below:

"The undulating strata mark one of the many local unconformities *present* in the arkose."

"Here cacti are *present in greater abundance* [more abundant] than on the plateau."

"Over each eye was a large horn, and *a third horn was present on the nose* [and the nose bore a third horn]."

"In most of its facies quartz is the most abundant mineral *present*."

"The metallic minerals *present* in the ores."

"Blocks of sandstone are *present* scattered over the surface."

"The cementing substances, *when present*, are quartz and iron oxide."

"The formation, *where present*, *varies* [ranges] from a few to 200 feet *thick* [in thickness]."

"In this area there are several irregularities *present*."

"Most of the sulphides *present* in these ores."

"By this means some of the zinc *present* in the ores is saved."

"Presence" is superfluous in many sentences, as in the following:

"*The presence of* open channels that extend downward to caverns may be seen at several places"; "The *presence of the* other sulphides of copper were not noted in the district" (wrong subject nominative but right verb).

SITUATED, LOCATED.

"Situated" and "located" are generally superfluous, as in the following sentences:

"One of the domes is *located* in sec. 31; the other is *located* in secs. 3 and 4."

"South of the axis of the principal anticline in sec. 13 there is *situated* a small syncline."

"The outcrops are *situated* on the shore *and in* close *proximity* to deep water."

"The largest of these outliers is *situated* 2 miles *to the* southeast*ward* of the canyon."

"This field is *located* 3 miles north of Bristol."

ALL OF.

The word "of" in the phrase "all of" is generally superfluous.

As a popular idiom all of is used to emphasize the totality of that which is referred to; as, "How many of these men did you see?" "I saw all of them." The best literary usage omits the of as needless, preferring "I saw them all." "I saw all [not all of] my friends once more."—Standard Dictionary, 1913 ed., p. 73.

All followed by of: This construction is comparatively modern and is probably due to form association with none of, some of, little of, much of, many of. Rare except with pronouns, as all of it, of whom, of which, of them.—New English Dictionary, vol. 1, p. 226.

The first citation given above represents the judgment of many literary critics, a judgment based on the assumption that, in phrases like "some of," "many of," "one of," the word "of" is a partitive—that is, a term implying partition or denoting a part—whereas in "all of" no expression of partition is intended. "The whole of" has been criticized on the same ground. A critic writes:

> One may say "the whole staff accompanied the general," or (for emphasis) "the whole of the staff," but it would be better to say "the entire staff," or "all members of the staff," not "all of the members of the staff." "I will take it all" is regarded as better than "I will take all of it."

But editorial critics should not mechanically cut out "of" after "all." In the phrase "Many *but not all* of these fragments are rounded" the italicized words may be superfluous, but whether or not they are cut out the "of" should stand.

ETC.

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—for example, the Telegraph, Commercial, [and] Old Jordan, *etc.*"; "The solution contained mineralizers, such as fluorine, [and] boron, *etc.*"; "The glacial features that give variety to the surface, such as moraines, kames, [and] eskers, *etc.*, are described"; "Any division based on the predominance of certain ferromagnesian constituents—for example, augite andesite, hornblende andesite, *etc.*—would be artificial." (See also pp. 95–96.)

OTHER SUPERFLUOUS WORDS AND PHRASES.

Superfluous and improper words are italicized below:

"Throughout *the whole of* the Mesozoic era."

"Throughout the *entire* area."

"A series of parallel ridges resembling in *their* form * * *."

"The problem is *a* difficult *one*." "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."

"The Survey has not *as* yet done any work in this region." (This "*as*" is a persistent intruder.)

"*As yet* no ore bodies of this type have [yet] been exploited."

"*As yet* but two regions have been thus far explored."

"The conditions were favorable for landslides *to occur*."

"Equally *as* well."

"It occurs in *disseminated* grains scattered through the rock."

"Most of the intrusive masses are *of* large *size*."

"The rock is *of a* red *color*."

"This lies *on the* southwest *side* of the line of the fault."

"The *color of the* fluorspar is dull green."

"A report giving the results of the work is in *progress of* preparation."

"*Subsequent to the formation of* [After] the Pleistocene terraces [were formed] *there has been* considerable phosphate [was] deposited *along the streams* in the *form of* flood plains and bars *of* [along] the present streams."

"No *side* streams enter Red River from the north."

"*At its base* the formation lies on a remarkably even surface of granite."

"About a mile *in a* northwest*erly direction from* [of] Fort Bayard."

Introductory phrases like "It may be said that," "It might be stated that," "Concerning this matter it may be borne in mind that," "In this connection the statement may be made that," "With respect to the occurrence of these ores it has been found that," perhaps intended to "break it gently" to the reader, are generally superfluous or can be replaced by single words, as in the following sentence: "*There can be little doubt that* this fissure is [doubtless] the prolongation of a fault *of the same character as the one* [like that] already described."

"During the winter months" or "In the summer time" are commonly used for "During the winter" or "In summer." Necessities of rhyme and meter may justify "the good old summer time," but Survey reports are not written in metrical form. "In the spring months" is not so common as "In the summer months" but is just as reasonable in phrases where "days" or "weeks" might with equal impropriety replace "months."

WORDS IMPROPERLY OMITTED.

Occasionally an author omits a word or words that may be needed to make a sentence complete. In the following sentences principal verbs have been added in brackets to the auxiliaries used: "The work was [done] for the State Survey"; "These surveys were [made] for economic reasons"; "The copper produced in Montana is [derived] almost entirely from the mines at Butte."

An infinitive is omitted from the following sentence: "The outcrop is reported [to be] traceable for 70 feet."

Essential words are omitted from the sentences quoted below:

"The work has been carried on under the general supervision of John Smith, [who was] assisted by William Jones."

"The rock is confined to comparatively small areas on Racetrack Creek near [the point] where it leaves the quadrangle."

"The following analyses *are* [represent specimens] from mines in the active part of the region."

The following sentence shows both defect and redundance:

"These rocks contain a few rusty-weathering beds [whose color is] due to *the abundance of pyrite in these particular beds* [the abundant pyrite they contain]."

Note also "The work done was under the supervision of" for "The work was done under the supervision of."

GRAMMATICAL ERRORS AND PROBLEMS.

ELEMENTARY ERRORS.

The manuscripts of Survey reports contain relatively few of the commonly recognized grammatical errors, though the copyist's occasional omission or addition of "s" introduces an error in number which is evidently not chargeable to the author. Some elementary errors appear, such as that seen in the sentences "Lake Superior is the largest *of any* lake in this region," "The timber in this area is the least marketable *of any* in the region," and "The Galena and Niagara dolomites have the greatest lateral extent of any formations in the area."

ERRORS IN THE USE OF PARTICIPLES.

Participles are misused in many sentences where the participial phrase should form a logical continuation of the preceding phrase or clause, explaining or amplifying it or so relating to it that the propriety of using the participle can not be questioned. Participles are used improperly in the sentences quoted below, for the participial phrases have no logical relation to the clauses to which they are added.

"The sandstones are more or less massive, occurring chiefly in the lower half of the formation."

"The discharge of the spring is about 8 gallons a minute, its temperature being 90°."

"This rock is mostly compact and hard, containing many organic fragments."

"The limestones are coarsely crystalline, their weathered surface being dark brown in color."

"Much of it is perfectly transparent, the oval grains being one-fourth inch in diameter."

"It [Douglas fir] grows between altitudes of 6,500 and 8,000 feet, the individuals averaging 16 to 18 inches in diameter."

The participle in the following sentence also is not in proper logical relation to the word to which it pertains: "Where the till is thick it is lighter in color, indicating less perfect oxidation" (=its color is lighter, indicating, etc.).

The participle in the following sentence may perhaps be used, if the added bracketed phrase is inserted: "Lakes are plentiful [and exhibit a wide range in altitude], occupying basins 100 to 2,000 feet above sea level."

A participle is occasionally used without reason as an adversative term, as in the sentence "It has a general width of 1 to 6 inches, *widening* [but] in places [it widens] to 12 inches."

Corrections involving participles have been indicated in the sentences quoted below:

"The quadrangle is well supplied with sand and gravel in the series of deposits *capping* [which cap] the Cretaceous shales [and] which have been mapped as outwash gravels."

"Narrow box canyons extend into the range from the southwest, *heading* [and head] against long valleys from the opposite side, thus affording low divides easy of passage."

The participle in the following sentence is superfluous: "They are therefore regarded as *being* of the same geologic age."

Some other sentences in which participles are misused are corrected below:

"The basal formation of the group here *occurs resting* [rests] upon the Tejon formation."

"These dikes *were found cutting* [cut] the granitic intrusives and *were noted cutting* the aplite dikes."

"Diabase dikes *occur cutting* [cut] the ore bodies."

"A fine-grained gray intrusive rock *was found lying* [lies] upon the formation."

"Remnants of quartzite *occur perched* [lie] along the crest of the ridge."

"The cliff *rises facing* [faces] the river."

"The dikes *were observed cutting* [cut] the ore deposits."

The "hanging" or "dangling" participle, the use of which violates the rule of grammar that the substantive to which a participle relates should appear in the same sentence, 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."

"Looking closer chatter marks were seen."

"Examined carefully no fossils were observed."

"Climbing up the bluff the confusion increases."

"Approaching the vein through the tunnel the serpentine is seen to be decayed."

"After entering the Alum Bluff formation a thick bed of clay was encountered."

The same fault is seen in the sentence "When fully explored other workable coal beds may be found here."

Some sentences that contain dangling participles are corrected below:

"Turning westward there is a striking change" (=Turning westward the spectator beholds a striking change).

"On going farther into the cave some bones were found" (=On going farther into the cave they found some bones).

"Not satisfied with this result the well was drilled deeper" (=Not satisfied with this result the driller sunk the well deeper).

In the sentence "In going seaward the boulders become smaller" the participle "going" seems to relate to "boulders," but the writer meant "Toward the sea the boulders become smaller."

The name of the thing or person to which the participle refers should not only be given in the sentence but it should be given in proper grammatical relation with the participle. "After examining an extensive suite of specimens I decided" is correct; but "After examining an extensive suite of specimens it seemed to me" is incorrect.

PROBLEMS AS TO SINGULAR OR PLURAL NUMBER.

Many writers appear to be in doubt whether certain nouns should take singular or plural verbs. The word "number" is itself an example. Both the following sentences are correct: "The number of men employed was greater in 1915"; "A number of the men were injured." If the thing or things represented by the noun or by the subject is viewed as a unit the verb should be singular; if the things are considered separately the verb should be plural. Examples: "He thinks that 30 cents is a high price"; "Three dimes were placed on the table."

The following sentences are correct: "It is reported that 15 barrels of oil stands in the well"; "At this place 20 feet of sandstone is exposed"; "About 3,000 tons was produced in 1915."

SUPERFLUOUS PREPOSITIONS.

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."

"Of" is superfluous after "permit," as in the phrase "too poorly preserved to permit *of* identification." "Admit" but not "permit" may be followed by "of."

"Of" is multiplied needlessly in many phrases, as in "An estimate of the cost of *the operation of* [operating] the filter." In most

such phrases a noun ending in "tion" and the "of" following it should be replaced by a participle ending in "ing." Many phrases in which "of" is repeated can be rewritten with advantage. "Following the discovery of the character of this deposit" means "After the character of this deposit was discovered."

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: "Each of the veins has been drifted on for from 50 to 70 feet." "This well was brought in in 1901." "This is equivalent to coal at at least $18 a ton." A newspaper account of a new flying boat announces that "it will cross the Atlantic in *from between* 12 to 15 hours," using three prepositions where one was enough.

THAT, WHICH, WHOSE.

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 to this distinction, however, 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 to designate things as well as persons, as "The only State whose production exceeded * * *."

THE "SPLIT INFINITIVE."

The "split infinitive," in which "to" is separated by an adverb or other word from the verb to which it relates, should preferably be avoided, notwithstanding the numerous examples of its use found in English literature by some eminent critics. Most of the "split infinitives" in Survey manuscripts are split without reason, to the detriment of the sentence in which they appear, as in "The miners intend to fully test this ground" (=to test this ground fully), and in "It was impossible to more rapidly perform this work" (=to perform this work more rapidly).

OTHER GRAMMATICAL IMPROPRIETIES.

The use of "are" with a singular predicate noun or of "is" with a plural predicate noun 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 large accumulations of sawdust *are* [constitute] a serious evil."

The reflexive pronouns "myself," "himself" should not be used for "I," "me," "him": "Long, Williams, and myself held a consultation"; "The place was named by myself"; "Lee believes that the locality described by himself * * *."

It is better not to "carry along" a singular verb to a second subject in the plural or a plural verb to a second subject in the singular: "The region was uplifted and the streams [were] rejuvenated."

"Underlain by" (not "underlaid by") and "overlain by" are correct forms.

The phrase "and [or but] 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 preserves * * *."

THE GERMAN COMPOUND ADJECTIVE AND OTHER FAULTS.

The German compound adjective is found here and there in English form in some manuscripts. One author writes of "the alcoholic copper acetate ammonia solution method"; another refers to "the natural gas production report"; and still another mentions "the west border of Bear Valley report." After seeing these Teutonic phrases the reader will not be surprised to find a hydrographer noting that by some means "the farther downward passage of the water is prevented," or a statistician writing of "a list of refined petroleum producers." Other similar phrases are "Calcite is rare as an igneous rock making mineral"; "A series of deep well and other water analyses"; "The white arsenic producing plants"; "A 30-ton capacity lead smelter"; "The mine still contains large 4 to 14 feet wide bodies of milling ore"; "A 6-foot wide strip of slate"; "The 425-foot well water."

Somewhat in the same fashion dates are used as adjectives, as in "The 1899 earthquakes in Alaska," "The 1912 results of primary triangulation." Instead of writing, in normal English, "The production in 1915 was greater than in 1914" a writer who has become infected by the newspaper use of such phrases will write "The 1915 production was greater than the 1914 production," with loss of emphasis on the terms compared. The writer of newspaper headlines has scant room in the column for his phrases, so we find "1915 speed

champions," "Heart disease victim," "Probes excessive living cost," "War state exists" (meaning state of war). An item about a Washington lady who had expressed objections to unnecessary or perfunctory social visits was headed "Useless calls foe."

The man of science may well leave to the newspaper writer such sentences as the following: "The thus far coldest weather of the 1915–1916 winter here was reached last night, when below-zero temperatures prevailed."

In the following sentence the phrase used at the end of the first clause should have been the model for the phrase to be used at the end of the second: "The replacement of pyrite by chalcocite would involve an increase in volume, while the corresponding replacement of chalcocite would *occur with a slight volume decrease* [involve a slight decrease in volume]." A similar undesirable discrepancy is seen in the sentence, "The layers of shale are much thinner than the *chert* layers [of chert]."

LATIN AND FOREIGN WORDS AND PHRASES.

"Data" (in many papers wrongly qualified by "this" or "much" or other term of singular number) is overused by some writers, appearing in places where better words can easily be found, and other Latin or foreign words and phrases are by many writers unnecessarily used where suitable English terms can be employed. Among these words and phrases are videlicet (viz), id est (i. e.), exempli gratia (e. g.), rôle, débouchure, in situ, brochure. The following sentences can be rewritten entirely in English without disadvantage: "These oxides were carried away in toto"; "Chalcocite enrichment is practically nil"; "The surface bore prima facie evidence of freedom from erosion."

"Pari passu" is a favorite phrase with some writers:

"This formation was laid down in local troughs *the sag of which proceeded pari passu with the deposition of the sediments* [that sank as fast as the sediments were deposited]."

"The compacting of the sandstone appears to have *proceeded pari passu* [kept pace] with the leveling."

"Per contra," "lapsus calami," and other Latin phrases are in favor with a few writers, whose manuscripts contain false plurals like lamina, lamella, foliae, and septae (for laminae, lamellae, folia, septa).

Even the generally meaningless "etc." can in many sentences be profitably replaced by significant English, as in "The gangue consists of quartz, *etc.* [and other minerals]"; "Damour, Hersch, *etc.* [and others]."

A scholarly critic[1] writes:

> I do not say that "etc." is not to be used, but its use should be rare, and chiefly for the omission of parts of quotations and the like. When used by the author to eke out his own matter or to save himself trouble the reader is disposed to exclaim, "If you have anything more to say pray say it; if not, finish your sentence properly; 'etc.' conveys no meaning at all."

"Etc." is not only superfluous but improper if used in phrases beginning with "such as," "like," and other words or phrases indicating that the things to be mentioned are cited only as examples. (See p. 88.)

EUPHONY.

Many violations of euphony, so called, are of practical consequence because they divert the reader's attention from the substance to the style of a paper. Examples follow: "Crustal movements crushed and crumpled the Cambrian rocks"; "Rocks of this character characterize the formation"; "The interval that intervened"; "The replacement in places took place"; "Rocks that form two unconformable formations"; "A much larger and longer lived lake"; "Not uncommonly conglomeratic"; "Further fissuring, faulting, and fracturing"; "Manuscript descriptions"; "Conglomerates with well waterworn polygenous pebbles"; "A somewhat similar series of sediments"; "Some with outlets and others without outlets"; "At the base of the diabase"; "Analyses in uniform form"; "The experiments made may aid"; "So far as known none"; "He pointed out some points"; "All are altogether altered"; "More modern methods of mining and milling."

A writer should avoid sentences like those quoted below:

"The writer made an investiga*tion* to obtain data for the classifica*tion* of the lands and the determina*tion* of the age and the correla*tion* of the forma*tions*, the results of the investiga*tion* to be used also in the prepara*tion* of a folio covering this sec*tion*."

"The descrip*tions* of the sec*tions* give informa*tion* showing condi*tions* that may affect the computa*tions*."

"The presenta*tion* of informa*tion* showing the varia*tion* of the streams under investiga*tion*."

A careful writer will leave to Walt Mason rhymed phrases like "The minor synclines in which are the mines," or "Some houses here are built of these rocks, which are easily quarried and shaped into blocks," or "The Wisconsin highland was at that time dry land," a couplet that suggests the old song "The bells of Shandon."

The following sentence contains a number of "faults" and "shoots" that make it ludicrous: "As the ore is richer at the junction of the *faults*, it is natural to suppose that if other *faults* are found

[1] Allbutt, Clifford, op. cit., pp. 158–159.

which off*shoot* from the main *fault* or which are branch *faults* from the off*shoots* of the main *fault* they will also contain rich ore *shoots*."

MINOR COUNSEL.

An author should avoid the use of phrases like "last year," "this year," "next year," "three years ago." Before the report is printed "this year" may have passed, and "last year" may be "two years ago." Write "In 1916"; "During the season of 1916."

"Leaser," a term used by some miners for "lessee," may be understood by others as meaning either "lessor" or "lessee." Use "lessee."

Write "strikes east," not strikes east-west; one direction is enough; and don't write "The stream here flows east-west."

Write "The strike is N. 40°–60° E." (not "40° to 60° E."); "The strike ranges from N. 40° E. to N. 60° E."—that is, in such phrases "to" should not be used unless it is preceded by "from."

It seems desirable to make a distinction between "contour" as applied to the surface of the earth and "contour line" as applied to a topographic map.

As the noun "outcrop" may be mistaken at first sight for the verb "outcrop" (as in "The rock outcrops in the stream bed are surrounded by gravel") some authors prefer to use "crop out" for the verb. The preference is at least worthy of consideration.

"Comprise," which is derived from Latin words meaning to seize together, should preferably be used with a plural object—one thing comprises several things. Some writers use it undesirably for "constitute."

"Except" is shorter and generally better than "excepting." "Except" and "exceptions" should be used intelligently, however, not as in the sentences here quoted: "The coast line is, with few exceptions, rocky and drops deep into the water close to the shore"; "With few exceptions this township is well wooded."

Phrases like the following should be avoided:

"A deposit of this type is described by Fenneman from Boulder County." (For "A deposit of this type in Boulder County is described by Fenneman.") "This plain connects with that described in the Driftless Area." "A marked faceting similar to that described on the pebbles of Nantucket and Cape Cod." "Roots in situ are described 10 feet below sea level." Note also "Pyrite is not mentioned in the Erebus mine," a statement that might appropriately be headed "Keeping it dark."

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 use of the shorter form. "Chemical" and "physical" are invariable, however, and both "economic" and "economical" are used, each with its own meaning.

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

Avoid phrases like "titanites, rutiles, and quartzes," for grains or crystals of titanite, rutile, and quartz. Note also the undesirable form "corroded crystals of quartz and a few sanidines."

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." "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." "It appears probable that it is a terrace deposit" (=It is probably a terrace deposit).

"Its" is used unfortunately in the following sentence:

"If a public well should encounter an open passage in limestone into which a drainage well carries sewage, typhoid may be communicated to hundreds of its citizens, even though the town might be miles from the source of contamination."

The following forms are recommended:

Half a mile, a quarter of a mile, three-quarters (or -fourths) of a mile.

East bank, side, end, corner, edge.

Eastern part, portion.

Easterly dip, direction, trend.

Eastward-dipping, -trending, -flowing.

Extends eastward.

Lies in contact; comes or brings into contact.

Dynamic metamorphism (not dynamometamorphism); dynamically metamorphosed (not dynamometamorphosed).

Shark teeth (not shark's teeth); fish scales.

At an altitude of 100 feet (not at 100 feet altitude).

Triassic time, Cambrian and Ordovician time (not times).

300 acres or more (not 300 or more acres).

From this place (not from here).

To a point near Akron (not to near Akron).

To and beyond Snake River (not to beyond Snake River).

SUMMARY OF THE FEATURES OF A GOOD MANUSCRIPT.

A well-prepared manuscript submitted to the Geological Survey for publication exhibits the features indicated below:

1. It is typewritten on sheets of uniform size that have been kept flat, not folded or rolled, and that are numbered continuously. The margin of white paper at the top, bottom, and left is ample, and the lines are far enough apart to permit easy and legible correction.

2. It includes a title-page, a table of contents (headed "Contents"), two lists of illustrations (headed "Illustrations"), one a carbon, and two lists, one a carbon, giving complete titles of the plates, with all explanatory matter that should appear on or below them. It does not include the illustrations themselves—the drawings and photographs—which are inclosed in a separate envelope or package. The pages of manuscript on which the headings appear are indicated by numbers in the table of contents (see p. 10), and the pages on which the plates are principally mentioned or described and those on which the titles for the figures are written are indicated by numbers in the list of illustrations (see p. 11).

3. It is logically arranged in divisions and subdivisions under not more than five orders of center headings and one order of italic side headings, and the headings designate the things described or discussed, not the discussion.

4. It contains references, in numerical order, to all illustrations, as well as full explanations of them or of such of them as may require explanation in the text.

5. It includes, in numerical order, at the proper places, the full titles of all text figures, in the exact form in which these titles should be printed.

6. Its citations or quotations from other books are literally correct, and the beginning and end of each extract are clearly indicated, either by quotation marks or by distinctive spacing of lines.

7. Its footnotes, which include the titles of all works or papers cited, have been verified by the author and are in the forms prescribed on pages 21–29.

8. Its tables, chemical analyses, and geologic sections are provided with headings and are written in proper form for printing. The summation or footing of every column of figures is correct.

9. Its geographic names are in the forms prescribed by the United States Geographic Board or other designated authorities, and its geologic names have been examined and approved by the Survey's committee on geologic names. (See p. 13.)

10. Its paragraphing has been carefully determined and indicated, so that few if any changes in this respect will be needed.

11. Its expression has been well considered and conforms to the following requirements:

(*a*) If the report is economic or is likely to be called for by untechnical readers it is written in simple, straightforward English, with words in common use and of generally recognized meaning.

(*b*) It is written in the first or in the third person, not in both, and not with the editorial "we."

(*c*) The subject and subject nominative of each sentence have been carefully chosen.

(*d*) As a rule the subject nominative stands at or near the beginning of the sentence; or at least it is not so far removed from the beginning by the introduction of adverbial or other clauses that the reader is long kept in suspense.

(*e*) Adverbs and adverbial or other qualifying phrases are put in proper places.

(*f*) If emphasis on some term or phrase is desired it is gained by proper arrangement, so that the emphatic word or phrase stands at the beginning or, preferably, at the end of the sentence or clause.

(*g*) Its author and the typewriter operators who wrote it have noted and profited by the suggestions and directions given in this pamphlet.

(*h*) It has been written with the fact in mind that easy writing is hard reading, and care has therefore been taken to consider the reader's requirements.

12. It has been read carefully in its complete form by its author, who at the same time had before him, for reference, the drawings and photographs intended for its illustration.

TYPOGRAPHIC STYLE.

The Survey publications conform, in general, to the Style Book of the Government Printing Office. A few of the more important rules are given below. A pamphlet entitled "Extracts from the Style Book of the Government Printing Office," which contains more rules and much other valuable matter, may be obtained from the editor of the Survey.

CAPITALIZATION.

Capitalize "State" (noun or adjective), singular or plural, and terms applied to groups of States, as North Atlantic, South Atlantic, Middle Atlantic, Gulf, Middle, Western, Pacific Coast States; also terms denoting sections of the United States, as the West, the South, but write eastern Gulf States, western Central States.

Capitalize "government" in phrases like Government control, and capitalize "national" where it is followed by a word that is capitalized, as National Government.

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

Archipelago	Draw (streamway)	Isle	Plateau
Bar	Falls	Lagoon	Point
Bay	Forest	Lake	Pond
Bayou	Fork	Landing	Port
Borough	Fort	Mesa	Range
Branch (stream)	Gap	Mount	Reservation
Butte	Glacier	Mountain	Ridge
Canyon	Gulch	Narrows	River
Cape	Gulf	Oasis	Run
Channel	Harbor	Ocean	Sea
County	Head	Parish (La.)	Sound
Crater	Hill	Park	Spring
Creek	Hollow	Pass	Strait
Delta	Inlet	Peak	Valley
Desert	Island	Peninsula	Volcano

Capitalize also the words "hills," "islands," "mountains," or "springs" where they immediately follow names denoting groups of natural features, as Black Hills, Aleutian Islands, Rocky Mountains, Hot Sulphur Springs.

The word "valley" should be capitalized if it is used as a name, as in Mississippi Valley, San Joaquin Valley, Santa Clara Valley, but not if it is used as a descriptive term, as in San Joaquin River valley, Rock Creek valley. By this rule "valley" is capitalized if "river" or "creek" is omitted.

Lower-case "basin" if it means a drainage basin, as Potomac basin, James River basin; capitalize it if it is used as a name, as Denver Basin, Bighorn Basin, Paris Basin.

Capitalize the word "the" where it is part of a geographic name, as The Hague, The Dalles (Oreg.), The Weirs (N. H.).

Note the capitalization in the phrases below:

Allegheny Front
Appalachian Plateau
Appalachian province
Atlantic Coastal Plain
Badlands (South Dakota and Nebraska); but as a common noun, badlands
Canal Zone (Panama)
Capes (Charles and Henry)
Coastal Plain region
Continental Divide
Cumberland Plateau
Delta (of Mississippi River)
Driftless Area (upper Mississippi Valley)
Eastern Shore (Chesapeake Bay)
Falls (Niagara)
Gulf (of Mexico)
Gulf Coastal Plain
High Plains
international boundary
Isthmus (of Panama)
Lakes (Great Lakes)
Lower Peninsula and Upper Peninsula (Michigan)
Piedmont Plain (or Plateau)
Plains (Great Plains)
Plateau province
Sound (Long Island Sound)
Staked Plain

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.

In titles of books or articles capitalize only proper nouns or proper adjectives. Use quotation marks in text; see pages 21–29 for style in footnotes.

Capitalize the names of genera, families, orders, etc., but lower-case the names of species, as *Ostrea bryani*, *Sequoia reichenbachi*. Lower-case anglicized forms of Latin names, as brontosaur, foraminifer, bryozoan; also coined adjectives like aviculoid, fenestellid.

The proper use of capital letters in geologic names is indicated on pages 13–14.

Capitalize terms used with roman numerals as titles, as Chapter VI, Plate IV; also Form 9–247, Table 14.

Capitalize prepositions, such as "van," "von," "de," "d'," "da," "della," or "di," in foreign personal names if used without the forename, a professional title, or a title of nobility or of courtesy, as Van't Hoff, Von Humboldt, De Verneuil, D'Orbigny, Da Ponte, Della Crusca, Di Stefano. Lower-case such prepositions if they follow the forename, a professional title, or a title of nobility or of courtesy, as J. H. van't Hoff, L. G. de Koninck, Fischer de Waldheim, Alcide d'Orbigny, Señor da Yznaga, G. dal Piaz, P. del Pulgar, G. dell'Acqua, Capt. di Cesnola, Constantin von Ettingshausen.

Lower-case the words in the list below that were originally proper names or were derived from proper names:

belleek ware	delftware	india ink	roman (type)
chinaware	gothic (type)	india rubber	russia (leather)
china clay	harveyized steel	macadamized road	wedgewood ware

ABBREVIATIONS.

Use the following abbreviations for names of States after the names of cities, towns, counties, reservations, or national forests; also lakes, rivers, or other natural features:

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

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

Use "St." for Saint, but write "Fort" and "Mount."

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 S.; Rs. 14 and 15 W.; T. 13 N., Rs. 7 and 8 E. Note use of "the."

Names of railroads should not be abbreviated. Use the correct form—"railroad" or "railway." If an old name must be used for identification give also the present name. The railway guide will settle most doubtful points of this kind.

Use "short and" (&) only in firm or corporate names, as Allyn & Bacon, John Wiley & Sons, Chesapeake & Ohio Railway, American Security & Trust Co. Names of persons who are associated in literary or similar companionships should be connected by "and," as Gilbert and Brigham, Meek and Hayden, *Cyrtolites disjunctus* Ulrich and Scofield.

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

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

Use "No.," not #, for "number."

The degree mark should be used with figures in statements of dips and strikes, and the terms of direction should be abbreviated: A dip of 10° SE., or 10° S. 35° E.; the strike is N. 55° E., or N. 45°–70° E.; but the dip is southeast—that is, terms of direction should be spelled out unless figures are given.

In text use "feet" and "inches," not ′ and ″. Over a figure column use "Feet" or "Ft. in." Write 16 by (not x) 24 inches.

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

In text and indexes write names of months in full, but in tables, leader work, and footnotes, if name of month is followed by figure or figures indicating day (as Mar. 9, Sept. 26), use the following abbreviations:

Jan.	Apr.	Sept.	Nov.
Feb.	Aug.	Oct.	Dec.
Mar.			

May, June, and July should not be abbreviated.

In the text and in reading columns of tables all units of measurement should be printed in full.

Where it is proper to employ abbreviations for the terms listed below, use the forms given.

B. t. u. for British thermal units.
c. c. for cubic centimeter.
cf. for compare.
c. i. f. for cost, insurance, and freight.
etc. for et cetera.
feet b. m. for feet board measure, when used with figures.
f. o. b. for free on board.
kw. for kilowatt.
op. cit. for opere citato (in the work cited).
per cent (omitting period) for per centum.
R. R., Ry., for railroad, railway.
sec.-ft. for second-feet.
ser. for series.
sp. gr. for specific gravity.
U. S. Army for United States Army.

Abbreviate Plate (Pl.), figure (fig.), page (p.) if used in parentheses or in footnotes. (See also pp. 24, 40.)

SPELLING AND COMPOUNDING.

Webster's New International Dictionary is the authority adopted by the Government Printing Office for spelling and compounding and will be generally followed; but note the form of the words below:

acidic	cerusite	groundmass
acre-foot	clue	inclose
afterward	downward	laccolith
aluminum	draft	perlite
arrastre	employee	pneumatolytic
asbestos	eolian	poikilitic
backward	esker	reconnaissance
badlands	farther (distance)	second-foot
base-level	further (not distance)	siliceous
boulder	fluorspar	toward
briquet	forward	upward
can not	gage	volcanism
canyon	gastropod	vug

Most compound adjectives that precede the nouns qualified take hyphens, as "first-class work," "enlarged-homestead act," "pig-iron manufacture," "40-horsepower engine," "3-inch pipe." Use a hyphen after "well" and "ill" in phrases like "a well-established industry," "ill-advised action"; but write "the industry is well established." Omit hyphens if the first word of the compound adjective is qualified by another term, as "a fairly well defined rating curve"; also if one or more of the words are capitalized, as "Portland cement industry," "Geological Survey work." The prefix "non" is usually joined to the word it qualifies, but write "non coal-bearing rocks." Adverbs ending in "ly" are not compounded, as "hastily written matter," "carefully prepared report." A chemical term used as a compound adjective should not be hyphenated, as "iron carbonate water."

The ordinary rule for compound adjectives applies to color terms: Bluish-gray shale, light-green clay, light greenish-gray marble, slightly purplish gray marble, milk-white quartz, blue-green tourmaline, deep-reddish dolomite, gray-greenish beds, pale cream color. Hyphenate also, in any position, (*a*) a color term made up of two color names: The tourmaline is blue-green in color, this marble is pink-white; (*b*) a color term made up of a color name preceded by a noun that indicates the shade: Brick-red, olive-green, jet-black, sky-blue, milk-white, verdigris-green, flint-gray; (*c*) a color term made up of a noun that indicates the color followed by "colored," "tinted," or some similar word: Cream-colored, salmon-colored, tan-colored,

ivory-tinted. "Colored" should always be used with a term that in its primary meaning does not express color, as chocolate-colored clays, not chocolate clays.

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

Write trans-Atlantic, trans-Mississippi, trans-Pecos, pre-Cambrian, post-Carboniferous.

Rules for the use of hyphens in rock names, with examples, are given on pages 14–17.

USE OF ITALIC.

Foreign words are printed in roman, not italic.

In lists the names of fossils are printed in roman; in the text the names of genera and species are printed in italic, as *Inoceramus fragilis*, *Ostrea congesta* Conrad, *Productus*, and names of families and higher groups are printed in roman, as Brachiopoda, Mollusca.

The words *See* and *See also* should be printed in italic in indexes, glossaries, and like matter.

Italic should not generally be used for emphasis; the matter should be so phrased that its emphatic part need not be indicated by a mechanical device like the use of italic type.

USE OF FIGURES.

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). If the matter is not statistical spell out isolated numbers less than 10 (nine stamp mills; seven days; but "The cement was tested at 4, 28, and 160 days").

Avoid a mixture of common and decimal fractions.

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. The sentence may be rewritten: "The production was 4,850 tons in 1906 and 5,180 tons in 1907." Arrangements of figures or numbers shown in the following examples should also be avoided if possible: "This makes the total mileage of levels run in 1906 38,307 miles"; "In 1906 464 tons was produced."

In writing decimals supply a cipher if there is no unit, as 0.25; 0.900 fine; it costs $0.3365 a pound; scrap at 0.75 cent a pound.

Metric amounts should be given in decimals: 0.5 millimeter (not one-half), 1.5 liters (not 1½).

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

Use a. m., p. m. (not A. M., P. M.) with figures denoting clock time.

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.

Spell the word indicating date in such expressions as "the early seventies," "it occurred in the eighties."

For a fiscal year or a year extending into the following year (except 1900–1901 and like combinations) use a dash and contract, as 1875–76, 1801–2; for a period of more than two years do not contract, as 1875–1879, 1895–1904; for two or more separate years use a comma, as 1894, 1895; 1873, 1876; 1888, 1891, 1894.

PUNCTUATION.

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: "The sandstone is white, hard, and fine grained; the shale is dark, firm, and even textured; and the limestone is massive."

Use commas before conjunctions (such as "and," "but," "or") in a sentence made up of separate clauses, each with its own subject nominative: "The ore is of low grade, but it has been worked." Note, however, "The ore is of low grade but has been worked." The presence or absence of the new subject nominative therefore determines the presence or absence of the comma.

Omit the period after "per cent" and after numbers (1, 2, 3) that stand over columns in a table.

Nouns (including proper names) ending in s in the singular number take the apostrophe and s in the possessive case, as Jones's, Stokes's. The plural possessive form is Joneses'.

Use no period at the end of an equation or formula written on a line by itself.

Note the punctuation in the forms T. 13 N., R. 8 E. Willamette meridian; T. 13 N., R. 8 E., Mount Diablo base and meridian.

A page reference should stand between parentheses unless it reads into the text: "This area is shown on Plate X (p. 150)" (not "Plate X, page 150"); "shown on page 150."

A series of adjectives that precede the noun they qualify should be separated by commas if they are coordinate in application, as "long, slender, tapering cones"; "lofty, rugged mountains"; "deep, narrow canyons." If they are not coordinate they should not be separated by commas, as "yellowish-gray clayey sand"; "homogeneous earthy material"; "hard-drawn 19-strand No. 0000 copper cable"; "3-phase 60-cycle alternating-current generator." In these phrases all the matter that follows each adjective is a unit to which that adjective applies. In the phrase "a narrow, elongate muscular scar" each of the first two adjectives is superposed on the unit formed by the third adjective and the noun—that is, "muscular scar" is described by the two coordinate adjectives "narrow" and "elongate," and the phrase should be punctuated accordingly.

Clauses of the two classes discriminated follow: "Hard, impervious subsoil"; "hard clay subsoil." "Dark, fertile loam"; dark sandy loam." "Short, swift streams"; "short tributary streams."

One who is in doubt concerning the punctuation of such a phrase should ask "How much of this phrase is a unit?" Some such phrases contain more than one unit. In "a 2-horsepower Fairbanks gasoline engine" there are three units—the last word, the last two words, and the last three words. No comma should be used just before a unit.

The following phrases are punctuated according to the rules given above:

Hard, compact quartzitic sandstone.
Greenish blocky clay shale.
Gray, rusty-weathered quartzitic sandstone.
Hard coarse gray to buff sandstone.
Tough, hard gray siliceous shale.
Gray carbonaceous fissile clay shale.
Soft greenish micaceous sandy shale.
Light-buff to white fine-grained quartz sandstone.
Thin-bedded shaly magnesian limestone.
Impure mottled shaly limestone.
Hard dark-gray fine-grained calcareous sandstone.
Buff crystalline siliceous limestone.
Drab indurated and nodular calcareous shales.
Dense blue-gray crystalline limestone.

CORRECTION OF PROOF SHEETS.

PRINTER'S TERMS AND PRACTICES.

To the printer "copy" is manuscript or matter to be set in type. "The matter has been read by copy" means that the manuscript has been read aloud by a "copy holder" to a proof reader who has held the proof sheets in hand and corrected them to agree with the manuscript except so far as the forms used in the manuscript may contravene the prescribed rules of printing, for unless the matter is to be followed literally (marked "fol. lit.") the proof reader will correct obvious errors in spelling, capitalization, and punctuation.

The first proof taken (or "pulled," as the printers say) at the Government Printing Office is called a "galley" proof because the type is assembled or imposed in brass galleys. The first galley proof is read by copy and corrected, and a second galley proof is then taken, revised (that is, compared with the corrected first galley), and sent to the office or bureau that furnished the manuscript. Proof received from the Government Printing Office is not read by copy in the Survey. By bureau and printing office procedure, generally slow—exasperatingly slow to the author except while he is himself reading the proof—the matter gets by stages into first page and second page proof. The first page proof, after it has been revised with the galleys in hand and otherwise corrected, may be approved for printing if it bears only a few corrections, but generally a second page proof is requested, and this is ordinarily the final proof, in which, as a rule, only typographic errors can be corrected. After the final proof has been approved for printing and returned to the Government Printing Office the matter is electrotyped and the book or pamphlet is printed from the electrotyped plates.

The time that ordinarily elapses between the date of approval for printing and the date of publication ranges from one to three months.

GENERAL RULES.

Galley proof will ordinarily be sent to the author; also page proof if desirable and practicable. The proofs will bear marks made by proof readers and editors—corrections, suggestions, and queries. These marks should be carefully noted, and special attention should be given to queries—question marks on the margins 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.

Only reasonable corrections can be made in the galley proof, not radical alterations; and only slight, inexpensive changes will be permitted in the pages. As a rule additions can be made only to the galleys. If 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, and the place at which the added matter is to be inserted should be clearly indicated. Proof should be corrected and returned promptly to the editor of the Survey, who has been instructed to conform strictly to the requirements stated in this paragraph and must ignore all corrections made in violation of them.

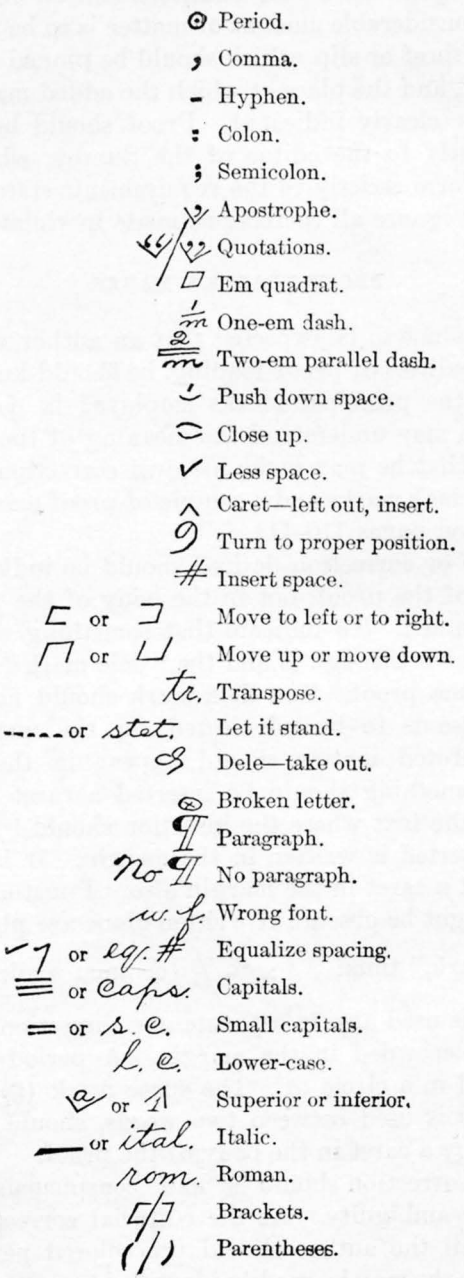
PROOF READER'S MARKS.

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 corrections are given on pages 110–111.

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" (ℌ) placed in the margin of the proof. The dele mark should not be employed if something else is to be substituted for the matter expunged; 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 where 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.

All marks of correction should be made conspicuously and legibly, without possible ambiguity. As the editorial corrections are made with black pencil the author should use colored pencil or ink, in order that his marks may be readily identified.

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.

Out, see copy

over

4/?

SOME DON'TS ON PROOF READING.

Don't write corrections or additions in the body of the printed matter. Write them on the margins of the proof sheets, placing each correction opposite the line to which it pertains. Don't run "skyrocket" marks from the place where a correction should be made to a mark or added matter written at some distant place on the margin of the proof sheet unless there is no room for the correction opposite the line to which it belongs. Don't cross one "skyrocket" mark with another.

In correcting proof sheets don't put a caret ($\wedge$) in the text except where something should be added. Never put a caret in the margin. If anything in the text should be replaced by something else, simply make a mark through the matter or sign to be replaced and write the substitute on the margin of the proof sheet, without making a caret anywhere. If something should be cut out (not replaced by something else) strike a mark through it and write in the margin the sign ꝺ, a form of d, meaning delete (cut out).

Don't put a "stop mark" (/) at the left of matter written in the margin. This mark may be needed to separate one marginal correction from another or to call attention to a hyphen, comma, or other small sign in the margin, but it should follow the sign, not precede it. An added period should be encircled ⊙; if written without the circle it may not be seen.

DIRECTIONS TO TYPEWRITER OPERATORS.

Typewriter operators who are preparing matter that is to be printed should familiarize themselves with such parts of this pamphlet 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 and leader work," "Geographic names," "Hyphens in petrographic terms," "Quotations and citations," "Footnotes," and "Typographic style." They should also examine recent Survey publications, noting the style of the table 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 the top of the page, an inch at the left, and at least half an inch at the bottom. The printers prefer that every page begin with a paragraph; therefore do not start a paragraph near the bottom of a page. Every page should be numbered. Temporary page numbers should be placed at the bottom.

The title of the report should appear not only on the title-page, but at the top of the first page of text, with the author's name below it, the name to be written between dashes, one above and one below, as shown on the first page of the text of all Survey publications. The title-page should contain only the title of the report and the author's name.

In the 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 should be capitalized in the text. Use leaders to page numbers (see p. 10), 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.

"Continued" lines should appear at the head of every page of a table of contents, to show the indention and relative rank of the items. Note the example below and see printed reports for examples.

Geology ---------- 36	Geology—Continued.
Sedimentary rocks ---------- 36	Sedimentary rocks—Continued.
Cretaceous system------- 36	Tertiary system---------- 38

In the 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 the style of recent printed Survey reports. Make a separate list for full titles of plates, containing explanations of details. Make carbon copies of both these lists.

For all headings use capitals and lower-case (small) letters; write nothing all in capitals. The relative rank of the headings should be shown by indention in the table of contents. (See p. 10.) 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 for italic, with period and dash after each heading. (See side headings on pp. 30–39.)

Write quoted matter or extracts of more than three lines single spaced—that is, with but half the usual space between the lines. Write all other matter double or triple spaced.

For reference marks in text use superior figures (^{1}, ^{2}, ^{3}); in tables use superior lower-case letters, underscored for italic, as $^{\underline{a}}$, $^{\underline{b}}$, $^{\underline{c}}$, not asterisk (*), dagger (†), etc.

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.

See that the footnotes are in the forms prescribed on pages 21–29.

Follow Webster's New International Dictionary in the use of hyphens. All the compound words in that dictionary are listed in a pamphlet entitled "Extracts from the Style Book of the Government Printing Office," which may be obtained from the editor of the Survey. Observe especially the rules for the use of hyphens in petrographic terms and the accompanying list of names on pages 14–17. Note also rules given on pages 104–105 for the use of hyphens.

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.

Omit the period after viz, per cent; also after numbers (1, 2, 3) that stand over columns in a table.

If a parenthetic reference to pages or illustrations is made at the end of a sentence, it 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. 127)." "The limestone is dolomized here as at some other places. (See p. 156.)" Note, however, "The reports of the *Challenger* expedition (see p. 118) contain valuable information on this point." 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 93." 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 pages 105–106 for the use of figures and words to express numbers.

Write "half a mile," "a quarter of a mile," not "a half mile," nor "$\frac{1}{2}$ mile." Spell out fractions that stand alone, as "one-eighth," "three-fourths"; but write "$3\frac{1}{2}$," "$1\frac{3}{4}$," where the fraction does not stand alone but is joined to a whole number.

Operators 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 pages 100–102 in regard to capitalization and note the list of abbreviations of names of States given on page 102.

Use a. m., p. m. (not A. M., P. M.) with figures denoting clock time.

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, in abbreviating second and third.

In copying manuscript "spell out" (that is, write in full or in words) any abbreviation or number that is encircled with pen or pencil mark, and write a small letter instead of a capital letter through which a vertical or diagonal mark has been drawn.

In copying matter that has been edited follow copy in all respects; do not change the style or punctuation. The editor has prepared the matter for printing, and disregard of his marks necessitates his doing the work twice. The marks indicating style of type need not be copied. Copied matter should be compared with the original before it is returned to the editor, and the original should be returned with the copy.

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 the end of a line of matter that is followed or should be followed by leaders. (See sample table of contents, containing leaders, on p. 10.)

Don't begin a sentence with a figure.

Don't write one figure upon another so as to cover it and to produce an uncertain result, as a 3 upon an 8 or a 5 upon a 6. Erase fully the figure first written before correcting.

Don't use ″ for "Do." or "do.," meaning ditto. In tables use "Do." (capitalized) in first and last columns; "do." elsewhere.

Don't use % for per cent, nor # for No.

Don't underscore foreign words for italic.

Don't underscore names of fossils when they are arranged in lists or in tables. In text underscore the name of genus and species (or genus, species, and variety), as Spirifer, Spirifer crispus, Spirifer crispus simplex, but not the family, class, or other name, as Lingulidae, Mollusca, Brachiopoda.

Don't underscore center headings, and don't fail to underscore side headings.

Don't put footnotes at the bottom of the page. (See p. 21.)

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

Don't write anything single spaced 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 blue prints 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 direction applies to tables and footnotes as well as to text.

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