J. G. Sohn

UNITED STATES DEPARTMENT OF THE INTERIOR

SUGGESTIONS TO AUTHORS

OF

PAPERS SUBMITTED FOR PUBLICATION BY THE UNITED STATES GEOLOGICAL SURVEY

✦

FOURTH EDITION

UNITED STATES DEPARTMENT OF THE INTERIOR
Harold L. Ickes, Secretary
GEOLOGICAL SURVEY
W. C. Mendenhall, Director

J. G. Sohn

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WITH

DIRECTIONS TO TYPISTS

By GEORGE McLANE WOOD
EDITOR, 1908–1925

✦

FOURTH EDITION
(REVISED AND ENLARGED)

By BERNARD H. LANE
EDITOR, 1925–

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Note to fourth edition

The third edition of Mr. Wood's "Suggestions to authors" was published in 1916 and has been reprinted seven times in response to continued and widespread demand, which has included requests from many foreign countries. Although the pamphlet has thus obviously proved useful, experience in using it has shown that expansion to set forth still more clearly the reasons for the suggestions would be desirable. Mr. Wood fully realized this need and had hoped to find time, after his retirement from the Geological Survey, to prepare a manual of somewhat wider scope for outside publication. He had accumulated some material for this purpose, but the requests for his help on technical manuscripts left him so little time of his own that death found his hope unfulfilled.

As Mr. Wood's associate for the last 20 years of his Government service and his successor in office, I have ventured to attempt a revision and expansion of the "Suggestions." The present edition, like the others, is intended primarily for Geological Survey authors or prospective authors: it is not the manual of wider scope that Mr. Wood had planned, and it contains none of his new material. If authors outside the Survey shall continue to find the suggestions useful, that will be a byproduct that testifies to the quality of the Survey's standards, which were established early in its history.

Some sections have been entirely rewritten, much new matter has been included, and an effort has been made to clarify and expand suggestions that have proved to be so brief as not to be readily understood by some authors and to add suggestions beaten out on the anvil of daily work in editing Survey manuscripts. If some of the explanations seem almost rudimentary and therefore unnecessary for scientific writers, the answer must be that experience has proved that they are not unnecessary—that some writers need just such explanations to enable them to recognize the faults in their writing and understand how to correct them.

The examples of faulty expression given in this book are all genuine, and all but a very few have been taken from manuscripts submitted by Survey authors. Some of them have been shortened by omitting words not essential in illustrating the point to be made, but none have been "manufactured" for the purpose.

The suggestions relating to reports on mining districts have been rewritten by G. F. Loughlin, chief of the section of metalliferous deposits, and a new section on ground-water papers has been contributed by O. E. Meinzer, chief of the division of ground water. The suggestions relating

to paleontologic papers have been revised by J. B. Reeside, Jr., chief of the section of paleontology and stratigraphy; the section on geologic names has been checked by H. D. Miser, chairman of the committee on geologic names; and the section on chemical terms and symbols has been checked by R. C. Wells, chief of the section of chemistry and physics. Valuable help has been given by my assistants on the editorial staff, Arthur W. Harkness, Mary F. Bugbee, and Anna Jespersen.

The section on typographic style has been changed to bring it into accord with the recently revised Style Manual of the Government Printing Office, and some additions have been made to the directions to the Survey typists, whose cooperation is so great a help in lessening the mechanical work of the editorial staff.

B. H. L.

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SUGGESTIONS TO AUTHORS

By GEORGE McLANE WOOD

Fourth edition, revised and enlarged by BERNARD H. LANE

General requirements

Although the geologist may with advantage include in his field notes [1] carefully written descriptions that can be transcribed literally into the manuscript of his report, he 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, maps, or half-tone plates produced from photographs. Moreover, an illustration may show clearly what it would be practically impossible to set forth in the text.

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 recent 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 relating to reports on mining districts, paleontologic papers, and papers on ground water are given on pages 31–43 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 on other pages, which apply to all Survey publications.

[1] Hayes, C. W., Handbook for field geologists in the United States Geological Survey, pp. 45–60, 1908.

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—that is, the first page of the abstract (see pp. 43–45), not the first page after the abstract.

If the report has been prepared in cooperation with a State or other organization the cooperation should be acknowledged on the cover and title page, in the form "Prepared in cooperation with * * *", and stated fully in the text.

Survey reports are not generally divided into "chapters", and headings are not numbered.

The use of numerous cross references, especially references to "another part of this paper" or "a subsequent connection", is not desirable. It may be necessary to repeat, in another connection, a statement that is made elsewhere in the report, but such a repetition should not be preceded by "As already stated" or a similar phrase—in fact, reference to the original statement is unnecessary unless it contains details to which the reader's attention should be again called but which would occupy too much space if repeated. (See also p. 91.) Such terms as "earlier" and "later", implying time, should not be used in cross references; it is better to cite the page numbers, but as page numbers cannot be supplied until the paper has reached the stage of page proof, such references should be kept at a minimum.

The material in a Survey report should rarely need apology or explanation. It must be generally recognized that no author is writing a monograph on every topic which he mentions and, on the other hand, that if he discusses some subject he believes it of sufficient importance to justify the space taken. The reader may be assumed to be more interested in the subject matter than in the author's mental processes.

Every paper should include an abstract setting forth its principal results or conclusions. Suggestions to authors of abstracts, revised from a circular prepared by a committee of the geologic branch, are given on pages 43–45.

In many papers it may be desirable to include 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. Entries in a bibliography should be written in the style prescribed for footnotes on pages 16–30.

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 revision (if necessary) and approval of that part of it which pertains to the work of his branch. If the paper contains geologic names both text and illustrations should be referred to the chief geologist for checking by the committee on geologic names, before it is transmitted to the Director.

All Survey manuscripts are prepared for the printers by the editorial staff 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. 103–111.) Much of this work is done according to prescribed rules, such as those of the Style Manual of the Government Printing Office, or mandatory decisions, such as those of the United States Geographic Board, the Division of Geographic Names, or 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, the clarification of obscure passages, the elimination of repetitious or irrelevant matter, and many other features, such as are discussed under the general heading "Suggestions as to expression" on pages 49–102 of this pamphlet.

After editorial revision the manuscript will be returned to the author in order that he many 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 editor 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 on letter paper of ordinary thickness and uniform size. Government letter paper is 8 by 10½ inches; the size commonly used outside the Government is 8½ by 11 inches. A mixture of these two sizes is awkward to handle and should be avoided. 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 typewriting should be on only one side of the paper, double- or triple-spaced. Nothing should be written single-spaced except literal quotations, and care

should be taken to see that they are really literal, as single-spaced writing does not leave room for corrections. Ample margins should be left—an inch at the top and left and at least half an inch at the right and bottom.

Because the copy is distributed to the typesetting-machine operators in lots of a few pages each, no paragraph should be broken at the bottom of a page. To remedy breaks in paragraphs it is necessary to cut and paste the manuscript—a task that consumes time, adds to the expense of printing, and produces sheets of different sizes, which are inconvenient to handle. For these reasons manuscripts intended for publication should, as far as possible, be so written that each paragraph is complete on the page where it begins. It is not necessary to fill every sheet completely with writing. Short pages are better than broken paragraphs. It may happen that a single paragraph cannot be kept within one page, but such long paragraphs should be avoided if possible. If new matter for which there is not room on the page already written 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 may be necessary to write the copy for wide tables on large sheets, which should preferably be either twice or four times the size of the regular sheets. Copy for tables should not be crowded, and the whole of a table need not appear on one sheet. Matter for long bibliographies or other similar works may be written on cards.

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, beginning with the cover or title page, not with the first page of the text.

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 separate from the manuscript, not inserted in it, but should 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"). Only words that should be capitalized in the text should be capitalized in these lists.

The table of contents should be a transcript of the headings appearing in the manuscript, so written as to indicate by indention their relative rank—their coordination and subordination. The manuscript page numbers given should be those that have been finally assigned, after the manuscript is complete. A specimen table of contents is given on page 5.

CONTENTS

The list of illustrations should contain only brief titles, but these should correspond, as far as they go, with the full titles that are to be printed with the illustrations. The manuscript page numbers given in the list should be those of the pages containing the principal references to the respective illustrations. It is especially necessary to give these page numbers, so that they may serve as a guide to the final numbering of the illustrations if any of the author's figures are made plates, or vice versa. A specimen list of illustrations is given below. The words "Plate" and "Figure" are each written only once, and the numbers are alined as shown. Two copies of the list should be furnished—the original and a carbon. (See also pp. 46, 47.)

ILLUSTRATIONS

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 5. All coordinate or similar groups of matter should be provided with headings of similar rank.

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 may be italic side headings; the others are center headings. The rank of the center headings will be shown by printing them in distinctive faces of type, properly graded as to size. The word or words that immediately follow a side heading should preferably not consist of a mere repetition of the heading, but as the text should be complete in itself, independent of the headings, so that it will be perfectly intelligible even if read without them, some repetition may be unavoidable.

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, should be used rather than "General statement", but it is not necessary to insert a perfunctory heading over a brief general statement that precedes detailed descriptions for which appropriate headings can be provided. Headings like "Introduction" and "Summary" are exceptions to the rule stated above, but some manuscript reports contain too many headings of this kind, especially "Introduction", which is used in numerous places where it should be omitted or replaced by a heading denoting specifically the features considered in the text beneath it. 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 to the Director 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	Pre-Cambrian.	

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

Q Quaternary	Ŧ Triassic	O Ordovician
T Tertiary	C Carboniferous	Ꞓ Cambrian
K Cretaceous	D Devonian	pꞒ pre–Cambrian
J Jurassic	S Silurian	

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.

A dagger (†) preceding a geologic name indicates that the name has been abandoned or rejected for use in classification in publications of the United States Geological Survey. Quotation marks, formerly used to indicate abandoned or rejected names, are now used only in the ordinary sense.

Geographic names

In the spelling of geographic names preference will be given to (1) decisions of the Division of Geographic Names (or its predecessor, the United States Geographic Board), (2) quadrangle maps published by 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 Division of Geographic Names for determination. As that division 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 used with names of rivers and in general with group names in the plural (or equivalents of such names) but not with names of creeks, runs, arroyos, washes, etc., nor with names of single mountains or peaks: The Colorado River, the Potomac and Susquehanna Rivers, the Middle Fork of the Piedra River, the Great Smoky Mountains, the Spanish Peaks, the Cascade Range; Rock Creek, Difficult Run, Salt Wash, Mount Mitchell, Pikes Peak.

In a few geographic names "The" (capitalized) is an essential part of the name: The Needle, The Dalles, The Weirs.

Care should be taken to avoid repetition in such names as Sierra Nevada (not Sierra Nevada Mountains), Blue Ridge (not Blue Ridge Mountains), Rio Grande (not Rio Grande River).

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 the same class are connected by a hyphen; others are not. For example, in "hornblende-quartz andesite" the two mineral names are connected by a hyphen; in "quartz monzonite

porphyry", consisting of a mineral name, a rock name, and a textural name, no hyphens are used. 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" or "gold quartz veins", 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 unit modifier preceding some other word—for example, bostonite porphyry, bostonite porphyry dike.

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."

acmite trachyte
actinolite-magnetite schist
adamellite gneiss
aegirite-augite
aegirite granite
aegirite 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
syenite porphyry
talc schist
tephrite tuff
theralite porphyry
tourmaline-biotite schist
tourmaline granite
trachyte-andesite
trachyte tuff
tridymite trachyte
tuff-agglomerate
tuff-breccia
uralite diorite
zoisite-hornblende diorite

Tables and leader work

The purpose of a table is to present in a concise and orderly manner information that could not be presented so clearly in any other way. Leader work is a simple form of tabulation, usually only two columns, printed without vertical or horizontal rules.

A table should preferably 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.

As a rule each table or leader-work statement should be provided with a concise, clear heading that indicates the principal items of information included. It is undesirable 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 (table 1; not table I, nor table no. 1). The words "Table showing" should not be used in the heading, nor is it necessary to include in the heading minor items that are incidental to the main features. Headings for statistical tables should generally begin with a concrete rather than an abstract term—for example, "Gold produced in the Willow Creek district in 1933" is better than "Production of gold * * *."

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 editor to ascertain its proper form. This instruction applies to all tables except those that can be patterned after 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.

Geologic sections should be "right side up" (or top side up)—that is, 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. The beds in a section should not be numbered unless the numbers are needed for convenience of reference in other parts of the text. If the beds must be numbered it is permissible to begin numbering either from the top or from the bottom, according to the purpose of the section.

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

The form given below indicates the style preferred by some authors. The rock term is given first and is followed by the descriptive adjectives. If this form is used, it should be followed consistently throughout a report. Its purpose is to give emphasis to the material in each bed rather than to its particular color, texture, or other features, but the device is effective only where the term to be emphasized comes first in the line, and hence it is unnecessary to invert the second term in a unit that includes material of two kinds: "Shale, sandy, and fine-grained sandstone" (not "and sandstone, fine-grained"). This form also shows the style to be used if both feet and inches are given.

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	
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	
Shale, sandy, bluish		3
Shale, sandy, drab, yellow, and gray	1	6
	8	11

More elaborate geologic sections are usually given in the following form. (The table is not complete but is adequate to show the general style.) The manner of centering, the alinement, and the position of "Unconformity" should be especially noted.

Summary of exposed rock formations in the Book Cliffs region, Colorado

Age	Group, formation, and member	Character	Thickness (feet)	Economic value
Quaternary		Alluvial material covering terrace remnants in front of cliffs; sandstone, sand, and algal limestone; locall stream gravel containin pebbles of igneous and metamorphic rocks.	0–30	None.
	—Unconformity—			
Tertiary (Eocene).	Green River formation (basal part). Douglas Creek member.	An aggregation of gray-green shale, papery gray shales, algal and ostracode limestone, and buff calcareous sandstone; few very thin layers of oil shale. The predominant color is gray.	600–1, 000	No recognized mineral value. Water from this horizon sweeter than from beds below.
	Wasatch formation.	Variegate clay shale, some sandy, containing a few beds of massive sandstone and numerous thin sandy lenses; some fresh-water limestone; locally conglomeratic at base.	280–790	No recognized mineral value.
	—Unconformity—			
Tertiary(?) (Eocene ?).		Mainly gray-white sandstone intercalated with clay shales, some of which are variegated. Major erosional unconformity at base, marked by conglomeratic sandstone 10 to 40 feet thick.	155–370	No recognized miner l value.
	—Unconformity—			
Upper Cretaceous.	Mesaverd group. Hunter Canyon formation.	Assemblage of massive brown, buff, and gray cliff-making fluviatile sandstone and gray clay shale. About 60 percent sandstone and 40 percent shale.	375–1, 400	Thin seams of coal in carbonaceous shale near top. No economic value. Sandstone too soft for building stone.
	Mount Garfield formation.	An assemblage in which sandstone averages about 33 percent, shale 51 percent, shaly sandstone 10 percent, carbonaceous shale 6 percent. The sandstones are much like those above but not so thick or coarse.	405–665	A few thin beds of coal are present, none of minable thickness. There are considerable beds of carbonaceous shale.

In connection with analyses the name of the analyst (with initials) should be given, in the form "[W. F. Hillebrand, analyst]", immediately below the heading. If the samples are numbered use arabic (1, 2, 3, etc.), not roman (I, II, III). The term "percent" is not necessary above the figure column if the total approximates 100.

Simple well or drill-hole records should preferably appear in the following form:

Record of Winters well, Southwest City, Mo.

	Thickness (feet)	Depth (feet)
Surface and coarse rock	48	48
Blue flint	30	78
Light-gray rock	20	98
Dark-brown flint	12	110

Records for a large area containing many wells may include a variety of data. For such complex tables it is especially desirable to consult the editor as to the general form and details of statement before writing the table. The items to be included may vary according to local conditions, but some good examples of general form are afforded by the well tables in Water-Supply Papers 639, 640, and 656.

Chemical terms and symbols

The preferred forms of certain chemical terms are shown in the first column below. The forms in the second column should not be used.

Univalent	Monovalent
Bivalent	Divalent
Trivalent	Tervalent
Quadrivalent	Tetravalent
Quinquivalent	Pentavalent
Aluminum	Aluminium
Beryllium	Glucinum
Beryllia	Glucina
Columbium	Niobium
Columbic	Niobic
Columbate	Niobate

The following list of chemical elements and symbols is based on the latest available information (1935):

Chemical elements and symbols

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

In the text of chemical or geochemical papers either chemical symbols (as "H_2S") or terms (as "hydrogen sulphide") should be used; terms and symbols should not be mixed indiscriminately. For some chemical com-

binations, however, no terms are available. In tables of analyses symbols alone or in less technical papers both terms and symbols may be used, the term first, followed by the symbol in parentheses, as "silica (SiO_2)."

Personal acknowledgments

Assistance rendered by persons not connected with the Survey should be acknowledged, but a statement of the nature of the assistance is ordinarily sufficient: the author's gratitude may be taken for granted. As a rule it is unnecessary to mention general assistance rendered by other members of the Geological Survey: nearly every Survey report by the time it reaches the printer has had the benefit of suggestions by many of the author's colleagues as a part of their routine work, so that the report is a product of the organization, and such contributions need not be recounted. Specific pieces of work, however, such as analyses, identifications of minerals or fossils, or computations, should be credited to the persons who made them. Such credit is polite; it is honest; and it fixes the responsibility. Usually it is also desirable to mention the section or division chief under whose supervision the work was done, as next to the author he is primarily responsible for the report.

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 guided the writer to the place.

Van Hise says * * *

George Otis Smith's work on * * *

The economic geology is discussed by Mr. Loughlin in part 2.

Analyst, W. F. Hillebrand. This rock was analyzed by Dr. Hillebrand.

The invertebrate fossils were identified by Mr. Reeside and the fossil plants by Mr Brown.

Quotations

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 quotations in which, for obvious reasons, quaintness or exactness 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 a quotation.

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

Footnote and other citations

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. However, a note that has a collateral bearing on the subject matter of the text and is of sufficient pertinence to be included but would be too much of an interruption if inserted in the text may be made a footnote. Some authors have 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.

As the footnotes are numbered consecutively in the printed report, the numbering should be deferred until all additions or eliminations have been made and the manuscript is ready to send to the printer. This final numbering will be done in the editor's office, and the references should therefore be left without numbers in the manuscript. Each footnote, however, should be written immediately below the line in which the reference mark is to appear and should be separated from the text above and below by lines. Superior figures ($^{1, 2, 5}$) are used for reference marks in text, and the places for them should be indicated by a "shelf" (_/) at each reference. The "shelf" should preferably be written immediately after the name of the author cited, but not if the name is in the possessive form ("Gilbert's theory _/") 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 should include initials, to make identification certain, especially for indexing. The initials should ordinarily not be given in the text; they should be included 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.

Page references should be specific—to the page or pages on which the particular matter cited appears, not simply the first page of the work cited nor the first and last pages unless the reference is a general one to the whole work. It is unfair to the reader who may wish to look up a reference to compel him to hunt for the appropriate place in the work cited, and the author should note the particular pages at the time he selects the reference, so that he may include them in his citation. Citations to papers published in serials should include both the title of the paper and the title of the serial. The decision of the reader whether to look up the citation may be governed by the nature of the paper as indicated by its title, and the title of the serial alone gives him only an inadequate clue.

The following typical footnotes should be examined in detail, as to punctuation, capitalization, order of items, and abbreviations: [2]

Gilbert, G. K., Recent earth movement in the Great Lakes region: U. S. Geol. Survey 18th Ann. Rept., pt. 2, pp. 637–639, 1898.

Van Hise, C. R., A treatise on metamorphism: U. S. Geol. Survey Mon. 47, pp. 691–697, 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.

Smith, G. O., The economic limits to domestic independence in minerals: Mineral Resources U. S., 1917, pt. 1, pp. 1a–6a, 1921.

Clark, M. B., and Shuey, E. T., Summary of mineral production [1932–33]: Minerals Yearbook, 1932–33, Statistical appendix, pp. A1–A40, 1934.

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.

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[2] For a description of Survey practice see Lane, B. H., A uniform scheme for citations: Science, new ser., vol. 73, pp. 390–392, Apr. 10, 1931; More about citations: Idem, vol. 74, pp. 338–339, Oct. 2, 1931.

Powers, Sidney, Occurrence of petroleum in North America: Am. Inst. Min. Met. Eng. Tech. Pub. 377, 46 pp., 1931.

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

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

Tarr, R. S., and Von Engeln, O. D., A laboratory manual of physical geography, pp. 309–312, 1910.

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

Dana, J. D., Manual of geology, 4th ed., pp. 207–226, 1895.

In English titles of books or articles only the first word, proper nouns, and proper adjectives are capitalized; in English titles of serials (abbreviated as indicated on pp. 22–29) principal words are capitalized; in foreign citations the particular national practice is followed throughout except that the first word of a society's name or a series of publications (or the abbreviation for it) is capitalized.

In citing papers included in the Survey's series 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 series.

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 serial 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 22–29. 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 or number (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 was formerly issued as Band 1 and Band 2 for each year. In citing this publication the date should be inserted in the place of the volume number ("Neues Jahrb., 1914, Band 1") and not repeated at the end. Recent issues of this publication should be cited as "Neues Jahrb., 1930, Referate, I" (or II or III). The Beilage-Band of the Neues Jahrbuch, however, carries a distinctive number and should be cited in the ordinary way, with the date at the end ("Neues Jahrb., Beilage-Band 15, p. 150, 1902"). Beginning with volume 52 the Beilage-Band has been issued in two parts each year, and in citations "Abt. A" or "Abt. B" should be inserted after the volume number.

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."

If the date of publication differs from the date given in the imprint, it may be desirable, especially if questions of priority are involved, to give both dates:

Lee, W. T., and Knowlton, F. H., Geology and paleontology of the Raton Mesa and other regions in Colorado and New Mexico: U. S. Geol. Survey Prof. Paper 101, p. 346, 1917 [1918].

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. 105) 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 publications 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 such citations as "Illinois Geol. Survey," "New York Acad. Sci.", "Cincinnati Soc. Nat. History", "Geol. Soc. America", "Royal Soc. Canada."

Use "1st", "2d", "3d", etc., for serial numbers of reports so designated, as "U. S. Geol. Survey 21st Ann. Rept.", "Vermont State Geologist 8th Rept.", also "U. S. Geol. Expl. 40th Par.", "2d ed." (not "2nd ed."), "3d ser." (not "3rd ser.").

In foreign citations such terms as the German "Band", "Heft", "Abt." (Abteilung), and "Lief." (Lieferung) or the French "tome" and "livr." (livraison) should be followed, not translated into "vol.", "pt.", etc. It is not necessary, however, to use the German "S." (Seite) for "p." or "pp."

The abbreviations used in Geological Survey citations are based on the plan of giving enough to indicate the words with reasonable clearness. Below is a list of unit forms that are frequently used. The words in parentheses explain the abbreviations and are not to be used in citations. This list is not a guide to capitalization, as the capitalization of many of these words depends on their position in the citation. (See list on pp. 22–29.)

Abh. (Abhandlung)
Abt. (Abteilung)
Acad. (academy, académie, academía)
Accad. (accademia)
Acta
Actes
Agr. (agriculture, agricultural)
Akad. (Akademie)
Allg. (allgemeine)
Am. (American)
America
Anal. (analytical, etc.)
Angew. (angewandte)
Ann. (annual)
Annaes, Annalen, Annales, Annals
année
año
Anorg. (anorganisch)
Anz. (Anzeiger)
Arb. (Arbeiten)
Årb. (Årbok)
Archiv, Archives, Archivio, Arkiv
Assoc. (association)
Atti
Av. (avancement)
Band
Beitr. (Beitrag, Beiträge)
Ber. (Bericht)
Bienn. (biennial)
Bind
Biol. (biologic, etc.)
Bol. (boletim, boletín)
Boll. (bollettino)
Bot. (botanic, etc.)
Botany
Bull. (bulletin)
Bur. (bureau)
Centralbl. (Centralblatt)
Chem. (chemical, etc.)
Chemie
Chemistry
Chim. (chimique)
Chimie
Cien. (ciencia, ciencias)
Cient. (científica)
Circ. (circular)
Cl. (Classe)
Coll. (college, collections)
Com. (comisión, comité)
Comm. (commission, committee, communications)
Compte rendu
Comptes rendus
Cong. (congress)
Cons. (conservation)
Contr. (contributions)
Deel
Denkschr. (Denkschrift)
Dept. (department)
Devel. (development)
Div. (division)
Econ. (economic)
Eng. (engineers, engineering)
Erläut. (Erläuterungen)
Exper. (experiment)
Expl. (exploration)
Fac. (faculty, etc.)
fig., figs. (figure, figures)
Foram. (foraminiferal)
Fören. (Förening)
Förh. (Förhandlingar)
Fortschr. (Fortschritte)
Franç. (français)
Gazette
Gazz. (gazzetta)
Gen. (general)
Gén. (générale)
Geog. (geographic, etc.)
Géog. (géographique)
Geographie, géographie
Geography
Geol. (geologic, etc.)
Géol. (géologique)
Geologie, géologie
Geologist
Geology
Gesell. (Gesellschaft)
Gior. (giornale)
Govt. (Government)
Grossh. (grossherzoglich)
Hälfte
Handl. (Handlingar)
Heft, Hefte
Hist. (historical, etc.)
History
Hüttenm. (hüttenmännisch)
Imp. (imperial, etc.)
Ind. (industrial, etc.)
Industry
Inf. (information)
Ing. (ingenieurs, ingenieros, etc.)
Inst. (institute, institution)
Internat. (international)
Inv. (investigation)
Irr. (irrigation)
Ist. (istituto)
Izv. (izvestiya)
Jaarb. (jaarboek)
Jahrb. (Jahrbuch)
Jahresber. (Jahresbericht)
Jahresh. (Jahresheft)
Jahrg. (Jahrgang)

Jour. (journal)
K. (kaiserlich, königlich)
Kl. (Klasse)
Lab. (laboratory)
Lief. (Lieferung)
Lit. (literary)
Livr. (livraison)
Mag. (magazine)
Math. (mathematical, etc.)
Mem. (memoir, memoria, memorandum)
Mém. (mémoire)
Met. (metallurgical, etc.)
Metallurgy, metalurgía
Micr. (microscopic)
Min. (mineral, mineraria, minières, mining)
Minas, Mines
Minera
Mineralog. (mineralogic, etc.)
Mineralogía, minéralogie
Mineralogy
Minería
Minero
Misc. (miscellaneous)
Mitt. (Mitteilungen)
Mon. (monograph)
Monatsber. (Monatsbericht)
Monatsh. (Monatsheft)
Monatsschr. (Monatsschrift)
Montan. (montanistich)
Monthly
Mtn. (mountain)
Mus. (museo, museum, etc.)
Nac. (nacional)
Nachr. (Nachrichten)
Nat. (national, natural)
Naturalist
Nature
Naturf. (Naturforscher, naturforschende)
Naturh. (naturhistorisch)
Naturwiss. (naturwissenschaftlich)
neue Folge
new ser.
no., nos. (number, numbers)
Nr. (Nummer)
Occ. (occasional)
p., pp. (page, pages)
Palaeontologie
Palaeont. (palaeontologisch)
Paleont. (paleontologic, etc.)
Paleontology
Pamph. (pamphlet)
Paper, Papers
Philos. (philosophical)
Physical
Physics
Physikal. (physikalisch)
pl., pls. (plate, plates)
Polytech. (polytechnic, etc.)
Prakt. (praktisch)
Proc. (proceedings)
Prof. (professional)
Prosp. (prospecting)
pt., pts. (part, parts)
Pub. (publication)
Quart. (quarterly)
R. (reale)
Rec. (record, records, recueil)
Rend. (rendiconti)
Rept. (report)
Rev. (review, revue, revista)
Riv. (rivista)
Royal, royale
R. R. (railroad)
Ry. (railway)
Schr. (Schrift)
Sci. (science, sciences, scientific, etc.)
Science (the journal so named)
Seismol. (seismologic, etc.)
Seismology
Seismotech. (seismotechnical, etc.)
Selsk. (Selskab)
ser. (series)
Service
Sitzungsber. (Sitzungsbericht)
Skr. (Skrift)
Soc. (society, société, etc.)
Sta. (station)
Summary
Survey
Tech. (technical, etc.)
Technology
Teil
Tidskr. (tidskrift)
Tidsskr. (Tidsskrift)
Tijdschr. (tijdschrift)
Tijdskr. (tijdskrift)
Trans. (transactions)
Travaux
Univ. (university, etc.)
U. S. (United States)
Vaterl. (vaterländisch)
Ver. (Verein)
Verh. (Verhandlung, etc.)
Vetensk. (vetenskaps)
Vidensk. (videnskabernes, videnskaps)
vol., vols. (volume, volumes)
Wetensch. (Wetenschappen)
Wiss. (Wissenschaft)
Wochenschr. (Wochenschrift)
Zeitschr. (Zeitschrift)
Zeitung
Zool. (zoological, etc.)
Zoology

The following list of forms for citing serial publications, which is manifestly incomplete, will serve as a general guide for citations not included in the list. Many of the organizations here named issue more than one series of publications, and the series designation given in this list (Proc., Trans., Bull., Ber., etc.) should, of course, be changed to correspond with the particular publication being cited. The original publication should be followed in the use or nonuse of the designation "vol."—for example, "Geol. Soc. America Bull., vol. 34", "Canadian Min. and Met. Bull. 239." The "no." is omitted in such designations as "Bull. no. 239", "Mem. no. 65", "Pub. no. 875." Such titles as "Académie des sciences, belles-lettres et arts" are shortened to "Acad. sci." Geographic names and other proper nouns are written in full.

Aargau. naturf. Gesell. Mitt.
Abh. geol. Specialkarte Preussen
Acad. nat. cien. Córdoba Actas
Acad. nat. sci. Bordeaux Actes
Acad. Nat. Sci. Philadelphia Proc.
Acad. polonaise sci. Bull. internat.
Acad. roumaine, Sec. sci., Bull.
Acad. royale Belgique Mém. cour. et sav. étrang.
Acad. royale sci. Belgique Mém.
Acad. royale sci. Denmark Mém.
Acad. sci. Lyon Mém.
Acad. sci. Paris Comptes rendus
Acad. sci. Paris Mém. sav. étrang.
Acad. Sci. St. Louis Trans.
Acad. sci. Toulouse Mém.
Acad. sci. U. R. S. S. Bull.
Acad. tchèque sci. Bull. internat.
Accad. gioenia sci. nat. Atti
Accad. sci. Acireale Rend. e mem.
Accad. sci. Ist. Bologna Mem.
Accad. sci. Torino Mem.
Accad. sci. veneto-trentino-istriana Atti
Acta chem., min. et phys.
Acta geog.
Agence gén. colonies Bull.
Akad. Nauk Izv.
Akad. Wiss. Wien, Math.-naturwiss. Kl., Denkschr.
Alabama Geol. Survey Rept. Progress
Albany Inst. Proc.
Alberta Sci. Ind. Research Council Repts.
Allg. Jour. Chemie
Am. Acad. Arts Sci. Proc.
Am. Assoc. Petroleum Geologists Bull.
Am. Ceramic Soc. Jour.
Am. Geophys. Union Trans.
Am. Inst. Min. Met. Eng. Trans.[3]
Am. Jour. Botany
Am. Jour. Sci., 5th ser.[4]
Am. Micr. Soc. Trans.
Am. Midland Naturalist
Am. Mineralogist
Am. Mus. Nat. History Bull.
Am. Mus. Novitates
Am. Naturalist
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Annaes sci. nat.
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[3] Omit the "Met." before vol. 68.

[4] Do not omit the series number.

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Beitr. Paläontologie Oesterr.-Ungarns u. des Orients
Berg- u. hüttenm. Jahrb. Leoben
Bergens Mus. Årbok
Berliner geog. Arbeiten
Biochem. Zeitschr.
Biol. Abstracts
Biol. Rev.
Biologia generalis
Birmingham Nat. History and Philos. Soc. Proc.
Black Hills Engineer
Bol. minas y petróleo
Bol. minero
Bol. oficial minas
Bol. petróleo
Boston Jour. Nat. History
Boston Soc. Nat. History Proc.
Bot. Archiv
Bot. Gazette
Bot. Jahrb.
Bot. Közlemények
Bot. Mag.
Braunkohle
Brennstoff-Chemie
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Cardiff Naturalists Soc. Trans.
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Chem. News
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Chicago Acad. Sci. Bull.
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Com. geol. ital. Boll.
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Comm. geog. e geol. Minas Geraes Bol.
Comm. géol. Finlande Bull.
Condor
Connecticut Acad. Arts and Sci. Trans.
Connecticut Geol. and Nat. History Survey Bull.
Contr. U. S. Nat. Herbarium
Cushman Lab. Foram. Research Contr.
Copenhague Univ., Mus. minéralogie et géologie, Comm. paléont.
Danmarks geol. Undersøgelse

[5] Insert the date here, as this publication has no volume number.

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Franklin Inst. Jour.
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Gazz. chim. italiana
Génie civil
Geog. Annaler
Geog. geol. Mededeel.
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[6] Eng. and Min. Jour.-Press from vol. 113, p. 513, to end of vol. 121.

[7] Issued by "decades" prior to 1920. For early citations give the decade number (dec. 4, etc.).

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Jaarb. mijnwezen Ned.-Indië
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Jour. Agr. Research
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Jour. conchyliologie
Jour. Geography
Jour. Geology
Jour. Paleontology
Jour. pétrole
Jour. physique
Jour. prakt. Chemie
Jour. Rheology
Jour. Sedimentary Petrology
K. Akad. Wetensch. Amsterdam Verh.
K. bayer. Akad. Wiss., Math.-naturh. Kl., Sitzungsber.
K. böhm. Gesell. Wiss. Jahresber.
K. danske vidensk. Selsk. Mat.-fys. Meddel.
K.-geod. Inst. Jahresber.
K. norske vidensk. selsk. Forh.
K. preuss. Akad. Wiss., Phys.-math. Kl., Sitzungsber.
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K. svenska vetensk. akad. Handl.
K. vetensk.-soc. Upsala Nova acta.
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Massachusetts Inst. Technology, Dept. Mining, Contr.
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Metall u. Erz
Michigan Acad. Sci. Papers
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Mus. Northern Arizona Mus. Notes
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Nat. Acad. Sci. Proc.
Nat. Bur. Standards Research Paper
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Nat. Research Inst. Geology Contr.
Natur u. Museum
Natur u. Volk
Nature
Naturf. Gesell. Basel Verh.
Naturf. Gesell. Halle Abh.
Naturf. Ver. Brünn Verh.
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Naturh. Mus. Wien Annalen
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[8] For method of citing the Neues Jahrbuch see p. 18.

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R. com. geol. Italia Mem.
R. ist. veneto sci. Atti
R. soc. geog. italiana Boll.
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R. ufficio geol. Boll.
Rassegna min. met. italiana
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Rec. travaux chim.
Rep. Argentina, Dir. minas y geología, Bol.
Rev. gén. botanique
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Rev. geog. americana
Rev. géographie phys. et géologie dynamique
Rev. industrial
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Rev. univ. mines
Rhode Island Nat. Resources Survey Bull.
Riv. geog. italiana
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[9] Published in three series, though the first and second series were not so designated. Should be cited as "Science [1st ser.]" (vols. 1, 2, 1880–81), "Science [2d ser.]" (vols. 1–23, 1883–94), "Science, new ser." (vols. 1– , 1895–).

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[10] The number should be given; it usually appears at the bottom of the last page, preceded by "P N."

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For a paper by one author included in a volume by another author: White, David, The carbonaceous sediments, in Twenhofel, W. H., and others, Treatise on sedimentation, 2d ed., pp. 351–430, 1932.

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.

[11] First nine volumes designated only by the date—"Jahrg. 1893", etc. Beginning in 1901 volumes numbered—"Jahrg. 10", etc.

The use of Latin terms in footnotes to avoid frequent repetition of titles is confined to "op. cit." and "idem." "Op. cit." may be used if the previous reference is not far away, provided there can be no doubt as to what work is cited. If two or more works by the same author have been cited previously it is necessary to repeat the reference, or, if one of the publications is cited many times, it may be sufficiently identified by repeating either the serial number of the publication, as "op. cit. (Bull. 770)", or one or more significant words of the title, as "op. cit. (Geochemistry)." However, for the reader's sake, "op. cit." should be used sparingly. "Idem" is used only for a second citation of the same work, immediately following the first, on the same page. "Idem" may represent all of the preceding citation except the page numbers, or it may be used to represent simply the journal just cited, the author and title being different. The forms "id.", "ibid.", "ibidem", and "loc. cit." are not used—not because they are not good Latin but for the sake of simplicity.

Footnotes to tables

For reference marks in a table superior figures ([1], [2], [3], etc.) are used. As the references begin with 1 in each table and are not renumbered, the reference marks should be written in the manuscript.

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", 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 numerical 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. If a reference is repeated it should carry the same reference number throughout the table. A sample table is given below.

Graphite produced in 1910

Country	Quantity (short tons)	Value
United States [1]	3,618	$288,455
Ceylon	[2] 30,183	1,159,529
Chosen (Korea)	[4]	[5] 56,000

[1] Mines and quarries, pt. 4, p. 672, London, 1911.
[2] Figures show exports.
[3] Subject to correction.
[4] Statistics not available
[5] Approximate only.

Reports on mining districts

By G. F. Loughlin

General suggestions

Reports on mining districts differ considerably in scope. Professional papers on large, extensively developed districts, which involve a vast amount of detailed study, are the most comprehensive and should be authoritative sources of information on all branches of geology that are conspicuously represented in the districts. Reports on small or only slightly developed districts are necessarily based on much less comprehensive information, and reports on certain special features may be much more restricted in scope. No matter what the scope may be, however, the purpose of the report is economic, and all parts of it therefore should be focused on those features that may be of direct value in the development of the district described. Too many authors tend to give equal emphasis to all sections of the report. The detailed study essential to the more comprehensive reports is likely to disclose valuable information on the more fundamental branches of geology, and the treatment of this information calls for careful consideration. It may be so closely related to economic problems that rather full treatment of it is essential to its practical application, or it may be more appropriately presented as a separate paper and only summarized in the economic report.

The report as a whole, as well as its major divisions, should be planned to give the reader a general idea at the outset, so that he may more readily understand the detailed descriptions that follow and appreciate their bearing on the author's conclusions. Although the author is treating a technical subject, he should also bear in mind that many of his readers will not be geologists. He should therefore avoid unnecessary technical terms and endeavor to express himself in simple, plain English. Certain technical terms that have become well established in the district being described and certain general terms that cannot be avoided without much circumlocution may be appropriately used, but even these terms may need definitions for the benefit of readers not familiar with the district or with the science of geology. There is a tendency among authors who are writing their first reports to continue the practice of their student days and attempt to display their command of technical terms and flowery expressions, but such writing is likely to give the reader who seeks practical information the impression that the report is impractical and only of academic interest.

Subject order

General order.—More elaborate reports should be planned under the following main divisions: Introduction, geography, geology, and mineral or ore deposits, in that order. The order of treatment of other reports

depends somewhat upon their scope and object but ordinarily should follow the same plan so far as it is applicable to the facts presented. The author should carefully consider this order of treatment and should depart from it only for the sake of leading his readers in methodical fashion to a realization of the main economic contributions of the report. Any departures from the usual order of treatment should be explained either in the general introduction or in the introductory statements at the beginnings of the major parts of the report. Every report, whatever its scope, should be preceded by an abstract that outlines the basic facts and states the author's conclusions. (See pp. 43–45.)

Introduction.—The introduction may comprise a statement of the purpose of the investigation and the events leading up to it, the conditions under which the work was done, acknowledgment of cooperation and favors, a summary of previous work in the same field, and an annotated bibliography. It should call attention to the author's outstanding conclusions regarding local or regional problems or on the further development of current theories and to noteworthy differences between his conclusions and those expressed in earlier publications.

Geography.—The attention given to geography should depend upon the district studied. If the district is little known, relatively complete information on location, routes of approach, topography, climate, vegetation, and other geographic features may be justified; if it is well known and its geographic features have been adequately treated elsewhere, only a brief statement emphasizing those features that affect the local mining industry is necessary. The origin of topographic features, as they are the latest results of geologic processes, should generally not be treated until the geologic features have been described.

Geology.—The discussion of geology should describe the distribution, character, and composition of the original and altered facies of the different rock formations, in order of age, their structural relations, their influence on topographic development, and their economic aspects. Descriptions of the formations should be followed by a section on geologic structure that interprets the origin of the different structural features to the extent that information permits and points out the extent to which structure has controlled the distribution and form of intrusive igneous masses and the courses followed by ore-forming solutions. The interpretation of topographic features should follow, and the entire section on general geology may be appropriately concluded with a summary of the geologic history.

Ore deposits.—The part on mineral deposits should aim to present historical descriptive data that will aid the operators in appreciating the factors on which to plan both the more thorough development of opened ground and the extension of exploration both horizontally and downward, not only within their own properties, but in undeveloped areas. Its general order of subjects treated should be history and

production, general character and classification of deposits, mineralogy, description of each class of deposits, genesis of original deposits, processes of alteration and enrichment, practical applications, and detailed mine descriptions. This sequence may be changed if orderly presentation can be improved thereby.

In reports on the older and larger districts the part on ore deposits should contain an adequate history of discovery, mining and cultural development, and production. The amount of information on the leading districts may even entitle this history to equal rank with the parts on general geology and ore deposits; on the other hand, the information on small districts may be so scant that it will be most conveniently appended to the general introduction, where it will not break the thread of consistent geologic treatment. The review of production should cite the geologic, technologic, and economic conditions that have accounted for fluctuations or changes in the rate of production, and it should conclude by calling attention to information in subsequent sections that may have a bearing on ore reserves and future development.

The section on mineralogy should logically precede the general description and classification of the mineral deposits, for it is at least a partial basis for classification. The more elaborate reports have contained alphabetic lists of minerals with their chemical formulas, and if the number of minerals is great, such a list may be a convenient reference, but the author should consider whether it is any more than a duplication of headings to the mineral descriptions. There may be some difficulty in deciding how much information should be included in the section on mineralogy and how much in that on the ores. Conciseness and clarity of treatment should govern the decision. Where preference is given to the section on mineralogy, this section should contain adequate descriptions of (1) the different ore minerals, grouped according to (*a*) their principal metal contents and (*b*) their hypogene or supergene origin; (2) the gangue minerals, appropriately subdivided. Any significant features regarding temperature of deposition, effect on metallurgical processes, and other matters may be appropriately included, thereby increasing the practical value of the presentation. The section may end with a review of paragenesis, which may be largely a review of pertinent parts of the preceding description and which should serve as a basis for any discussion of the classification, origin, and zoning of ore deposits.

The description of the general character of the deposits should serve as an introduction to subsequent sections and should present any classification of deposits that the author may devise for convenience and clarity of description. Much has been written about the classification of mineral deposits, and most writers today favor a genetic classification when considering mineral deposits in general; but, as all the deposits of a mining district may fall within two or three subdivisions of such a classification, although they differ markedly in form, structure, and metal contents, a

special classification based on these differences is likely to be most practical in a report on the district. The order in this classification should be followed in the detailed description of each class and subclass.

Descriptions of the different classes and subclasses of ores or mineral deposits should follow, including distribution of the main deposits and the ore shoots in them, controlling geologic features, structural relations, processes of ore deposition, and related alteration or replacement of wall rock. If the classes of deposits are few they may all be conveniently described before their genesis is considered; but if they are too diversified for such simple treatment, the original or hypogene deposits may be described and their genesis considered before the altered or supergene ores and the processes of alteration are described.

The subject of rock alteration also may be so complex as to deserve a special section enumerating the processes of alteration which have been active at different and perhaps widely separated times and some of which have particular significance with respect to the distribution and origin of mineral deposits, whereas others have no such significance. The most appropriate position of a special section on rock alteration depends upon its contents. It may follow the treatment of intrusive rocks or may be more closely associated with the discussion of mineral deposition. The author in his discussions of alteration and genesis should recapitulate the essential facts brought out in the descriptions, show their bearing on the problems under consideration, and deduce such theoretical conclusions as they may warrant. If the descriptive matter has been properly focused on these problems and has brought out the significance of the different items, the reader will be so well prepared for these interpretive discussions that they may be brief and do little more than bring together and confirm the minor interpretations that have been made throughout the report.

The general part of the report should conclude with a section on practical applications in which the author points out how his work may aid in the development of ore bodies and the finding of new ones and expresses his conclusions regarding ore reserves and the economic future of the district.

The detailed descriptions of mines should contain as full information as is available on history, development, production, and geologic features of each mine and should be adequately illustrated. The general reader may have little interest in these detailed descriptions, but operators and others who may become interested in a mine even many years later will look to these detailed descriptions for information and may value them more than the general part of the report. Their preparation should not, therefore, be regarded as an irksome duty but as the preservation of important geologic records. The more nearly complete they are the better is the author's basis for his general conclusions; in fact, it is advisable to prepare rough drafts of the mine descriptions before completing

the general sections of the report, as this practice gives a strong appreciation of the practical significance of different geologic features and prepares the author for emphasizing these features throughout the report. Care should be taken that the final drafts of mine descriptions do not include or needlessly repeat data that properly belong in the general sections of the report.

Definitions

In former editions of "Suggestions to authors" considerable attention was given to definitions of terms pertaining to ore deposits. Some of these terms have been little used for several years, and as both such terms and terms in current use are defined in textbooks and treatises on mineral deposits and structural geology and in glossaries of mining terms, only a few comments regarding them need be made here.

There has been much published discussion on the term "ore", but no definition proposed has been entirely satisfactory, principally because there is so much diversity in the materials to which the term is generally applied that attempts at a strict definition involve quibbling over minor details. Most definitions stipulate that ore is a mineral or rock from which one or more metals may be profitably extracted, but some ores are so treated that only one or more compounds of metals, such as zinc oxide and vanadium oxide, can be extracted on a commercial scale; furthermore, a considerable amount of material called "ore" is unprofitably produced, although the metals or compounds extracted from it enter the metal market. These comments suffice to emphasize the futility of a meticulous attempt at strict definition. It is far more essential to explain the significance of the terms as used in the district under consideration and follow the usage consistently throughout the report. Such related terms as "mill ore", "metallized rock," and "protore" will help in descriptions.

The term "gangue" is restricted so far as possible to nonmetallic minerals that were deposited in openings or by replacement of wall rock, but as there is no sharp distinction between completely replaced and only moderately altered wall rock, this term also must be used with discretion. Clear descriptions will aim to avoid confusing usage of the term. It is not desirable to describe as gangue any metallic minerals of no economic value. They are more clearly designated "associated metallic minerals."

As the terms "vein" and "lode" or "lead" have been used synonymously in legal phraseology, the author's use of them should be made clear. In general "vein" should signify a mineral deposit that occupies a well-defined fissure, whereas "lode" should signify an assemblage of veins, veinlets, or stringers so closely spaced that they can be mined as a single ore body; but it may be difficult or at least impracticable to distinguish between a simple fissure filling and a deposit that has been

formed by the partial or complete replacement of a sheeted zone. The term "lode" has also been used to designate a group of veins in steplike arrangement, to which the term "vein zone" may be applied. It is consistent to use terms that correspond as closely as possible to those designating faults and fissures, such as "fissure zone" and "fissure system." The least confusing procedure under such conditions is to adopt local usage and to define terms accordingly; otherwise it is good practice to restrict the use of "vein" to deposits in or along well-defined fissures and to use "lode" in its original meaning of anything that leads the miner.

Distinction should be carefully made between the mineral deposit as a whole and the ore shoots within it, also between ore shoots and stopes. The terms "pitch length", "stope length", "breadth", and "width or thickness", adopted by Lindgren and Ransome in their Cripple Creek report, have proved very useful.

"Hypothermal", "mesothermal", and related terms, introduced by Lindgren in his classification of ore deposits, and "hypogene" and "supergene", introduced by Ransome, have proved very useful in technical discussions, as each expresses in one significant word what would otherwise require a phrase or clause; but, as understanding of the significance of these words depends upon the reader's acquaintance with technical literature, it may be desirable to give at least some parenthetical explanations for the benefit of those who have little academic interest in the science of ore deposits. It is impossible to treat a technical subject without some use of technical terms, and those terms that have been generally accepted and are consistently used in standard textbooks are especially entitled to use in reports on mining districts, with as many parenthetical explanations as seem advisable. It is also impossible to write a text that will be understood by everybody, but the simpler the language used the greater the number of readers who will understand it. Technically trained readers will not object to a clear presentation in simple words. It is enlightening to find out incidentally during the study of a district the extent to which appropriate technical terms are understood and to use them accordingly.

One valuable aid to clear presentation is the distinction between processes and the results of processes. Such terms as "mineralization", "replacement", "alteration", "silicification", and "impregnation" refer to processes and should not be used to describe aggregates of minerals produced by these processes. Mineralization is a general process that comprises several specific processes, such as fissure filling and replacement, and the different terms should be used with corresponding care. Such careless expressions as "mineralization can be seen in all the openings" or "these deposits are tabular quartzose replacements" make sloppy writing and arouse a suspicion of hasty work, if not of half-baked training. They are common in reports by self-made "experts." The

term "secondary enrichment" is strictly tautologic, as enrichment is by definition a secondary process. As enrichment, generally effected by descending meteoric water, may also be effected by rising solutions, the terms "supergene enrichment" and "hypogene enrichment" are both concise and valuable.

These comments serve to emphasize the opening suggestion that clear, simple language is essential in reports that are to be read by those who are not specialists in the subject. A good measure of an author's understanding of his subject is his ability to express it clearly in plain words. Such clear presentations will be appreciated not only by the layman but by fellow scientists.

Paleontologic matter

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

In center headings it is desirable to use with the name the term "class", "order", "family", or "genus"—that is, any classific term of higher rank than species.

The name of the founder of a species should be given, even in his original description: *Cassidulus holmesi* Twitchell, n. sp.

The name of the founder of a genus or species should not be abbreviated: "*Cinnamomum affine* Lesquereux", not "Lesq." nor "Lx." Paleontology is world-wide in scope, and identification of authors is important and should not be made uncertain by abbreviation. A note from the Far East [12] is appropriate here:

> Names of authors cited in combination with systematic names should not be abbreviated. What seems clear to the writer may not be clear to the reader, especially in other countries. Even official lists of abbreviations can only be complete to the date of their publication, to say the best.

In headings, synonymies, and lists the name of a species should be followed by the name of its founder; if it has been transferred to another genus the founder's name should be enclosed in parentheses, and it is desirable to add the name of the author who transferred it: *Sequoia langsdorfii* (Brongniart) Heer was described as *Taxites langsdorfii* by Brongniart and transferred to *Sequoia* by Heer.

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 16–30 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, and that titles of papers published in serials should not be given. In a footnote it is desirable to give both the title of the paper and the title of the serial (see p. 17); in synonymy the name of the species cited is an adequate clue for the reader, and it is not necessary to give the

[12] Krejci-Graf, Karl, Scientific nomenclature and the preparation of papers: Kwangtung and Kwangsi Geol. Survey Special Pub. 12, p. 116, 1932.

title of the paper. 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 second from 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, 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.

?*Geinitzia reichenbachi* Hollick and Jeffrey, New York Bot. Garden Mem., vol. 3, p. 38, pl. 5, figs. 7–10, 1909.

The next to the last entry indicates the proper form for citing a misidentification. In the last entry the prefixed query indicates that *Geinitzia reichenbachi* is probably a synonym of *Sequoia reichenbachi* but that the point is not yet determined. Entries for homonyms and partial identifications are shown in the following examples:

Thinnfeldia variabilis Velenovsky [not Fontaine], Die Gymnospermen der böhmischen Kreideformation, p. 6, pl. 12, figs. 1–5; pl. 3, fig. 12, Prag, 1885.

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

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

Liriodendron simplex Newberry [part], Torrey Bot. Club Bull., vol. 14, p. 6, pl. 62, figs. 2–3 [not fig. 4], 1887.

It is also permissible to use the following form, which gives more specific information:

Thinnfeldia variabilis Velenovsky, Die Gymnospermen der böhmischen Kreideformation, p. 6, pl. 12, figs. 1–5; pl. 3, fig. 12, Prag, 1885. [Not *T. variabilis* Fontaine, 1889.]

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 names of the genus, species, and founder are

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. Resources 30th 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", "undet.", "position uncertain" are preferable to the Latin "gen. nov.", "sp. nov.", "var. nov.", "s. str.", "non", "pars", "auct.", "indet.", "incertae sedis."

The forms "*Orthis* cf. *O. umbraculum*" (not "*Orthis* cf. *umbraculum*") and "*Orthis* aff. *O. umbraculum*" should be used—that is, the initial of the generic name should be repeated. The first example means that the specific identity of the fossil is not known but that it resembles *Orthis umbraculum* (cf., confer, compare); the second means that it is related to but not identical with *O. umbraculum* (aff., affinis, related to).

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 or identification 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 enclosed in parentheses: "*Martinia? glabra* Martin" means that the reference of the species to the cited genus is doubtful; "*Martinia glabra?*" or better "*Martinia glabra* Martin?" means that the identification of the species is doubtful but that the genus is certain. 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.

A plural formed by simply adding s to the Latin name is capitalized but not italicized: Rhynchonellas, Streptasters. The anglicized form of a Latin name is not capitalized: brachiopods, foraminifers.

Coined adjectives, such as "aviculoid," "limopteroid", and "modiolopsoid", are not capitalized.

The side heading "Description" is generally unnecessary and contravenes the suggestion as to character of headings given on page 6.

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 (Lesquereux)
Nectandra lancifolia (Lesquereux)
pseudocoriacea Berry
puryearensis Berry
Nyssa eolignitica Berry
wilcoxiana Berry
Oreodaphne obtusifolia Berry
pseudoguianensis Berry
puryearensis Berry
wilcoxensis Berry
Oreopanax minor Berry
Osmanthus pedatus (Lesquereux)

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

Unpublished or "nude" names (unaccompanied by a description) are invalid and should not be included in any paper, even though they are stated to be manuscript names, unless it is certain that a description in some other paper will be published before the paper in which it is desired to include them.

Reports on ground water

By O. E. Meinzer

Papers relating to ground water, like other technical productions, should be written in language that is precise and logical. A writer can use such language only if he has precise concepts and a logical train of thoughts to present. Technical papers that are difficult to understand are likely to have been written by authors who are incapable of precise and logical thought. The language should be as concise as practicable, in order that the reader need not waste mental effort in his endeavor to determine the facts and conclusions presented; but it should

not be so abbreviated or idiosyncratic as to call attention to the style. Every conclusion should be expressed accurately and completely, with explicit statement of the limitations of knowledge involved. This should be done regardless of the number of words and sentences required. However, when a conclusion has once been carefully expressed it should not, as a rule, be repeated in paraphrased form. Technical terms are an aid to both the technical and the lay reader, provided they represent precise and significant concepts that are involved in the subject matter covered, and provided the reader already has or is given accurate definitions of the terms. Only a quack will use technical terms to advertise his erudition.

Papers relating to ground water differ greatly in their subject matter and objectives, and therefore no general outline can be given that will be adapted to all papers. The areal reports, or papers that give systematic descriptions of the ground-water conditions in specified areas, should as a rule be divided into three parts, as follows: (1) General description of the area, including the geologic and ground-water conditions; (2) systematic description of each of the successive geologic formations in the area, including their water-bearing properties, and the quality of the water; (3) detailed descriptions of subareas, such as counties, townships, or geomorphic units. (For an example of a report with this arrangement see Water-Supply Paper 656.)

The outline for the general description will vary somewhat with the area to be described. Each author who is preparing to write an areal report should make a preliminary study of the tables of contents of Water-Supply Paper 656 and other areal reports that have been published or are with the editor. As a rule the general description should include an introduction and a general treatment of the geography, geology, and ground-water conditions. The text relating to the general geography and geology should be written for the purpose of giving an adequate background and foundation for effective presentation of the facts relating to the occurrence, source, quantity, quality, recovery, and utilization of the ground water. As a rule it should not be more elaborate than is necessary to accomplish this purpose. Some statement of pertinent hydrologic principles is also warranted, but extensive presentation of general principles should be avoided. In the course of an investigation valuable geologic or hydrologic results are frequently obtained which deserve publication but the details of which are not essential in the areal report. It is generally a question of judgment and expediency as to whether such material should be included in the areal report or presented in a separate publication. If the area has a considerable stratigraphic section, the general description should include a table of the geologic formations, with a column for succinct statements regarding the water-bearing properties and quality of water in each formation. (See Water-Supply Paper 656, pp. 18–21.)

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The systematic description of a stratigraphic unit should include the information that is usually given in geologic reports, such as distribution, thickness, lithology, age, and stratigraphic relations, insofar as the information is essential for effective treatment of the ground-water conditions. Detailed geologic data, such as lists of fossils collected, may be included in the systematic descriptions or published in a separate paper. The systematic descriptions should cover, in considerable detail, the water-bearing properties of the formations described and the head and quality of the water, including reference to significant well data. The data as to mechanical composition, porosity, moisture equivalent, and permeability can appropriately be presented in the systematic descriptions or given in tables at the end of the water-supply paper.

Detailed descriptions of subareas aid greatly in applying the facts and conclusions of the report to the determination of the ground-water conditions in specific localities. Much skill is required in preparing the reports on subareas to avoid repetition of general statements and to describe adequately the conditions in all parts of the subarea. The well records and logs, water-level records, and water analyses can advantageously be given in the reports on subareas, either in the text or in accompanying tables, or they may be presented in tables or notes at the end of the water-supply paper. Data given in the tables should not, as a rule, be repeated in the text. Likewise, well sections given in graphic form should not be duplicated in the form of well logs.

Illustrations accompanying water-supply papers are of two general types—those which present detailed information not given in the text, such as the detailed geologic and hydrologic maps; and those which illustrate or summarize, in pictorial or graphic form, information that is presented in detail in the text or tables.

Detailed maps are unavoidably more or less complicated. If a map is made to show data of several kinds it may become too complicated to be intelligible without excessive effort. In such circumstances the data should be presented on two or more detailed maps. By careful planning and avoidance of unnecessary colors, it may be less expensive to publish two or more relatively simple maps than to publish one complicated map that would show the same data. The legend of every geologic map should include a succinct explanation of the water-bearing properties of each stratigraphic unit shown on the map.

Diagrams based on detailed data published in the report can generally be justified only if they aid the reader in obtaining a perspective of the outstanding results of the investigation. They should therefore be carefully limited in number and invariably kept simple. Diagrams that illustrate only unimportant features or are too complicated to be readily understood are worse than useless, because they tax the time and energy of the reader without giving commensurate reward.

Every report that is prepared for publication as a water-supply paper or contribution to hydrology should include an abstract. (See below.) Great effort should be made to keep the abstract as brief as practicable and yet to have it give an adequate perspective of the subject matter covered and the results obtained. It should, if practicable, include a brief but accurate statement of the principal conclusions that are expressed in the report. It should not be a mere paraphrase of the table of contents. With the rapidly growing volume of technical literature, it is becoming increasingly desirable to publish abstracts that will in a few words give the reader the essence of the principal conclusions and will, moreover, indicate whether the report contains material relating to the reader's specific problems or interests that will justify further expenditure of his time.

Abstracts [13]

Purpose

For the author the abstract is an opportunity to bring what he considers the important results of his work before his colleagues in condensed form. For his colleagues it is a means of keeping in touch with a much larger field of scientific publication than they can otherwise cover. It also, by presenting a brief quotable summary of the report, helps the Survey to disseminate knowledge of its work.

An abstract should therefore be a concise but comprehensive summary of the significant contributions to knowledge contained in a report. It should also be in a broad sense a guide to the contents of the report, adequate to serve as a basis in the preparation of general indexes to geologic literature. Therefore it should bring out not only the major contributions related to the main subject of the report but also any important incidental contributions to which the title gives no clue. Although the conclusions arrived at are the most valuable part of a scientific contribution, yet the author should realize that few of his colleagues will have time to read his paper in full, and he should indicate, as far as necessary, the method of attack and the type of data used.

Content

As the abstract may be used in an abstract journal it should be independent of the table of contents and not a mere expansion of it.

The abstract should clearly orient the paper in place, in geologic time, and in function, but it should supplement, not duplicate the title in this respect.

A systematic grouping of facts is desirable, and in the abstract of a large report headings may be used.

If local stratigraphic names are used, a statement of their place in the general geologic column, as nearly as it is known, should be included.

[13] Revised from suggestions prepared by a committee of the geologic branch.

Examples should not be used to amplify statements.

Comparisons with the work of others or with what has been previously known about a topic should be avoided. This does not exclude reference to the work of others if the present work is a development from theirs and it is necessary to show the basis on which it is built.

Be as specific on each point as space allows. Do not state what the report is about but what it tells. For example:

Do not say, "Not all the primary minerals are detrital; some are probably formed in place." Say, "Not all the primary minerals are detrital; at least a part of the iron carbonate, titanite, and feldspars have been formed in place."

Do not say, "There were several periods of elevation and erosion." If doubtful say, "The region has been elevated and eroded at least twice and possibly five times."

Do not say, "Subsequent movement along old faults indicates * * *." Say, "Pleistocene movement along the late Mesozoic faults indicates * * *."

Do not say, "From the character of the sand grains it seems that the sandstone is eolian." Say, for example, "From the roundness, predominance of 0.5-millimeter grains, and freedom from flaws of the quartz grains it seems * * *."

Abstracts of paleontologic papers, which are partly in the nature of catalogs, require special consideration. New family and generic names should probably be mentioned, and the number of new species in different groups indicated. The proportionate distribution of fossils in the different groups should probably also be given. In other respects the abstract should follow the usual plan.

Length

It is impossible to assign definite lengths to abstracts. In general, short, compact papers require actually shorter but proportionately longer abstracts than long, detailed ones. Many Survey publications are areal reports that consist of a series of nearly independent papers, and it is therefore especially desirable that abstracts of these should bring out all the significant results, which may be hidden under the regional title. The Revue de géologie sets very low limits—not more than 125 words for a 5-page article, 250 words for a 25-page article, and 1,200 words for the longest reports. Biologic Abstracts sets the upper limit at 3 percent of the length of the original paper. The abstracts in Astrophysical Journal and Physical Review and those from anthropologic articles average about 5 percent. Those in Chemical Abstracts average considerably less, but they are of a different character from what is contemplated here. Probably 3 percent is a reasonable maximum limit for a short paper, and 2 printed pages of small type (1,500 words for a bulletin or water-supply paper; 3,000 words for a professional paper) for a long paper.

References

Some articles on the functions and methods of abstracting that may prove useful are cited below.

Fulcher, G. S., Scientific abstracting: Science, new ser., vol. 54, pp. 291–295, 1921; The usefulness of analytic abstracts: Idem, vol. 56, pp. 678–680, 1922; Indexing of scientific articles: Nat. Research Council, Reprint and Circ. ser., no. 34, 1922.

Schramm, J. R., The abstracting and indexing of biological literature: Science, new ser., vol. 56, pp. 495–501, 1922.

Jenks, A. E., A suggestion for abstracts of anthropological literature: Idem, vol. 60, pp. 73–76, 1924.

The best guide, however, is a study of published geologic abstracts. Good examples, chosen at random from Survey publications, are in Bulletins 771, 787, 795–A, and Professional Paper 135. Other good abstracts of Survey reports are given in the Journal of the Washington Academy of Sciences, volumes 1–11, 1911–21, and of Survey water-supply papers in Revue de géologie.

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 illustrate some feature described in the text.

Drawings and photographs intended for use as illustrations should not be inserted in the manuscript but should be kept in a separate envelope or package, and the material for all the illustrations for a report should be submitted at one time, with the text. The letter of transmittal accompanying the text should mention the illustrations and state their total number. The package of illustrations should contain a carbon copy of the list that forms part of the text, with manuscript page numbers. (See specimen list of illustrations on p. 5.) Illustrations on which geologic names are used should be submitted to the Survey's committee on geologic names, with the text, before the manuscript is transmitted to the Director.

The author and the chief of the branch transmitting the report are primarily responsible for the selection of illustrative material, but after the manuscript has been approved for publication by the Director the illustrations submitted are scrutinized by the administrative geologist, who rejects any that are unsuitable for reproduction or that seem unessential in view of the necessity for economy and approves the rest for preparation by the draftsmen. The chief illustrator decides the technical questions relating to the preparation of the illustrations. He is ready to advise the author at any stage but will not receive illustrations for final preparation in advance of approval of the complete report by the Director.

The illustrations are classified into plates and figures. Colored maps, line drawings larger than a full page, and generally reproductions of photographs will be made plates; other line drawings will be made figures. Figures are printed with the text; plates are, as a rule, printed separately from the text and are bound into the book at appropriate places or, if so large as to require several folds, put in a pocket at the end of the book. To save expense in binding, plates that do not go in a pocket are usually inserted at the end or in the middle of a "signature" (16 pages), and several plates may be inserted at one place.

The author should give each illustration a distinctive number—plates in one series, figures in another. The numbers should be assigned in the order in which references to the illustrations appear in the text. It should be noted, however, that an incidental mention of an illustration need not determine its number, which should be governed by the place where it is principally mentioned or discussed.

The number originally assigned should be kept, no matter what rearrangement, addition, substitution, or elimination may be made after the manuscript is typed. The final numbering of illustrations is determined by the chief illustrator and editor after the finished drawings, etc., are made, and as a rule it then becomes necessary to make some change in the author's numbering. For example, what the author has listed as a plate may prove to be susceptible of reduction to the size of a figure, or what the author has listed as a figure may have to be made larger than a page and hence become a plate. Any such change, of course, affects the numbers of all succeeding plates and figures. It is wasted labor for the author to attempt any change before the final numbers are determined; moreover, such an attempt may lead to confusion if one or more references in the manuscript are inadvertently overlooked. If new illustrations are added after the first numbering they may be designated temporarily by fractions, as "14½." If illustrations are eliminated their numbers may be omitted in the author's list. If an illustration is shifted from its original place, the appropriate change in the manuscript page number in the list of illustrations is all that is necessary to serve as a guide in the final numbering.

The author should not leave references to illustrations blank because of the possibility that his numbers may be changed in the final numbering. It is necessary for the editor who inserts the final numbers to know which illustration is being cited, and if the number is left blank he may have to guess, and his guess may be wrong. It makes no difference, for example, whether the author's original number is 7 or 700 if the editor knows that that is the particular illustration to be finally numbered 17.

Plates are numbered in arabic (1, 2, 3, etc.). If two or more subjects are combined to make a single plate they should generally be designated by italic capitals, as "plate 4, *A*"; but in plates showing a group of

fossils the individual subjects are numbered in arabic and called "figures", as "plate 4, figure 7." For details of a single subject that are too long to be lettered directly on the plate, italic lower-case letters (*a*, *b*, *c*, etc., or initials, as *q*, for quartz; *g*, for galena; *cp*, for chalcopyrite) are used and the explanation is given in the plate description.

In grouping photographs 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.

If it is necessary to indicate that a photograph or photomicrograph has been enlarged or reduced in the reproduction the notation will be placed on the finished illustration itself, preferably at the lower right corner, in the form "× 87" or "× ½." The author should include this information in his title, however, and not on the photograph, as the chief illustrator may find it necessary to reduce the photograph slightly for reproduction, and in that event the enlargement on the printed plate will differ from that on the photograph. The correct scale will be computed in the section of illustrations from the information furnished by the author.

Full descriptions of the plates should be furnished if the brief titles given in the list of illustrations are not sufficient. It is desirable that the full descriptions be attached to the illustrations, especially photographs, as the length of the description may govern the amount of reduction necessary to bring an illustration within the page limits, but a separate list comprising the full descriptions should always be furnished, and a carbon of this list may be cut apart for attachment to the illustrations. The descriptions should, if possible, be kept short enough to be printed on the plates themselves. For example, on a plate showing fossils it is usually sufficient to give the name of each subject with a reference to the page on which it is described, as "3. *Sequoia concinna* Heer (p. 57)." Descriptions that are too long to be printed on the plates must be printed on facing pages, which adds to the expense. Such long descriptions can sometimes be avoided by incorporating the details in the text, but if unavoidable they should be inserted in the manuscript at the proper places, the description of each plate written on a separate page. Otherwise the titles of plates should not be written in the text, as they are set up at a different time.

Figures are numbered in arabic (1, 2, 3, etc.); details of a figure are lettered in lower-case italic (*a*, *b*, *c*, etc.). Symbols or letters that are used on the figures must be explained, preferably in the titles, but if the explanation is long and complex it may be incorporated in the text. The titles of the figures, including all necessary explanations, are set up at the same time as the text and therefore should be written in the manuscript at the places where the figures are to appear.

The original drawing for a line illustration should be larger than the illustration as it will be printed in the report. Most illustrations 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 illustration. The size of the printed page in bulletins and water-supply papers is 4⅜ by 7½ inches, in monographs and professional papers 7⅛ by 9⅛ inches. These dimensions include the space allowed for the page heading and the title of a text figure. Monographs and professional papers are printed two columns to a page; the width of a single column is 3⅛ inches. 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 or column and enough shorter (or, if the title is to be printed the long way of the page, enough narrower) to leave room for the full title, as explained above.

Before an author prepares the material for illustrations he should confer with the chief illustrator concerning details of the work, especially with respect to maps. It is 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.

Authors should not attempt to make finished drawings, as that is the work assigned to the section of illustrations. Every care should be taken, however, to furnish clear copy, so that the draftsmen need not be in doubt as to any details.

Written explanations of all illustrations are also desirable. Too much of the time employed by draftsmen in making final drawings is consumed in interpreting uncertain features shown in crude original drawings. Authors can prevent this loss of time by adding to their drawings explanations of features that may be difficult or doubtful of interpretation. These explanations will also be useful when the author cannot conveniently be consulted, and they may be the means of avoiding long delays incident to correspondence.

Each piece of copy for illustrations should be plainly marked with the number assigned by the author. 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.

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.

Written permission to reproduce a copyrighted illustration must be obtained from the owner of the copyright, and the description of the illustration must contain the note "Copyright by ———; used by permission."

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.

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 promptly. If corrections are necessary they should be clearly marked in ink on the proofs. Changes involving alterations from copy cannot be made at this time unless they are of great importance or are necessary to correct conspicuous errors, and such changes cannot be permitted without the consent of the administrative geologist. Even slight alterations at this stage may make reengraving necessary. Engraved 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 a few 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. Electrotypes of illustrations cannot be obtained for use in unofficial publications, but if the original drawings or photographs are still available in the Survey files they may be borrowed by an author for reengraving, after approval of the request by the administrative geologist.

Suggestions as to expression

"Writing maketh an exact man. He who writes little had need have a good memory."—Bacon.

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 cannot 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 that is 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, coal beds, or water-bearing beds, 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 writers.

The following extracts from an article written by a former Director of the Survey[14] are suggestive and highly significant:

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

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 cannot 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.

In a later article [15] Dr. Smith wrote:

The geology I plead for is that which states facts in plain words—in language understood by the many rather than only by the few. Plain geology needs little defining, and I may state my case best by trying to set forth the reasons why we have strayed so far away from the simple type.

First of all, I suppose we may as well admit a certain liking for the sound of words, and the longer the word the more sound it has. Especially enjoyable is this mild form of hypnotism if both ideas and words are such as to make us feel that we are moving in the highest circles. At the meeting of the British Association this year one physicist frankly explained that the idea of relativity is popular because to most people it is "pleasantly incomprehensible." * * *

Again, I fear lest in our writing we lose sight of our audience, if, indeed, some of us ever see at all the audience to whom we address our written reports. The chief purpose of words is to convey thoughts, and unless the wave lengths of the words are right the receiving apparatus will utterly fail to pick up the thoughts. * * *

This brings me to a third reason for our use of highly technical language: we too often try to overdress our thoughts. Just as there is a somewhat prevalent notion that clothes make the man, so we subconsciously believe that words make the idea. We follow the precept "To be scientific, use scientific terms", and in so doing we deceive ourselves. I do not wish to be unduly autobiographic in this analysis, but to show my true sympathy for those whose practices I denounce, I confess that I, too, have had the unhappy experience of stripping the technical words from what looked like a good-sized geological deduction only to find that the naked idea was rather small and not my own. It is also a common experience to make the sad discovery that a piece of involved and obscure writing is simply the product of roundabout reasoning or twisted thinking. Our own words fool us, and unconsciously we cover up with long words or tangled rhetoric our lack of plain thinking. * * *

There is really somewhat of an obligation upon us, both as scientists and as partners in the world's business, to show the world that geology is not mystery or magic but only

[15] Smith, G. O., Plain geology: Econ. Geology, vol. 17, pp. 34–39, 1922.

common sense. I have told practical men of business that they should give little credence to the geologist who cannot tell his story in common language. The world has a right to discount our usefulness and even to distrust our honesty if we persist in concealing our thoughts, or lack of thoughts, behind a mask of professional jargon.

Much of the popular ridicule excited by some scientific reports is justly chargeable to the authors' indifference and neglect in the matter of expression. An eminent critic,[16] 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. * * * A writer who wishes to convince must lay his mind alongside that of the reader, who must be carried along in a quick and equable current.

Another English critic [17] says:

> You must first be your own reader, chiseling out the thought definitely for yourself, and after that must carve out the intaglio yet more sharply and neatly, if you would impress its image accurately upon the wax of other men's minds.

An English instructor in a New York City college said recently, "Clarity is not infantile, nor is complex opacity profound."

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 read critically by the Survey's editorial staff, but the editorial work is done under the same stress and is necessarily somewhat superficial. Many of the refinements of style that characterize the best literature therefore cannot reasonably be expected in a Government scientific report, where the chief object should be precision or clearness of statement.

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

[17] Quiller-Couch, Arthur, On the art of writing, p. 162, 1916.

Adams Sherman Hill,[18] 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 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."

The technical student's need of better training in English has been recognized by many professional and 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. Mann,[19] of the Carnegie Foundation for the Advancement of Teaching, wrote:

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.

In a lecture on the teaching of English at the universities Sir Stanley Leathers said:

Education without English is like the wisdom of the dumb: it lacks the one thing which gives outward value to the whole. And what sort of professional training is that which has not made the man fit to put his meaning on paper that others can grasp and respect it?

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

[18] Hill, A. S., The principles of rhetoric, pp. 18–22, 1895.
[19] Mann, C. R., Soc. Promotion Eng. Education Bull., vol. 6, p. 100, October 1915.

better. All he 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 [20] 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.

The dictionaries must be used with vivid realization that as a rule they do not and cannot prescribe usage—they only record it, and they record both good and bad usage. One of the few scientific men who have also undertaken literary criticism [21] 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.

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 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 author of a report on mineral deposits or geologic structure and processes.

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

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

If the author wishes his message to have its best chance of being effective, it is well worth his while to burden himself with all the labor of making it clear and forceful. The author's perspiration will lead to the reader's inspiration.

First or third person

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. The first person is more straightforward than the third and if not overused is no less modest or becoming; moreover, it prevents the ambiguity that may occasionally arise where "the writer" may be taken to refer to some other writer who has just been mentioned, as in the following example:

These analyses, according to a letter received from Mr. Ellicott, were made * * *
Though the samples analyzed were collected from localities unknown to the writer * * *

Order within the sentence

Essentials of a good sentence

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 forcefully, the ideas to be expressed. Among the indispensable requisites are the choice of the best subject nominative, the determination of its proper place, and the selection of an effective closing phrase or word. Other points that must be considered are consistency of construction, relation of all parts of the sentence to the subject nominative, and continuity of thought. Order of statement or of arrangement is of primary importance, and related words and phrases should be kept together. The obvious lack of proper order in the following example is corrected in the rewritten sentence:

His interpretation differs from that of the writer for the ancient glaciation of the region here described in several particulars. (His interpretation of the ancient glaciation of the region here described differs in several particulars from that of the writer [or from mine].)

Brevity is, of course, always desirable, but brevity should not be gained at the expense of clearness or correctness. The following sentence of 130 words shows not only lack of brevity but numerous other faults. The labor of untangling such a muddle of ideas should have been assumed by the author before he submitted his manuscript for publication.

The view, looking west, shows a portion of the Park City mining district and in the distant background a peak, Clayton (elevation 10,728), formed by an extensive stock of diorite, cutting and metamorphosing sediments adjoining on north as the argillite composed Jupiter Peak which are traversed by master northeast fissures carrying extensive veins of valuable silver-lead ore as the Crescent vein on Crescent Ridge; which faults Jurassic down 1,000 feet against Triassic; and in near foreground a ridge marking a major overthrust fault, overriding two formations; and in immediate foreground the mouth of

Ontario tunnel (5 mi. in length) of Ontario mine, which produced, between 1872 and 1896 silver-lead ores which yielded over $60,000,000 worth of silver, surrounded by the plant of the Park Utah Consolidated Mining Co.

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 9 words instead of 14 and with a gain in force and clearness. Some other sentences of this kind are corrected below.[22]

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

There are [At] some places *where* lignite beds are exposed. (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.)

"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, 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", etc., 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 cannot express his thought more forcibly in some other way.

[22] 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.

Wrong subject nominative

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

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 principal production [Most of the ore produced] was mined from the Nevada property.

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

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

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 cannot be *obtained* [confirmed].

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 resort to weak, clumsy, or inappropriate substitutes, such as "occurred", "accomplished", or "transpired."

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.

In the sentence "Barite and intense silicification usually always accompany the ore" the compound subject nominative links together a mineral, which could accompany the ore, and a process, which was ended long ago: it is the product of that process that accompanies the ore. Change "intense silicification" to "intensely silicified rock." Whatever idea the writer may have had in mind by his "usually always", the expression is objectionable, and probably the conditions will be adequately described if "always" is omitted.

Forgetfulness of subject nominative

Some writers seem to forget their subject nominative before they finish the sentence.

Its flow is large and is reported to be excellent for drinking. (The flow [of the spring] is so many gallons a minute; it is the water, not the flow, that is excellent.)

The "rim rock", which surrounds Billings, Park City, and the intermediate area, is the popular designation for this scarp. (A "designation" cannot surround an area. There is more than one way to correct this sentence, but it might well be rewritten "This scarp which surrounds * * *, is popularly called the 'rim rock.' ")

The average thickness of the shale partings is about 1 millimeter but is extremely variable. (How could an average be variable? Write "The thickness * * * averages about 1 millimeter but is extremely variable.")

Although the rock has been greatly altered by weathering, the decomposition is believed rather superficial and is regarded as affording entirely adequate foundations. (Decomposition seems hardly an "adequate" foundation for a dam.)

The length of the shell is only about one-fourth or one-fifth longer than high. (Omit "length of the.")

The principal granite district of this group of States is at Salida, Chaffee County, and is sold for monumental stone. (The granite, not the district, is sold.)

Since the World War the French deposits have been largely Government-owned and have been sold through the German-French cartel. (It is the potash obtained from the deposits that has been sold, not the deposits.)

Modified subject nominative wrongly carried along

A phrase that qualifies or relates to the subject nominative applies until a new subject nominative is introduced, but in many sentences such a phrase is "carried along" to a part of the sentence to which it does not apply.

For full development the tree seems to require considerable water and probably deserves its reputation as an indicator of underground water. (The phrase "for full development" does not apply to the second statement and should be transposed after "considerable water.")

The individual grains in the coarser limestone are as much as a millimeter in diameter and average 0.02 millimeter in the finer-grained beds. (As thus written the subject of the verb "average" is "the individual grains in the coarser limestone." Write "The individual grains * * * diameter, and those in the finer-grained beds average 0.02 millimeter.")

Because of its generally dark color it is somewhat somber for building stone but makes a very substantial structure. (The dark color does not affect its durability. Put a comma after "building stone" and insert "it" after "but.")

In 1889 Charles Earle began a careful study of the material in the Princeton Museum and in 1892 published his memoir on the genus *Palaeosyops*. (Put a comma after "Museum" and insert "he" after "1892.")

During the summer a pool of water forms on the ice and gradually freezes again during the winter. (Change to read: "During the summer a pool of water forms on the ice; during the winter it gradually freezes.")

No lead and manganese were reported in these analyses and were evidently negligible. (It might be taken for granted that "no lead and manganese" would be negligible. Write "Lead and manganese were not reported", etc.)

Very little sulphide is present in the main ore shoot, but *it* [sulphide] is relatively abundant along the margins. (It is sulphide, not "very little sulphide", that is abundant.)

Undesirable change in construction

Many sentences that should preferably be written without change in construction are begun with a clause containing an active verb and ineptly 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:

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.*

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 following examples:

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 gravel, *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 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.

Logical defects

Many sentences cannot stand the test of logical analysis, their writers having failed to keep in mind the relations of all parts of the sentence to one another.

An uninhabited country fully 50 miles square lies north of the San Juan, yet it is visited during winter by herdsmen. (The "yet" clause was probably intended to contrast with "uninhabited", but as the sentence is written it contrasts with the statement that the area "lies north of the San Juan"—a fact which would of itself have nothing to do with the herdsmen's visits.)

Unlike West Virginia, however, the losses in the organized districts of Pennsylvania offset gains in the nonunion field. ("Losses" are not comparable with West Virginia.)

The red berries induce violent illness in man, which is no hardship, since they are not at all palatable. (What he meant was that because the berries are sour it is no hardship to refrain from eating them; what he said was that the illness induced by eating them is no hardship.)

In May and June pumping rapidly increases again to a maximum in August. (The pumping couldn't reach "a maximum in August" in either May or June. The idea that the writer failed to express was that it increases in May and June and reaches a maximum in August.)

One of the most interesting place names in Manitoba is "Norway House", famous over a century ago as a district headquarters of the Hudson's Bay Co. (A place name cannot become a headquarters in the same sentence. Change "place names" to "places.")

The evidence of this one species is unimportant, nor is the deduction drawn from it by Mr. E. (The "nor" requires a preceding negative; change "unimportant" to "not important", or else change "nor" to "and so.")

Because of the character of its basin, its large and well-sustained flow, and its steep gradient, Rogue River is well suited to use as a source of power. (The first item—"character of its basin"—should be specific, like the others: every basin has a "character" of one sort or another.)

The chalcopyrite followed closely upon chloritization and replaced that mineral. (The only mineral mentioned is chalcopyrite; obviously it did not replace itself, and the chlorite that it did replace must be inferred from the "chloritization", which is not a mineral but a process. Change "that mineral" to "the chlorite.")

The original character of the rocks has been so largely destroyed as to be a serious hindrance to geologic mapping. (In some regions the "original character of the rocks" may be so complex as to make geologic mapping difficult, but the idea in the author's mind, which he failed to express in his sentence, was that the mapping is hindered by the destruction of the original character.)

The structure of the elongate ranges is so incompletely understood *as to hamper* [that] any attempt to study the origin of the valleys between them [is hampered].

The topography has been so much modified since the old glaciation as to obliterate most traces of morainal topography. (This sentence is also like the outmoded style of having twin vases at the two ends of the mantelpiece: it begins and ends with "topography." Change the last part to read "* * * glaciation that most traces of moraines have been obliterated.")

Defects in logic appear in many of the examples given elsewhere in these pages, under more specific headings.

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. In the sentence, "Their presence can only be determined by actual tests", the "only" should go after "determined." (Incidentally, it is not clear how "actual tests" would differ from "tests.") 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", in which the "principally" should follow "derived."

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

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

In 1917 it is probable that this region may be reached by railway [in 1917].

In Indiana recent writers have classified the rocks [in Indiana] as Utica or Eden.

On level 2 it is reported that considerable realgar and orpiment were found [on level 2].

The samples were preserved *for analysis* in a paraffine-sealed flask [for analysis].

The sentence "There is a band of coarsely crystalline limestone carrying bunches of garnet-pyrite rock from place to place" presents the ludicrous picture of an animated limestone carrying bunches of rock hither and yon. Better write "Here and there is a layer of coarsely crystalline limestone containing bunches of garnet-pyrite rock." "Layer" is a better word than "band", which refers simply to the visible edge of the layer.

The statement that "Care should be taken to see whether such wells are contaminated by frequent analysis" seems to be slander of the analyst. Write: "The water should be analyzed frequently to see whether such wells are contaminated."

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"; "leaves room for little doubt"; "the luxuriant gray-green of the sagebrush"; "tilted edges of sandstone strata"; "the *hasty* cover dug [hastily] by the infantryman"; "the most prevalent region of cloudbursts." In "a coarsely porphyritic rock of dark granular texture" it is the rock, not the texture, that is dark. "Two altered thin vitric tuff beds" should read "two thin beds of altered vitric tuff."

In general a phrase that applies equally to two or more items should be given with the first and not with the last—for example, "mountainous in the western part of the quadrangle and level in the eastern part." The reader should not be compelled to look ahead to get the full meaning of the "western part." So also "The thickness ranges from 700 feet at the east [side of the area] to perhaps 1,600 feet at the west side *of the area.*"

Parallel construction

Some writers seem to think that it is a fault to use the same construction for phrases that are parallel or coordinate in meaning. In their attempts to introduce variety they succeed only in introducing confusion. Long ago Lord Kames [23] wrote:

> Uniformity in the members of a thought demands equal uniformity in the verbal members which express that thought.

The following sentences illustrate the misleading combinations that result from failure to observe this requirement:

> The average growing season *according to the Ennis record* is 98 days [at Ennis] and longer at the other stations. (Not "98 days and longer.")
>
> The district has a moderate climate, in winter not very cold and *not excessively hot* in summer [not excessively hot].
>
> The veins pinch out in one direction and *in the other* pass under the glacier [in the other].
>
> The facets are best preserved near the base and *higher up* have suffered from erosion [higher up].
>
> These leaves vary in length from 6 to 9.5 centimeters and [in width] from 4 to 7.5 centimeters *in width.*

[23] Home, Henry, Elements of criticism, new ed., p. 308, 1855.

Snow fields may occur *in any latitude* at high altitudes [in any latitude] and at all altitudes in high latitudes.

The boundary between the belts is fairly distinct in places and in places indefinite. (Write "distinct in some places and indefinite in others.")

The biotite replaced albite and quartz very extensively and *sparingly replaced* hornblende [sparingly].

Some sentences of this sort cannot be corrected by simple transposition:

Most of the white arsenic is exported to America and *South Africa takes* most of the other products [to South Africa].

Limestone in massive layers and *thin beds of* shaly sandstone [in thin beds].

The following sentences, each containing two complete statements, could be somewhat improved by inserting the commas indicated in brackets, but a comma, even if its use is permissible, is generally an inadequate remedy for a miswritten sentence, and mispunctuation only adds to the faults.

The report represents a large amount of careful work [,] and a comparatively small amount of good work would improve it materially. (A better remedy would be to omit the comma and write "and would be materially improved by a comparatively small amount of good work." The reader may wonder, however, what was the distinction, if any, in the writer's mind between "careful work" and "good work.")

The waters of collieries in Durham and Northumberland carry barium [,] and barium sulphide has been found in pipes that lead from the coal pits. (Better "Barium occurs in the waters", etc.)

Other sins against parallel construction are illustrated in the following examples:

Estimating the potential value of power sites and storage capacities of reservoir sites. ("Capacities" should be changed to "capacity", an abstract term like "value.")

The replacement of pyrite by chalcocite would involve an increase in volume; the corresponding replacement of chalcocite would *occur with a slight volume decrease* [involve a slight decrease in volume]. (Change in form of a phrase may be taken by some readers to indicate a difference in idea, but in this example the only difference is that between "increase" and "slight decrease": the two phrases are parallel and should be expressed in the same form.)

The layers of shale are much thinner than the *chert* layers [of chert].

Misleading forms of expression

A writer should avoid the use of misleading phrases like "In the Cambrian limestones are found", which seems about to tell something about the Cambrian limestones but was written to mean that limestones occur among the Cambrian rocks. In the sentence "From the ice water overloaded with glacial debris 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."

Continuity

The long sentence is unobjectionable if it is well knit together and runs smoothly on, with no pitfalls of bungling construction or obscure reasoning to test the reader's patience and skill. Long parenthetic clauses,

whether set apart by parentheses, dashes, or commas, are likely to cause the reader to lose the main thread of the sentence. If he must be halted by an aside the halt should be brief. On the other hand, a "choppy" style produced by a succession of short sentences is like the "rat-tat-tat" of a pneumatic riveter and should be avoided. A few years ago a scientific news service described the comma as "the greatest foe of those of us who attempt to write clearly for the public" and in connection with that assertion gave, presumably as an example of clear writing, a statement of about 250 words in which not a comma was used. A part of this statement is quoted below.

> If we are to popularize our product we must bear in mind that the reading public is not patient.
> The public with which we deal is a new public.
> It is under a highly nervous tension.
> It must do quickly the thing it has in mind.
> It must be on its way.
> It is a public that is subjected to rapidly succeeding periods.
> Here are the periods of its daily grind.
> It awakens. Sometimes it washes. It eats. It reads while it rides to office or factory. It works. It lunches. It works. It rides and reads. It eats. It plays. It sleeps.
> It will read what is easy to read. It will not read what is hard to read.

"Hard to read" certainly describes such a style as that. It takes more nerve force to stop and start again every few words than to keep going for a reasonable time.

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 such words as "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. The editor of a small-town newspaper

once heard or read the word "blatant", which was altogether new to him, and he was so delighted with his discovery that he used it half a dozen times in his next issue. Once would have been enough, but six times simply advertised his own naïveté rather than the several examples of blatancy he was describing.

It is undesirable to use a word in two senses in the same sentence. 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 defect related to lack of clearness is the painful effort of some writers to use a substitute for a term that ought to be repeated to avoid switching the reader's train of thought off the track. "Tautology" is their bogeyman, but they have no clear idea of what tautology really is. A competent critic [24] 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.

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

> 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] * * *.
>
> Water supplies which in more humid regions are wholly or almost *entirely* [wholly] neglected here become of great importance.
>
> Most of the phenomena are due to lack of water rather than to the presence of *that agent* [water].
>
> This sandstone is well exposed at Whiskey Gap, where it forms the *most constricted* [narrowest] part of *this topographic feature* [the gap].

To understand the sentence "Andesine and augite are the essential minerals and usually are found in the proportion of 3 of the plagioclase to 1 of the pyroxene" the reader must remember that andesine is a plagioclase and augite is a pyroxene. The variation in terms was unnecessary, anyway, because "the proportion of 3 to 1" would have been perfectly clear. The writer in the next sentence used neither "andesine" nor "plagioclase" but "feldspar"—three terms for the same thing in three lines.

The phrase "the same" should not be used to represent a preceding noun, as in 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].

---

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

The writer of the following sentence avoided what he thought would be tautology not by the use of a synonym but by too much condensation: "The formation is of fresh-water origin in the west and *brackish* [of brackish-water origin] in the east."

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. A 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." He may even stumble by using the wrong high-sounding word, as in "mitigated against successful operation." He meant "militated against", but the plain word "hindered" would have served his purpose better.

One author wrote of water samples being "withdrawn through ordinary garden hose by a portable manual pump." It would seem that a prosaic garden hose might well have been linked with an equally prosaic "hand pump."

Occasionally an author recognizes this fault before it is pointed out to him by the critic: one writer changed "hydropneumatothermal contact action" in his manuscript to "hot solutions."

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[25] 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.

The enthusiasm of some writers for their studies leads them to apply such terms as "splendid" and "beautiful" to fossils, exposures, specimens, etc., that have neither splendor nor beauty in the primary sense of the words. It is easy to find a more appropriate designation, such as "excellent", "remarkable", "well-exposed", or "well-preserved."

"Inaugurate" and "inauguration" may be reserved for use in Washington on January 20 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, or procure. There is an old story of the young man who invited his extremely fat inamorata to attend the opera and on her asking "Have you secured the seats?" replied, "Oh, I didn't think that would be necessary."

Even the dictionaries are disposed to proscribe the use of "limited" and "restricted" for "scant" and "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 noticed the same fault. One of them[26] 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.)

[25] Woolley, E. C., Handbook of composition, p. 9, 1907.

[26] Hodgson, W. B., Errors in the use of English, p. 43, 1889.

The pathetic fallacy

What Ruskin calls the "pathetic fallacy"—the ascription of human qualities to inanimate objects—though picturesque and appropriate enough in such works as the plays of Shakespeare ("Pity, you ancient stones, those tender babes whom envy hath immured within your walls"), seems a little far-fetched in a scientific paper. The author who wrote "Similar forms in humid climates suffer basal steepening and may therefore enjoy accelerated back-weathering" used this figure twice, though perhaps the amusing contrast between "suffer" and "enjoy" was inadvertent.

Standpoint, point of view, and basis

Such phrases as "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 Miocene" is a bad equivalent of "These rocks are of Miocene age" or simply "These rocks are Miocene." "The 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.

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 standpoint of [According to] this theory.

The ridge is [topographically] symmetrical *from a topographic standpoint.*

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

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* [produced] this escarpment.

A flood in the eighties *was responsible for* [caused] this damage.

These valleys will be referred to under the heading "Geologic history", where the glacial erosion *responsible for* [to which] their characteristic forms [are due] is *narrated* [described].

The rock is *earlier in age* [older] than the *period of* regional metamorphism that *was responsible for* [resulted in] the present structure of the enclosing schist.

"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 percent 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" cannot 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:

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.

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. (Write "Most such deposits contain calcite, and any copper-iron sulphides they carry will oxidize", etc.)

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.)

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

Other misuses of "latter" are indicated below.

I have seen all the phenomena herein described but have minutely studied only small portions of them. It would be impossible for any one man to do the latter unless he made it a life task. (Search for an antecedent for this "latter" would be fruitless. What the writer probably meant but did not express by "to do the latter" was "to study them all minutely.")

Movement continued along these faults during and after these intrusions, causing the latter to be shattered. (The grammatical antecedent of "latter" is "intrusions", but a process cannot be shattered, and "latter" should be changed to "intrusive rocks", which also gets rid of the rhyme in "latter" and "shattered." Another offense against euphony as well as against clearness is shown in "fragments of float from the latter may litter the hillside." Gilbert and Sullivan alliteration has no place in a geologic report.)

This *latter* outcrop approximately parallels the Red Mountain outcrop at a distance of about 3½ miles *from the latter*. (The antecedent of the second "latter" is not the same as that of the first, and both can with advantage be omitted.)

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* [blue chrysocolla] has a vitreous luster and is crystallized, but the *former is* [brown varieties are] 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 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 their avoidance is troublesome.

Leslie Stephen [27] 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 [28] 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" [29] 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

Such "cotton-wool" words as "cases" and "instances" have been condemned by many critics. Fowler [30] says:

Case. There is perhaps no single word so freely resorted to as a trouble saver and consequently responsible for so much flabby writing.

Instance. * * * There is some danger that, as writers become aware of the suspicions to which they lay themselves open by perpetually using "case", they may take refuge with "instance", not realizing that most instances in which "case" would have damned them are also cases in which "instance" will damn them. The crossing out of one and putting in of the other will not avail: they must rend their heart and not their garments and learn to write directly instead of in periphrasis.

Quiller-Couch [31] devotes a whole chapter to "jargon", in which he describes "case" as "jargon's dearest child" and rails at the vice of using "circumlocution rather than short straight speech" and habitually choosing "vague, woolly, abstract nouns rather than concrete ones."

Another critic [32] says, " 'Case' and 'instance' are the commonest and most dangerous of a number of parasitic growths which are the dry rot of syntax."

Examples of the improper or superfluous use of these words 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 * * *.

One such case is definitely known to have formed a cinder and ash cone over 200 feet high. (So elusive a thing as a case cannot form so substantial a thing as a cinder cone.)

The author who writes that "Specimens in some cases show veins of calcite" does not intend to refer to specimens in cases; he means simply "Some specimens," which should be denoted clearly by two words instead of doubtfully by four.

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[27] Studies of a biographer, vol. 1, p. 23, 1898.

[28] Freeman, E. A., Internat. Rev., September 1876, p. 690.

[29] Howells, W. D., Harpers Mag., March 1914.

[30] Fowler, H. W., A dictionary of modern English usage, pp. 65, 277, 1930.

[31] Quiller-Couch, Arthur, On the art of writing, pp. 100–126, 1916.

[32] Chapman, R. W., The portrait of a scholar and other essays.

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

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.

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.*

There are several cases, however, where wells * * * finally fail to yield either oil or water. In such cases the casing has been pulled and the hole filled with cement (Write "Several wells, however, finally fail * * *. In such wells the casing", etc.)

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. 63.) 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.

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.
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 fuzzy habit of thought that leads a writer to use these words may also be reflected elsewhere in his writing, as illustrated in the following example, which, happily, is not taken from a Survey manuscript but from another Government report:

> It is seldom the case that one department or bureau is enabled to render a service with such potential possibilities of the results being of value to so many departments or bureaus as it is believed is the case in this instance.

The unnecessary and undesirable use of other abstract terms is illustrated in the phrase "good examples, some of them 5 feet in diameter", in which "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 flow of the stream was obstructed by ice *conditions.*
> Most of this petroleum is used for fuel *purposes.*
> *Under* [In] baseleveled *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. (Write "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" means "fairly good public roads"; and "stone suitable for building purposes" is simply "building stone."

Some other sentences in which these words 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.

A number

The phrase "a number of" is overworked by many writers. Probably it is usually intended to mean an indefinite rather small number, in about the same sense as what is generally understood by "several", but as 5,000,000 or 50,000,000 is also "a number" it seems preferable to use an appropriate and more specific substitute, such as "several" or "a few."

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* [was] subordinate.

These gravels *have the appearance of having* [look as if they had] been deposited by moving water and *have a strong resemblance to* [strongly resemble] the Gila conglomerate.

The known geologic history of the region *may be said to have been begun* [begins] in Silurian time.

It is expected that by March the [first] 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* [are of] considerable age.

The alluvial soil *has* [contains] much sand and gravel.

The rocks *have a flesh color* [are flesh-colored].

The sample had *had no exposure* [not been exposed] 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 better word than "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 satinlike 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.

Allbutt [33] 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 an 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." 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. Similar ludicrous comparisons are afforded by the following examples:

In Texas the men on strike remained out an average of over 20 days, while in Maryland they were out 155 days. (The days must have been long in Texas.)

[33] Allbutt, Clifford, op. cit., p. 98.

The mining on claim 3 is being done in winter, while that on claim 4 is being done in summer. (Contemporaneity of the seasons.)

The greatest geosynclinal accumulations in the Paleozoic were just east of the batholith, while comparable thicknesses of Mesozoic beds were deposited in a trough 150 miles or so farther east. (Telescoping of geologic time.)

In the following sentence "while" should be replaced in both clauses:

While [Although] windmills are economical, they are subject to destruction by severe storms, *while* [and] calm reduces the production to zero.

"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.

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.

Quartz and calcite were locally deposited with the copper [;] *while* the zeolites were later than the copper.

"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" the "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 sentence "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.

The patient reader may interpret 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" appears in some Survey manuscripts instead of "merges into" or "merges in." "The foothills here merge *with* [into] the plains."

"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" and "not quite finished." If used generally in this sense its significance in a phrase like "white, plastic clay quite free from sand" would be unmistakable, whereas, owing to the uncertain value of the word as employed by many writers, the exact meaning intended by 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 needs. A few of the diverse misuses 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?].

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 a depth yielded* [were found to be underlain by] 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* [exposures] in the Mancos Valley (="was named the Mancos shale, from Mancos Valley, where it is typically 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?].

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. Archaic and dialectical.—Webster's New International Dictionary, 2d ed., 1934.

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, but the variant form seems unnecessary.

"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 [34] 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 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 inch 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. "Knife edge" and "vanishing point" are other acceptable terms to express the idea intended by the cipher in these phrases, as "This bed ranges in thickness from 25 feet to a knife edge [or to the vanishing point]."

Note also that the phrase "in thickness" and not the adjective "thick" must be used in the predicate after "ranges": "The bed ranges from 40 to 50 feet in thickness." "The bed is 40 to 50 feet thick" is correct, however.

If the range is not known and only the upper limit is to be given, the form "up to", which logically requires a preceding "from", should not be used:

> Microcline phenocrysts *ranging up to* [as much as] 2 inches long.
>
> The pebbles *range in size up to* [reach a maximum of] 6 inches in diameter. ("In size" and "in diameter" are not both needed, and "in diameter" is the more specific.)

The statement "The pebbles are up to 3 inches in size" gives only the maximum size, not the range; it is equivalent to saying that the largest pebbles are 3 inches in diameter, or that the pebbles are "as much as 3 inches in diameter."

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

If "range" is used, however, care should be taken to express the two ends of the range in coordinate terms—not as in the following examples:

The concretions range from *fine grains* [less than an eighth of an inch?] to 2 inches in diameter.

It ranges in width from a *narrow belt* [few feet?] to 60 rods.

This deposit ranges from a thin veneer to [a bed] several hundred feet [thick].

The sentence "These pebbles range in size from peas to walnuts" expresses the ends of the range in coordinate terms but is objectionable because "peas" and "walnuts" are not terms of size and are too indefinite anyway: peas and walnuts vary in size. What the writer probably meant was a range from the size of an average ripe garden pea to that of a walnut [black or English?] in its shell, but his idea would have been more clearly expressed by giving the range in some unit of measurement, such as the inch or centimeter. If he didn't want to be too specific he could have qualified the measurements by "about."

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."

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."

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]."

This and these

"This" and "these" should not be used alone as subject nominatives where there can be any doubt as to their meaning, where the reader will be compelled to look back to find their antecedents, or where no antecedents have been expressed. The missing noun can generally be supplied, with advantage to the reader.

The rocks contain * * * numerous drusy cavities. In these [cavities] minerals of later age have been deposited. (Not "these minerals.")

In the Milesburg Gap the quartzite has been quarried to a considerable extent for ganister, and near *this* [the] quarry barite is found in narrow fissures. (No quarry had been mentioned.)

Horizon

"Horizon" is improperly used for "bed" or "stratum", as in the sentence "This horizon is 4 feet thick." The report of the committee on stratigraphic nomenclature representing the Geological Society of America, the American Association of Petroleum Geologists, the Association of American State Geologists, and the United States Geological Survey contains the following statement: [35]

> The term "horizon" * * * denotes merely position. A horizon has no thickness, being merely a stratigraphic level, or plane.

Instead of "This horizon is oil-bearing in all parts of the field" a writer would 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.

Structure

The awkwardness that is likely to result from the use of the term "structure" not only in the general, abstract sense, in which it denotes attitude, but in a concrete sense as applied to an anticline, syncline, or other structural feature is well illustrated by the following quotation:

> The principal * * * structure in the township is the * * * syncline, described on page —. It is probably to be regarded as a synclinorium, rather than a simple syncline, so that its structure is somewhat more complex than was formerly supposed.

The "its" in the second sentence refers to "structure" in the first sentence; "its structure" therefore means "the structure's structure." To avoid such awkwardness the term should be confined to its abstract meaning, and for the other sense some definite term, such as "anticline", "syncline", "dome", "terrace", "monocline", "fold", should be substituted, or, if an inclusive term is needed, "structural feature." (See Bulletin 661, pp. 78–79.)

Production

The lingo of many oil men includes such expressions as "the well failed to reach production" (meaning a productive stratum) or "the area beyond production" (meaning the productive wells). Such short cuts simply befog meanings and dull the edges of distinctions in expression.

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

[35] Ashley, G. H., and others, Classification and nomenclature of rock units: Geol. Soc. America Bull., vol. 44, p 429, 1933.

"abundant", "conspicuous", "valuable", or any other word of clearly defined meaning. One of the early members of the Geological Survey,[36] who was also one of its best writers, said:

> Not unfrequently an essay ostensibly and mainly scientific will contain the statement that an object, or relation, or other phenomenon is "interesting", the context indicating that interest is supposed to inhere in the phenomenon. As a matter of fact, interest is a mental attitude of the observer, and the adjective "interesting", though applied to the phenomenon, describes only the observer's relation to it. * * *.
>
> Something similar may be said of "important", "valuable", etc., when employed in scientific description. In common with "novel", "pertinent", "significant", and the like, they indicate the relations of a phenomenon to the condition of human knowledge. Just as each observed fact has at some time, temporarily, the quality of novelty, so each fact and inference may in some phase of the process of knowledge serve to explain the previously unexplained and thus have importance or comparative value. Apart from such temporary and humanistic relations, all facts are equally important or equally unimportant. When, therefore, an author makes the bald statement that a fact is "important" he * * * is self-deceived if he thinks of the importance as an essential characteristic.
>
> It conduces to clear thinking as well as clear writing if one fortifies the use of "interesting" or "important" by pointing out the relation which endows the indicated fact with interest or importance. When that has been done the need for the adjective often disappears; and if it cannot be done the adjective is a meaningless platitude.

The following examples show some remedies for this fault:

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 * * *.

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.

A well-exposed occurrence of dolomite sheared and made slaty by faulting *occurs* [is well exposed] north of Pequea Creek. (The correction, besides getting rid of the "occurrence * * * occurs", substitutes a definite subject nominative for the somewhat vague "occurrence.")

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

[36] Gilbert, G. K., Interesting and important facts: Science, new ser., vol. 21, no. 524 pp. 68–69, 1905.

largest lead-producing section of Canada. This region is mountainous." 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. If a distinction is needed it seems desirable to use "region" for the larger unit and "area" for the smaller.

Proposition

A "proposition" is something proposed. The expression "a good commercial proposition" for a business venture that is likely to be profitable is "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 practice, as in the sentences "Mr. Kellerman went West following a prolonged illness"; "O'Brien left the place following his dinner" [seasick and jumped overboard?]. The phrase "during and following the interval" is objectionable both because "following" is not a preposition and because the similarity of ending makes "during" look like a participle.

Suffered

"Suffered" is a favorite word with some writers on geology, who often misuse it, as in "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." (See "The pathetic fallacy", p. 66.)

"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

"Majority", a good term 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."

The verb to be

The verb "to be" is best used to indicate existence or location. Its use as a principal verb in other connections is likely to make a flabby sentence, in which a word of more positive meaning could be substituted with advantage, as indicated below.

Much of its northwestern base *is* [consists] of quartzite.
Its steepest face *is* [fronts] toward the west.
Part of this adjustment *was* [was accomplished] through abrasion.
The only strong winds *are* [blow] from the southwest.
The presumptive origin *is by* [is to be ascribed to] faulting.
The principal gold production has been [obtained] from placers.

A few examples in which the use of the verb is unobjectionable will make the distinction clear:

Below the summit plain are valleys of gentle slope.
The remnants are on opposite sides of the fault.
The front tapeman should be a man of experience.

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, may fail 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 baselevel" 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 baselevel." The task of ferreting out the careless writer's meaning is thus imposed upon the reader, who, even with all his efforts to interpret obscure words or phrases, may fall into gross misunderstandings. The scientist who, in deprecating efforts to make his writings more easily understood, said of the prospective readers "Let 'em dig" perhaps realized that what he had to tell wasn't worth stating clearly.

Words and phrases to be discriminated

Terms of direction

Terms of compass direction—such as "west", "western", "westerly", "westward"—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 sentences "This extends for an indefinite distance westerly" and "The stream here turns westerly" the word "westerly" should be "westward." In like phrases some writers use undesirably, as an adverb, not only "westerly" (a good adjective) but "westwardly" or "to the westward" or 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." In phrases like "10 miles north and 2 miles east of Alamillo" the "of" should be "from", as the distance is measured by starting from Alamillo and going first 10 miles north and then 2 miles east. The excuse for such an expression may be the fact that the place indicated cannot be reached by a bee-line diagonal, the roads being laid out along section lines.

Altitude and elevation

Both "altitude" and "elevation" are used in referring to distance above sea level, but as "elevation" also means uplift and is used in that sense in many geologic reports ("elevation of the two areas to their present altitudes"), whereas "altitude" as used in such reports has only the one meaning, there is a good argument for preferring "altitude."

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 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."

"The volcanoes are sometimes practically extinct" is an impossible statement: they might be sometimes quiescent and sometimes active, but if they were practically extinct they would be so without qualification. What the writer meant was "Some of the volcanoes are practically extinct."

Sentences like "These rocks are often red" and "The beds are often thick" 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.

These 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", indicating time, is misused for "where", indicating place:

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* [where] fresh to pale yellow where exposed to the weather.

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

The granitic intrusion probably occurred in *lower* [early] Jurassic time.

The beds may mark the *upper* [later] part of this general period of sedimentation.

"Shortly" is properly used for time but not for distance: "Shortly after" but not "shortly below" [a short distance below].

Part and portion; partly and partially

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

Part, the general term, denotes simply that which is or is regarded as being 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 individual function, or purpose; as "All are but parts of one stupendous whole" (Pope). "The priests had a portion assigned them" (Genesis 47:22). "Art, thus conceived, realizes for men a larger portion of life" (Stevenson).—Webster's New International Dictionary, 1934 ed., p. 1781.

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.

The reason for preferring "partly" is thus expressed:

"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 and oral

"Verbal" is misused for "oral", which signifies "spoken."

"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, 1934 ed., p. 1712.

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

Watershed and 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" is improper.

Since, as, and ago

"Since", which in its primary meaning refers to sequence of time and is likely to be so understood, is by some writers used in the other sense, where "as" or "inasmuch as" would prevent momentary ambiguity. In each of the following phrases the "since" would on first reading be taken to indicate time and should be replaced by "as":

Since these experiments were made to determine the order of solubility of the compounds studied.

Since the war in Europe has affected ocean transportation.

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 it was exposed to wave attack even before the Koolau spurs, ample time has existed for the ocean to remove this segment of the dome.

In the following sentence "since" is used in two senses:

Since the ore is crushed some movement has taken place since mineralization. (The intended meaning was "The fact that the ore is crushed indicates that some movement" etc.)

"Since" and "ago" should also be discriminated. "Ago" refers to a point in past time; "since" to the time intervening between such a point and the present. "Since the ice uncovered the nunatak, not many decades *since* [ago]."

Like and such as

"Like" introduces a comparison with something else; "such as" introduces an example of the group itself. In "some of the cones, like Manana Island", the "like" puts Manana Island outside of the group indicated by "the cones"; in "some of the cones, such as Manana Island", the "such as" makes it one of the group. "Such as" may also be used, however, to introduce a comparison. "Cones such as are present in other areas" is equivalent to "cones like those present in other areas."

Begin and open; end and close

The verb "open" means primarily "to move [something] from its shut position"; the opposite verb is "close." This pair and the corresponding nouns "opening" and "close" are often used in a figurative sense where "begin" (or "beginning") and "end" would be more exact and therefore preferable, on the general principle that a word that has only the intended meaning is better than a word that has several meanings, of which only one is applicable at the particular place where it is used.

Vary and various

"Vary" is misused for "range", as in "The wells *vary* [range] from 100 to 300 feet in depth." "Various" is misused for "many" or "several", as in "Gold occurs here and there on the ocean beach and *various* [many] attempts have been made to recover it"; "Native arsenic was found at *various* [several] places."

Evidence and evidenced

"Evidenced" (a word to be avoided) is used for "shown", "indicated", "proved", or "evinced", and "evidence" is much overused, especially "fossil evidence." An 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. 57–58). Instead of saying that a certain conglomerate contained pebbles of limestone a geologist wrote "In this conglomerate limestone pebbles were in evidence."

Over and more than

"Over" is used in many phrases where "more than" would obviously be preferable. In the following sentences the "over" and "under" are in confusing contrast:

The burning has advanced along the coal bed for a distance of over 1,000 feet and under 1,000 feet of overlying material.

The ore mined usually lies under more than 20 feet, and in some places over 100 feet, of sand and clay overburden.

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."

"Over" or "above" may be used in a misleading sense in such sentences as "Oxidation extends to depths *above* [below, of more than] 2,100 feet."

Due and owing

The adjective "due" may be misused for the participle "owing", and "owing" may be misused for "due", as in the following sentences:

The Whittier School was injured by the earthquake, *due* [owing] to the fact that the building stood on made ground.

The injury was *owing* [due] to the earthquake.

The line of strike of each fault is very crooked, *due* [owing] to the fact that the faults traverse a rugged country.

This energy is immediately due to gravitation, but it is remotely *owing* [due] to the sun's heat.

Due [Owing] to irrigation, the discharge had increased by 1917 to 5,000 second-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, 1,000 feet to the east"; "The same gravel is 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.

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

Short versus long words

A long word is not objectionable simply because of its length, but if a short word that conveys the same meaning is available it is ordinarily to be preferred. For example, "numerous" usually expresses no idea that is not equally well conveyed by "many"; "approximately" is generally no better than "about"; "during" can be replaced by "in" where the

idea of duration is unintended or unimportant. Moreover, the repetition of a short word does not divert the reader's attention as much as the repetition of a long word.

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.
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 formation, *where present, varies* [ranges] from a few to 200 feet *thick* [in thickness].
In this area there are several irregularities *present*.
By this means some of the zinc *present* in the ores is saved.
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 "of" after "all" should not be mechanically cut out. 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 quoted below. (See also p. 99.)

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.

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* [spared] with advantage.

The conditions *met with* [observed, prevailing] in the field.

A large production is not to be *looked for* [expected] from these deposits.

Placer mining has been *carried on* [done] on this stream.

In "a thickness of from 2 to 4 feet" the "from" should be omitted. So also in "the water rises to within 10 feet of the surface" the "to" is superfluous. Prepositions are doubled or tripled badly in the following sentences:

Each of the veins has been drifted on for from 50 to 70 feet [Drifts have been run on each vein for 50 to 70 feet].

This well was *brought in* [completed] in 1901.

This is equivalent to coal at *at least* $18 [or more] a ton.

A newspaper account of a new flying boat announced that "it will cross the Atlantic in *from between* 12 to 15 hours", using three prepositions where one would have been enough.

"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 gerund 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."

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.

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

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 dark green *in color*.

An innumerable *number of* tiny veins.

Bilateral asymmetry.

Contemporaneous *in age*.

The beds do not crop out *at the surface*.

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.

Lenticular *in character*.

Grass Creek almost bisects the basin *into two parts*.

In every respect except size the Ashe County deposits are exactly like *those exhibited by* the Cranberry deposit.

Minerals formed after the rock in which they are found *had preexisted*.

The *down*-dropped block. (An up-dropped block would be peculiar.)

The ores are of igneous origin *originally*.

The highest at 1,200 feet and others *at lower levels* down to about 1,000 feet above sea level. (Naturally others than the highest would be "at lower levels." The "above sea level" should be transposed after "1,200 feet"—with the first item to which it applies rather than the last. See p. 60.)

In addition another similar dike. (If it is "another" it is "in addition"; if it is "similar" it can't be the same one and therefore must be "another." "A similar dike" tells the whole story.

The phrase "as already stated" is generally unnecessary and undesirable. Repetition of a statement in another connection may be perfectly justifiable, but the reader need not be notified that it is a repetition—in fact, he may not realize it unless the author tells him. If it is desirable to make a cross reference to a place where the statement is given in more detail the form "as explained in detail on page —" or simply "(see p. —)" may be used.

Care is needed in using the connective term "as well as": in "complete as to maps as well as to text" the sense requires "as well as as to text", but to avoid the double "as" the second "to" may be omitted, or the phrase may be written "complete in maps as well as in text." The term "as well as" gives a slight additional emphasis to what precedes it compared with what follows it, and where no such emphasis is desirable "and" should be used instead.

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." (See also, "The verb to be", p. 82.)

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.

These sediments show [that] the Black Point basalt is as old as the Waimanalo stand of the sea. (Some writers also improperly omit the "that" after such verbs as "believe" or "indicate.")

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].

"The work done was under the supervision of" should be "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. 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* [all the] formations in the area."

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 cannot be questioned. In each of the following examples the participial clause simply makes an additional statement that has no logical relation to the clause to which it is added:

Pine Bluff is the natural business center of the southeast half of the State, the average temperature being 62°.

It is thin and slabby, weathering to a cinnamon color.

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°.

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

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

The palate is long and narrow, *the roof of the same being* [and its roof is] strongly arched.

A Washington newspaper writer perpetrated this sentence: "There have been many attempts to fix the value of the Tredegar estates, the accent being on the second syllable of the name."

The participle "affirms a state or action about something named by a substantive." [37] Except in the "absolute construction" (see below) the substantive (noun) should be included in the sentence as the subject

[37] Bates, Arlo, Talks on writing English, 2d ser., p. 35, 1901.

nominative of the clause to which the participial clause is attached. The following examples show failure to observe this requirement:

Where the till is thick *it is lighter in color* [its color is lighter], indicating less perfect oxidation. (The color indicates, not the till.)

The slopes are covered with debris, *thereby effectively concealing* [which effectively conceals] the coal beds. (The debris, not the slopes, conceals.)

These wells range in depth from 97 to 1,500 feet, depending on location. ("The depth of these wells ranges," etc. The depth, not the wells, depends.)

The dangling or hanging participle also represents a violation of the requirement stated above. A few bad examples may be cited:

Recognized as a bureau of information, *the services of* [it has to employ] two men *are required* to answer questions relating to topography alone.

Looking closer, chatter marks were seen (=Closer inspection showed chatter marks).

Examined carefully [On careful examination] no fossils were observed.

Approaching the vein [As the vein is approached] through the tunnel the serpentine is seen to be decayed.

After *entering* [the drill entered] the Alum Bluff formation a thick bed of clay was encountered.

Judging from the dips in the tuff [indicate that] a small hill has been mantled at this place.

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 [or are] smaller."

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." Without the bracketed phrase the participial clause is simply an added statement having no logical connection with the main clause.

In the "absolute construction" the substantive to which the participle relates is included in the participial clause, which expresses a condition or action that has some bearing on the main statement of the sentence. This construction is rare, and the more direct phrasing suggested in brackets in the following example seems preferable: "*The difficulties being* [As the difficulties are] by no means insuperable, however, a satisfactory interpretation may be worked out."

In many sentences a participle may be replaced by a defining relative clause (see pp. 96–97) with a slight gain in emphasis and possibly in clarity:

A gravel-floored plain *sloping* [that slopes] gently toward the southeast.

All the thick coal beds *cropping out* [that crop out] in this field.

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

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.

They are therefore regarded as *being* of the same geologic age.

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.

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

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

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 large 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. The following sentences are correct:

He thinks that 30 cents is a high price.

Three dimes were placed on the table.

It is reported that 15 barrels of oil stands in the well (that much oil, not 15 separate barrels; there were no barrels in the well: the barrel was simply a unit of measurement).

At this place 20 feet of sandstone is exposed.

About 3,000 tons was produced in 1934.

The term "United States", treated as a plural in the Constitution, is now generally used as a singular. Ramsey [88] says:

The change is as much political as grammatical. In the early days of the Republic the plurality of origin was kept more before men's minds than the unity of result. They emphasized the "pluribus" of the common motto rather than the "unum"; but since 1865 there has been a greater feeling of nationality.

Some writers have difficulty with firm names. "Southern Pacific Co." is singular; "D. Appleton & Co." is plural. Uncertainty may lead to treating a name as both singular and plural in the same sentence:

The Illinois Central System announces the installation of air-conditioned cars on *their* [its] Chicago-New Orleans trains.

"None" may be used in either a singular or a plural sense. "Did you get some cottage cheese? None was to be found." "Did you get some strawberries? None were on sale." The Standard Dictionary says:

When the singular or plural equally well expresses the sense, the plural is commonly used. "None of these words are now current."

Antecedents

Relative and demonstrative pronouns and other words that require an antecedent are in many sentences left without one, or the grammatical antecedent is not the true one.

The basins receive much of the run-off of the adjacent mountainous catchment areas, in which many streams rise, but which discontinue when they reach the margin of the desert. (Grammatically both the first and the second "which" refer to "areas", but the second one was intended to refer to "streams". The last clause may be changed to read "but these streams carry water only as far as the margin of the desert.")

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[88] Ramsey, Samuel, The English language and English grammar, p. 274, 1892.

A nine-span steel highway bridge, three of which are over the normal river channel. (The grammatical antecedent of "which" is "bridge"; the real antecedent is "nine spans" and must be expressed in that form. Write "a steel highway bridge of nine spans, three of which", etc.)

With it there is much spotted ore that could be concentrated, but that has not yet been undertaken. (The "that" in the last clause has no expressed antecedent and should be changed to "concentration", or "concentrated" might be changed to "treated by concentration", thus providing an antecedent for the "that."

They enable stock to spread out into territory immediately after a rain which they are unable to graze in normal times. (As the nearest noun is naturally taken for the antecedent of a relative, the words "into territory" should be transposed just before "which.")

The lower salt series, which was deposited upon the Delaware Mountain formation in the Delaware Basin and which it filled to overflowing * * *. (The second "which" does not refer to "lower salt series" but to "Delaware Basin"; change "it filled" to "filled the basin.")

A succession of relatives, each referring to a different antecedent (a sort of échelon arrangement), makes an awkward sentence. The following example shows how the "which" used three times can be reduced to one:

Among the steeper dips north of the synclinal axis are those *which occur* along the southeast flank of the Hamilton dome, which, like the Bell Rock dome, is situated upon the axis of an anticline *which* [that] almost parallels the Round Bottom syncline.

A word that has to refer back to an antecedent of its own should not be made to serve as an antecedent for another word that follows. The weak construction that would result is shown in the following example:

These men had been appointed commissioners by the King, to determine all controversies in the colonies. The matter was referred to them, who after a full hearing determined * * *. ("Them" is an inadequate antecedent for "who"; write "and after a full hearing they determined", etc.)

Other troubles with antecedents are indicated below.

Probably less than two dozen cottonwood trees occur along the San Juan at and below Piute Farms, yet they are numerous in some of the side canyons. (The antecedent of "they" is "less than two dozen cottonwood trees"; change "they" to "cottonwoods." (See "Forgetfulness of subject nominative", p. 56.)

During early Tertiary time an area beneath the present mountains was domed, possibly by a deep-seated intrusion. This dome * * *. (No dome had been mentioned; change "This dome" to "The dome thus formed".)

Dry Creek and Cottonwood Creek contain many pools of alkaline water which are unfit for drinking. (The writer thought his "which" had to refer to "pools", but it was the water, not the pools, that was unfit for drinking. Put a comma after "water" and change "are" to "is.")

The basal beds rest unconformably upon those of the Fort Union formation. (The antecedent of "those" is "basal beds"; omit "those of.")

The variation in thickness seems to be due to erosion, for the sandstone rests on it with irregular contact. (The real antecedent of "it" is not "variation" but "the shale" in the preceding sentence. Change "it" to "the shale.")

Only one bear was seen, and their signs were not at all common. ("One bear" is not a sufficient antecedent for "their"—in fact, even a dozen bears that were seen wouldn't be a sufficient antecedent: it was the signs of the unseen bears that were not common. Change "their signs" to "signs of bear.")

The author of an "English grammar" writes, "I know of hardly any words that ought to be abbreviated; and if these were not, it would be all the better." Change "hardly any" to "very few"; "these" needs a positive rather than a negative antecedent.

It seems incredible that the following sentences should have been written while the writer was awake:

Many minerals were named after the discoverers. Among these could be mentioned wollastonite, hatchetine, and wernerite, who had described their properties. (Insert "named after the men" before "who.")

From April to October there are few wholly clear sunny days, a large number of them being cloudy or foggy. (The antecedent of "them" is "wholly clear sunny days", and the writer therefore trips over himself by saying that many sunny days are cloudy. Change "a large number of them" to "many of the days.")

Especial care should be taken in the use of "it." Carelessness produces a misfit, obscure sentence:

The bottom of the valley of Rosebud Creek has an altitude of 3,700 feet at the south line of the reservation. It flows in a narrow valley, and its tributaries are short and steep. ("It" and "its" refer to the creek, not to the bottom of the valley. The second sentence should read, "The valley is narrow, and the tributaries", etc.)

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 antecedent of "its" is "a public well"! Change "its citizens" to "citizens of the town" and "the town" to "it.")

The origin of this fragmental texture has been variously explained. It has been argued by Hubbard and others that part of it, at least, is erosion debris. (As the antecedent of the second "it" is "fragmental texture", the writer says that part of the texture is debris. Change this "it" to "the material.")

The last example also shows the fault of using "it" in two senses in the same sentence. A still worse example, in which "it" is used in three senses, may be quoted from a book on the style of one of the oldest and most respected magazines published in this country:

"Probably" differs so slightly, if at all, in meaning from "likely" that it is difficult to conceive a case in which it might not be substituted for it.[89]

In the following sentence "it" is used four times—twice impersonally and twice referring to the same thing:

It has not been possible to identify it with any of the described forms, and it seems to be so distinct that it is probable that additional examples could be recognized without difficulty.

The awkwardness could be cured by writing "It could not be identified with any of the described forms, and it seems to be so distinct that probably additional examples", etc.

That, which, and 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 defining or restrictive pronoun, to be used where the clause that

[89] Ives, G. B., Text, type, and style, p. 270, 1921.

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. In "The house that Jack built" each of the dramatis personae is identified by a defining clause beginning with "that." For example, among all the forlorn maidens of that neighborhood, the one "that milked the cow with the crumpled horn" was the one who got kissed.

The distinction between "that" and "which" is rigidly adhered to by some critics, but considerations of euphony may make it desirable to substitute "which" for "that" in a sentence where "that" is used several times or in more than one sense. "That" cannot be substituted for "which", however, and in a defining clause that begins with a preposition "which" must be used: "The quadrangles of which maps have been published."

Either "who" or "that" may be used as a defining pronoun referring to a person.

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

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 * * *." It is necessary to use "which" rather than "that" in a defining clause that is followed by an "and which" clause:

> The portion of South Australia which has been most favorable for human occupation and within which there has been the greatest density of population in post-Pleistocene time * * *.

Than does, etc.

In such a sentence as the following the "does" is awkward and usually unnecessary: "There is little in the Patoot flora to mark its occurrence 36 degrees farther away from the Equator than does the Ripley flora." Howells [40] wrote:

> He writes in more than one place such an uncouth clause as "Goldoni shows a truer insight into cosmopolitan life than does Moliere"; as if he did not know that the ellipsis was perfect without the auxiliary and were bound to hammer the sense into us with blows that battered his sentence out of shape.

The same criticism of course applies to the use of any other verb with "than."

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

[40] Howells, W. D. in Editor's Easy Chair, Harpers Mag., March 1914.

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* [I] held a consultation"; "The place was named by *myself* [me]"; "Lee believes that the locality [he] 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 multiple compound adjective and other faults

The clumsy multiple compound adjective is found here and there 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 cumbersome 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 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"; "large 4 to 14 feet wide bodies of milling ore"; "the 425-foot well water"; "a 300,000 kilowatt 70 percent annual capacity factor basis"; "an only 2 to 3 miles wide schist band."

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" some authors 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." Such headings are perhaps excusable because of their necessary limitations, but they should not serve as models for scientific writing.

Latin and other 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 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.

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 [41] 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."

For the improper use of "etc." in phrases beginning with "such as" and similar terms see page 89.

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"; "conglomerates with well water-

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

worn 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"; "minutely comminuted"; "as the process proceeded."

The following sentence seems to be "faulty" in more than one respect:

A dike of agglomerate in the Colorado Prince reverse fault has been faulted by a minor cross fault within the fault zone, due to renewed movement along the main fault.

A few more infelicitous examples may be added:

Although in both cases there are certain uncertainties due to the presence of form genera of uncertain botanical affinities,* * *.

Milky quartz with sparse chlorite and sparse pockets sparsely mineralized with pyrite.

As erosion proceeded the ore became shattered and scattered through the clay.

Inasmuch as much the same characteristics * * *.

Around these mountains lie low-lying lands.

Proper emphasis is one element of euphony. A flabby, feeble sentence that lacks emphasis can be changed to one that cracks like a whip by rearrangement or rewording. The following sentence is faulty not only in the rhyme of the two clauses but in the failure to bring out clearly the contrast between the two transporting forces:

Ice in motion in the form of glaciers and icebergs transports an important quantity of material, and the wind carries small quantities of very fine, light material. (Change as follows: "Considerable material is transported by moving ice in the form of glaciers and icebergs, and small quantities of very fine, light material are carried by the wind." The rewritten sentence gets rid of the rhyme, the meaningless "important", and the awkward doubling of "quantity" and "quantities" and gives the places of emphasis (at the ends of the two clauses) to the words that should be emphasized.)

Minor counsel

An author should avoid the use of phrases like "last year", "this year", "next year", "3 years ago." Before the report is printed "this year" may have passed, and "last year" may be "2 years ago." Write "in 1934"; "during the season of 1934."

"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. 10° W. 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") the form "crop out" seems preferable for the verb.

"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." "Exceptions" should have a logical relation to something expressed in the sentence. In "The coast line is, with few exceptions, rocky" it is the rockiness, not the coast line, to which there are exceptions. Write "Except in a few places the coast is rocky."

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 [, described above]." "Roots in situ are described 10 feet below sea level" [in the Mermaids' Home Journal?]. 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."

A noun used to define a color should be so specific in meaning as to leave no doubt in the reader's mind. For example, "olive" is often used as a color term, but as an olive may be green or brownish drab or even, if ripe, almost black, the terms "olive green" and "olive drab" should be used where applicable, and it will not be necessary to refer to the ripe olive for a color comparison.

A similar indefiniteness is seen in such phrases as "pebbles the size of nuts." The reader has no clue to tell him whether the writer was thinking of filberts, walnuts, or coconuts.

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 the Snake River (not to beyond the Snake River).

Eastern Marquette County and western Delta County (not eastern Marquette and western Delta Counties).

In Placer and Nevada Counties and the southern part of Sierra County (not in Placer, Nevada, and the southern part of Sierra Counties).

Summary of the features of a good manuscript

A well-prepared manuscript submitted for publication by the Geological Survey 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, 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. 5.)

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. The relative rank of the headings is indicated by indention in the table of contents.

5. 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.

6. 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.

7. 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.

8. Its footnotes, which include the titles of all works or papers cited and the particular pages to which reference is made, have been verified by the author and are in the forms prescribed on pages 16–30.

9. 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.

10. Its geographic names are in the forms prescribed by the Division of Geographic Names or other designated authorities, and its geologic names have been examined and approved by the Survey's committee on geologic names. (See pp. 6–8.)

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

12. 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 the third person, not in both.

(*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 typists 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.

13. 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 publications of the Geological Survey conform in general to the Style Manual of the Government Printing Office. It is impracticable to quote here all the rules that affect Survey publications, but a few of the most common questions are answered below. An "Abridged Style Manual" that contains practically all of the larger book except the part that is of interest solely to printers is obtainable for 20 cents from the Superintendent of Documents.

Capitalization

Capitalize a descriptive term used to denote a definite region, locality, or geographic feature, also such terms in the plural:

Allegheny Front
Appalachian Plateau
Atlantic Coastal Plain
Badlands (South Dakota)
Big Horn Basin
Blue Ridge
Canal Zone
Cascade Range
Catahoula Parish
Continental Divide
Continental Shelf
Crow Indian Reservation
Driftless Area (Mississippi Valley)
Eastern Shore
Fall Line
Gulf States; Central States
High Plains
Lower Peninsula (Michigan)
Lycoming Township
Mount Rainier
Niagara Falls
North Atlantic States
Pacific Coast States
Potomac River Valley
Puget Sound
Rangeley Lakes
Rio Blanco and Moffat Counties
San Joaquin Valley
Skyline Drive
Thornton Gap
Tioga Pass
the West; the Southwest

Such terms as "district", "area", "region", and "province" and such geologic terms as "formation", "anticline", "dome", "fold", and "fault" are regarded as common nouns not forming a part of the proper name and are therefore not capitalized.

Appalachian province
Bar X ranch
Breckenridge district
Mud Lake area
Yukon-Tanana region
Cincinnati anticline
Lagarto formation
Nacimiento uplift
Vermejo Park dome
Williams Range fault

The iron and copper "ranges" of the Lake Superior region are not mountain ranges, and in writing of them the word "range" is treated as a common noun like "area" or "district" and not capitalized. These ranges are the Cuyuna, Gogebic, Marquette, Menominee, Mesabi, Penokee, and Vermilion.

Capitalize the word "The" forming part of a geographic name: The Dalles, The Weirs, The Hague.

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: 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: 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. In American and British names follow individual usage, if ascertainable: Henry van Dyke, Reginald De Koven.

Capitalize the full names of organized bodies and the distinguishing substitutes for such names—North Carolina Geological Survey, Idaho

Bureau of Mines and Geology, Connecticut Geological and Natural History Survey, Hayden Survey, Fortieth Parallel Survey, the Survey.

In citations of books or articles capitalize only the first word, proper nouns, and proper adjectives. (See section on footnote and other citations, pp. 16–30.)

Capitalize the name of a phylum, class, order, family, or genus, but not the name of a species: Arthropoda, Crustacea, Hypoparia, Agnostidae, *Agnostus; Agnostus canadensis*, *Epigaea repens*, *Quercus palustris*, *Diplotrypa westoni.*

Coined terms derived from proper names are not capitalized: aviculoid, menodontine.

Capitalize a plural formed by adding s to a Latin generic name: Martinias, Bellerophons.

Do not capitalize derivatives of proper names no longer identified with the names from which they were derived:

babbitt metal	pitot tube
canada balsam	plaster of paris
carlsbad twins	portland cement
china clay	roman type
harveyized steel	taintor gate
india ink	venturi tube

Do not capitalize a common noun used with a date, number, or letter merely to denote time or sequence or merely for the purpose of reference, record, or temporary convenience:

chapter 3	page 245
class I	plate 23
collection 6812	section 10
exhibit A	table 19
figure 7	well 162

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.
Calif.	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."

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In references to public-land divisions use the following forms: "In the NE¼SW¼ sec. 25, T. 5 N., R. 14 E."; "in the N½ 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: Allyn & Bacon, John Wiley & Sons, Chesapeake & Ohio Railway, American Security & Trust Co. Names of persons who are associated in scientific, literary, or similar companionships should be connected by "and": Gilbert and Brigham, Meek and Hayden, *Cyrtolites disjunctus* Ulrich and Scofield.

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

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

For "number" (meaning a serial number) use "no." (lower-cased unless part of a capitalized name), not #.

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.

Use "a. m.", "p. m." with figures denoting clock time (10:23 a. m.). Note use of colon.

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 day is given with name of month (Mar. 9, Sept. 26), use the following forms:

Jan.	Apr.	July	Oct.
Feb.	May	Aug.	Nov.
Mar.	June	Sept.	Dec.

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. for centigrade.
cm^3 or cc for cubic centimeter.
cf. for compare.
F. for Fahrenheit.
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).
percent (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.

Omit periods after abbreviations of units of the metric system: mm, cm, kg, etc.

Abbreviate plate (pl.), figure (fig.), page (p.) if used in parentheses or in footnotes. (See also pp. 19–21, 39.)

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. Note the form of the words below:

acidic	clue	gage
acre-foot	debris	gastropod
afterward	downward	groundmass
airplane	draft	laccolith
aline	draw-down	ostracode
aluminum	drought	pneumatolytic
arrastre	échelon	poikilitic
asbestos	employee	porcelaneous
badlands	enclose	reconnaissance
baselevel	eolian	second-foot
boulder	esker	siliceous
briquet	farther (distance)	upward
cannot	further (not distance)	volcanism
canyon	fluorspar	vug
cerusite	forward	water-worn

Words combined to form a unit modifier immediately preceding the word or words modified are generally hyphenated:

flood-plain deposits	blue-green algae
40-horsepower engine	light-green clay
well-defined rating curve	medium-grained sandstone
bluish-gray shale	thick- to thin-bedded limestone

The hyphen is not used if the first word of the modifier is an adverb ending in "ly" or if the first word in a three-word modifier is an adverb that modifies the second word:

carefully prepared report
fairly well defined rating curve

If, however, the first word in a three-word modifier applies to the other two, the hyphen is used between those two:

thoroughly contact-metamorphosed rocks
a nearly right-angle bend

A chemical term used as a unit modifier is not hyphenated: iron carbonate water.

Compound color terms, made up of two color names or a color name preceded by a noun that indicates the particular hue, are not hyphenated unless the term becomes a unit modifier:

The shale is olive green to blue green.
Brick-red and chocolate-brown clays.

A compound adjective in which the second word is a past participle or a coined adjective in the form of a past participle is hyphenated unless derived from a solid compound:

case-hardened	single-spaced	lime-cemented
chocolate-colored	fine-grained	V-shaped
cross-bedded	fine- to medium-grained	wind-blown

Prefixes (except ex and self) and suffixes (except elect) do not ordinarily require a hyphen:

clockwise	nonmarine	self-interest
ex-governor	pluglike	unaltered
interbedded	president-elect	varicolored

A hyphen is used, however, to avoid doubling a vowel (except after the short prefixes co, de, pre, pro, re) or to prevent mispronunciation or misinterpretation:

micro-organism	antero-inferior
meta-andesite	re-treat (treat again)
ultra-atomic	non-coal-bearing rocks

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 8–11.

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: *Inoceramus fragilis*, *Ostrea congesta* Conrad, *Productus*. Names of families and higher groups are printed in roman: 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 such as the use of italic type. Fowler [42] says:

> It is an insult to the reader's intelligence to admonish him periodically by a change of type, like a bad teacher imploring his boys to attend for a moment, that he cannot safely go to sleep just now. * * * To italicize whole sentences or large parts of them as a guaranty that some portion of what one has written is really worth attending to is a miserable confession that the rest is negligible.

The columnist Heywood Broun, criticizing the use of italic, says, "A writer might as well shout 'Booh!' at a reader."

Use of figures

Decimals, degrees, measurements, money, percentage, time, and similar matter should be expressed in figures (10.75 millimeters, 27°, 45 miles, 3 cubic feet, 24 pages, $1.54, 17 percent, 8 hours). Figures are also used

[42] Fowler, H. W., A dictionary of modern English usage, pp. 304, 305–306, 1930.

for groups of enumerations in which any one is 10 or more, isolated enumerations of 10 or more, and serial numbers, but not for isolated enumerations of less than 10 (tested at 4, 28, and 160 days; 25 wells; locality 259; nine stamp mills).

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 tons 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: 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", "1¼" where the fraction is joined to a whole number.

Use figures for meridians and parallels: 141st meridian, 40th parallel.

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

Write "2d" and "3d", not "2nd" and "3rd."

For a fiscal year, consecutive years, or a continuous period covering more than 2 years use the contracted forms "1934–35", "1890–91", "1916–27", "1900–10", "1907–8" (but "1900–1901", "1895–1902").

Spell the word indicating date in such expressions as "the early seventies", "it occurred in the eighties."

Spell enumerations preceding a compound modifier that contains a figure, as "twelve 2-inch planks."

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."

In the following sentence a comma should be inserted after "weeks": the sense is not "weeks and tents and frame buildings" ("shoes and ships and sealing wax"): "The population increased from 10 or 15 to about 200 within 2 or 3 weeks and tents and frame buildings of all descriptions were hastily erected."

In the sentence "Certain difficulties arose between the contracting parties and the work was abandoned" insert a comma after "parties": the difficulties did not arise between the contracting parties and the work.

One more example may be enough: "Hops and briars are twined about the shrubs [,] and flowers grow in profusion" (not "twined about the shrubs and flowers").

The presence or absence of the new subject nominative therefore determines the presence or absence of the comma. If, however, the first clause is preceded by a phrase that applies also to the second clause the comma should generally not be used: "East of Olinda the beds are somewhat coarser-grained and conglomerates are more prominent than west of Olinda."

Omit the period after "percent" and after numbers (1, 2, 3) that stand over columns in a table.

Nouns (including proper names) ending in s take only the apostrophe in the possessive case, singular or plural, as Jones', Stokes', 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 10 (p. 150)" (not "plate 10, page 150"); "shown on page 150."

Omit the comma between month and year if day is not given: January 1935.

A defining clause should not be separated by a comma from the term that it defines, but a comma should precede a clause that simply gives additional information that is not necessary to complete the sense: "The highway bridge 2 miles west of Absaroka"; "Cabin John Bridge, 10 miles northwest of Washington." The distinction has the same basis as that between "that" and "which." (See pp. 96–97.)

A famous "lexicographer" writes, "The Spanish explorer, Francisco de Coronado, set out * * * in 1540", but as Coronado was by no means the only Spanish explorer the commas before and after his name should be omitted. The sentence "To the great Frenchman, Cuvier, paleontology owes its beginning" shows the same fault: Cuvier was great, but so have been many other Frenchmen.

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 "muscular scar", 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." "Long dry spell"; "long, tedious spell of dry weather." "A brief, interesting account"; "a brief typewritten account."

In "Chopin's most characteristic posthumous impromptu" the unit is "posthumous impromptu", and the insertion of a comma after "characteristic" would make the sense "most posthumous", which is of course absurd.

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: the phrase describes an engine run by gasoline, a gasoline engine of Fairbanks make, a Fairbanks gasoline engine of 2 horsepower. No comma should be used just before a unit.

The following phrases are punctuated according to the rules given above:

Hard, compact quartzite sandstone.
Hard dark-gray fine-grained calcareous sandstone.
Tough, hard gray siliceous shale.
Gray, rusty-weathering quartzitic sandstone.
Gray carbonaceous fissile clay shale.
Dense blue-gray crystalline limestone.
Soft gray thin-bedded fine-grained ripple-marked cross-bedded limy sandstone.
Light-buff to white fine-grained quartz sandstone.
Massive cross-bedded fine-grained cliff-forming dark-red sandstone.
Buff crystalline siliceous limestone.
Drab indurated and nodular calcareous shales.
Thin-bedded shaly magnesian limestone.
General Electric ATB 750-kilovolt-ampere 189-ampere 3-phase 60-cycle 2,300-volt 18-pole revolving-field alternating-current machine.

Correction of proof

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 "copyholder" to a proofreader 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 proofreader will correct obvious errors in spelling, capitalization, and punctuation.

The first proof taken at the Government Printing Office is called a "galley proof" because the type is assembled 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 bureau that furnished the manuscript. Proof received from the Government Printing Office is not read by copy in the Survey unless the author wishes to take that precaution himself. By bureau and printing office procedure, generally slow—exasperatingly slow to the author except while he is 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. The final proof is approved for printing and returned to the Government Printing Office.

The time that ordinarily elapses between the date of approval for printing and the date of publication may be several months, depending on conditions and other demands at the Government Printing Office. The printing of elaborate colored maps may require from 6 months to a year, and work on the proof of the text of a report may be finished long before the first proofs of the maps are received.

Few Survey reports are electrotyped, and consequently reprints are generally impracticable; moreover, colored lithographic maps cannot be reprinted except at disproportionate expense.

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 proofreaders 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.

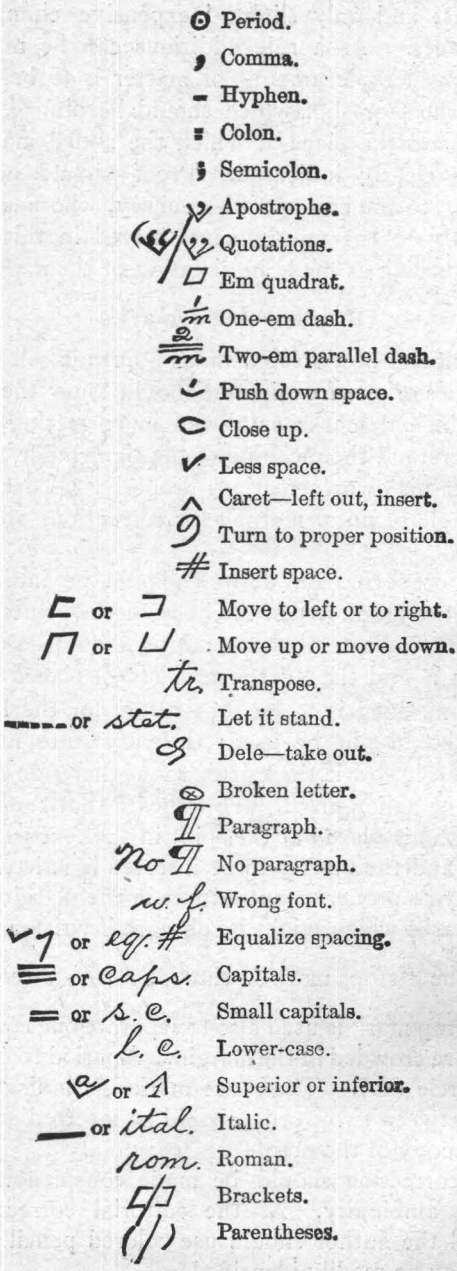
Proofreader's marks

Although it is not to be expected that an author will be familiar with all the technicalities of proofreading, 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 proofreader's marks and a sample of proof marked for corrections are given on pages 114–115.

Every change or correction desired should be indicated by marks on the margin of the proof, not in the body of the printed matter, except as here noted. To indicate that something should be taken out, a line is drawn through it and the "dele mark" (ꝺ) placed in the margin of the proof. If something is to be substituted for the matter expunged the dele mark should not be used: the substitute matter should be written in the margin, or, if there isn't room there, on a separate sheet, to be pinned to the galley proof. 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 proofreaders to indicate corrections:



6-pt. ital. caps

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 proofreaders 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 proofreaders, 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.

stet.

tr.

tr.

w.f.

lead.

lead.

Out; see copy;

l.c. who

w.f.

over

4?

Some don'ts on proofreading

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 (∧) 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 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  , a form of d, meaning delete (cut out).

Don't correct proof in the fashion attributed to a former President of the United States, who is said to have indicated a change from a semicolon to a comma by carefully erasing with his penknife the dot of the semicolon, without making any mark in the margin.

DIRECTIONS TO TYPISTS

Typists 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", "Footnote and other citations", 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 (8 by 10½ inches), 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. 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—that is, the first page of the abstract—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. 5), which should be given, the pages being those on which the headings appear in the manuscript. If page numbers cannot be supplied when the table of contents is written they may be inserted with pencil 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.

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, 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. 5.) Do not underscore or number the center headings, in either contents or text, to indicate their rank. Side headings should be underscored for italic, with period and dash after each heading.

The text of a report, including geologic sections, well logs, etc., should preferably be written triple-spaced; footnotes and quoted matter double-spaced. Leaving plenty of room for editorial marking may avoid the necessity of recopying edited pages, but a page with crowded interlineations, no matter how carefully they are written, must be recopied before it can be sent to the printer.

Write titles of text figures with "hanging indention" (see printed reports), not ordinary paragraphs nor each line flush.

Footnote references in the text should be unnumbered, but a "shelf" should be written for the final number, to be inserted later. (See p. 16.)

For reference marks in tables use "superior" figures (^{1}, ^{2}, ^{3}), not asterisk (*), dagger (†), etc. The references should be numbered in order, as explained on page 30.

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 16–30.

Rules for the use of hyphens in petrographic terms and a list of such terms are given on pages 8–11. Some other rules for the use of hyphens will be found on pages 107–108.

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, percent; 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 enclosed within the sentence unless "See" is used: "Shown on the map (pl. 6)"; "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."

The heading for a table or section should be underscored for italic. See 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 108–109 for the use of figures and words to express numbers.

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.

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."

Observe the directions given on pages 104–105 in regard to capitalization, and note the list of abbreviations of names of States given on page 105.

Use "a. m.", "p. m." with figures denoting clock time, and use a colon between hours and minutes (4:30 p. m.).

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

Write "2d" and "3d", not "2nd" and "3rd."

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. Footnote numbers in text should be left blank. (See p. 16.) Carbon copies are not necessary.

As the printers require that no paragraph be carried over from one page to the next it is necessary for them to cut and paste manuscript to remedy such breaks in paragraphs. This task consumes much time and is therefore expensive and a source of delay; moreover, it produces sheets of different sizes, which are inconvenient to handle. For these reasons manuscripts intended for publication should be so written that no paragraph breaks at the bottom of a page. This plan requires looking ahead to determine whether the next paragraph can be finished on the page, and because some short pages are necessary it uses more paper; but these items are more than offset by the saving in expense, time, and convenience. If the author has written a paragraph so long that it will not go on one page the editor must apply the remedy; three or four lines may be written single-spaced to squeeze the paragraph into the page,

but if the paragraph is still longer the typist can do nothing about it. If she has written one or more paragraphs and miscalculated the length of the next so that it cannot be finished on the page, the sheet should be cut apart at the last paragraph, each portion pasted on a full-size sheet, and the paragraph finished with double spacing.

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 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. 5.)

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 "percent", nor # for "no."

Don't underscore names of fossils when they are arranged in lists or in tables. In text underscore the names of genus, species, and variety (*Spirifer, Spirifer crispus, Spirifer crispus simplex*), but not the family, class, or other name (Lingulidae, Mollusca, Brachiopoda).

Don't underscore other foreign words for italic.

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. 16.)

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

Don't write anything single-spaced except as indicated at the top of this page. (See pp. 3–4.)

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