GEOLOGICAL SURVEY OF CANADA

OPEN FILE 3600

GUIDE TO AUTHORS
A guide for the preparation of Geological Survey of Canada maps and reports

compiled by
GID Editorial Board

1998

Natural Resources Canada | Ressources naturelles Canada

Canada

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Foreword

The Geological Survey of Canada (GSC) produces information to promote the sustainable and balanced use of geological resources for business and industry. It releases the results of its scientific research programs mainly in the form of publications and maps. Similarly to all other institutions involved in scholarly publishing, the GSC requires that submissions by authors comply with its own set of precise specifications. To assist authors, a *Guide to Authors* was prepared twenty years ago, and several revised editions have been released since then.

The main purpose for such a guide is to provide authors with examples of the style in use at the Geological Survey of Canada. As was previously stated in an earlier version of the Guide: 'The *Guide to Authors* is designed to assist authors in preparing a clear, concise manuscript that will be...published with a minimum of delay and difficulty. The usage applied...is the way we do things - it is neither right nor wrong'. To this end, we have adopted a style of presentation and standards for our publications that have become the hallmark of GSC publications and that contribute to the high esteem in which GSC publications are generally held.

Readers will find this current edition of the Guide concentrates heavily on the editorial aspects of writing, including grammar, punctuation, and abbreviations. However, a great deal of time was devoted to expanding the spelling and usage section, and important revisions were also made to sections dealing with the writing of references and paleontological texts. The guidelines have been revised so as to more accurately reflect current writing standards and seek to bridge the boundary between author and editor; they are designed to help established authors to write better, and to explain writing goals for scientific publications to novice authors.

Acknowledgments

This guide is based on the 1979 Geological Survey of Canada (GSC) edition of *Guide to Authors*. The following GSC editors, research scientists, and advisers, who are listed alphabetically, made fundamental contributions to the Guide in the form of new material, suggestions, and critical review: E.M. Cameron, J. Caron, F.W. Chandler, M.-F. Dufour, H. Dumych, S.R. Elliott-Meadows, P.J. Griffin, G. Labelle, O.E. Inglis, J. Kingsley, J.M. MacGillivray, A.D. McCracken, D.C. McGregor, W.C. Morgan, G.S. Nowlan, N.C. Ollerenshaw, T. Poulton, L. Reynolds, and A.J. Weatherston.

The following kindly gave permission for use of copyright material: American Association of Petroleum Geologists, for the *North American Stratigraphic Code*; Kenneth K. Landes for extracts from 'A Scrutiny of the Abstract' and 'A Scrutiny of the Abstract II'; and T. Neil Irvine and Oxford University Press for extracts from *A Writing Guide for Petrological (and other Geological) Manuscripts*.

The GSC welcomes comments on the content and format of this edition of the *Guide to Authors*, as well as corrections and suggestions for additions.

PREPARING MAPS AND REPORTS FOR PUBLICATION

Publications issued by the Geological Survey of Canada

The Geological Survey of Canada (GSC) is not only concerned with scientific research, but is also directly involved with providing the geoscience data needed for short-term planning and for making policy decisions on such critical subjects as nonrenewable energy resources, transportation corridors, strategic mineral resources, earthquake or landslide hazards, and other environmental issues. Because almost all the results of GSC studies should be equally available to all Canadians as nearly as possible at the same time, a variety of publication modes are used to meet these diverse objectives. They range from printed geological maps and classic scientific treatise that present results acknowledged by the scientific community to be major contributions, to coloured Open File maps and reports produced digitally on demand, and completely digital products released as computer diskettes, CD-ROMs, and via the Internet.

The output from the Survey's scientific program is announced monthly in the GSC Information Circular and can be purchased from the Geological Survey of Canada Bookstore, 601 Booth Street, Ottawa, Ontario K1A 0E8 as well as from the GSC's regional offices in Vancouver, Calgary, and Quebec City. Information on publications and orders can also be placed by telephone (613-995-4342), fax (613-943-0646), or e-mail (gsc_bookstore@gsc.nrcan.gc.ca). The Information Circular is available on the Internet at this URL:

http://www.nrcan.gc.ca/gsc/gicd/pubs/publish.html

Bulletins

This series comprises generally final reports on at least some phase of a research project, and deals with topics such as systematic areal mapping, geophysics, geochemistry, surficial geology, and economic geology of either broad regional or local interest. They are all critically reviewed by one or more specialists, and may include maps, figures, and pocket items, and can be of any length. The Bulletin series now incorporates all the categories of GSC publications that were formerly released as Memoirs, Bulletins, Economic Geology reports, and Papers. Consequently, some Bulletins may contain interim results, although these are more commonly released in Current Research or as Open Files.

Current Research

The Geological Survey's 'Current Research' series contains reports that are comparable in scope and subject matter to those appearing in scientific journals and other serials (contributions not to exceed 5000 words with abstracts fewer than 150 words).

Current Research is currently released twice a year: in January and in July. Reports for the January issue of Current Research are restricted to the results of current fieldwork and surveys, whereas no such restriction applies to the July issue, which also contains the results of laboratory work. The January issue is usually produced as several regionally oriented volumes, whereas the July issue is normally a single volume divided into regional sections. Also included in the Current Research series are separate collected reports for radiocarbon dates and radiometric dating techniques. The particular instructions for the preparation of submissions to Current Research volumes are given in Appendix A and are regularly updated.

Miscellaneous Reports

This series includes popular guides designated mainly for the use of the general public, and publications not readily assigned to Bulletins or Current Research. A few examples are the 'Rocks and Minerals for the Collector' series, and several atlases.

Maps

Digital technology now enables the GSC to produce all of its wide variety of geoscientific maps more expeditiously. Some multicoloured maps are printed on quality stock when large press-runs of several hundred copies are needed. Others are printed on demand by means of colour electrostatic plotters, and may be released as 'A-series' or Open File maps. Maps are also available in digital format as computer diskettes or CD-ROMs and even, in some cases, released on the Internet. Like the reports, however, GSC maps are subject to critical review; in their case, by at least one scientific authority. Instructions on database standards and procedures for geological map production are available on the Internet at this URL:

http://www.nrcan.gc.ca/ess/carto/english/reference/reference.html

Open Files

The Open File series is produced to expedite the release of data by making unedited manuscript material available to the public in advance of formal publication, and to act as a repository for relevant supporting data that are referred to in published reports. The series includes manuscript maps and reports, voluminous data sets resulting from multiparameter geophysical and geochemical surveys, consultants' reports, preliminary, unvetted field and laboratory results, etc. The release media include paper copy, plastic film, magnetic tape or diskette, CD-ROM, videotape, and the Internet.

Open Files are made available for viewing at GSC sales outlets and GSC libraries, and also at certain provincial geoscience information centres. The public can purchase copies from designated outlets; copies of Open Files are usually printed on demand. Further information and instructions on the preparation of Open Files are given in Appendix B.

The publication process

The Geological Survey of Canada communicates the results of its research as expeditiously and effectively as possible to the public. Survey authors, therefore, should only consider a project complete when the results have been published and not when their manuscripts have been submitted for editing.

The results of research done at the GSC are released either in Survey publications or in outside journals. The publication process described here deals with Survey publications, their routing procedures, the steps involved, and the responsibilities of authors.

The first step in the publication process is the acceptance of a manuscript by a division and submission of the 'Permission to Publish' (*see* Appendix C1) form following agreement between author(s) and critical reviewers, who must complete the 'Critical Reviewer(s) Appraisal form' (*see* Appendix C2).

The approved manuscript in a double-spaced hard (paper) copy and a diskette, together with the critical reviewer's comments, is then submitted to the Sector Scientific Editing unit. After editing, the revised manuscript is sent to the Digital Design unit where production officers are responsible for co-ordinating the cartographic work, final layout of the text, and liaising with the printer. The production officers prepare the final copy or page proofs, which are returned to authors for proofreading (typographical errors, mislabelling of figures, omissions of text, etc.).

Note that changes to the text cannot be allowed at this stage as they may involve the recompilation of the entire report. Major changes and additions to a manuscript must be made when the report is being edited. The corrected page proofs are returned to editors for final approval before printing.

Survey reports are printed from either camera-ready copy or digital files prepared in-house by the Digital Design unit.

First steps

Authors should consider several things before starting to compile a geological map or write a report:

Which geological time scale should be used?

Are there sufficient geographical names appearing on the map area covered?

Do new geographical names have to be proposed?

Are the stratigraphic/lithological units being described referred to formally or informally?

Is it necessary to formally propose and define new stratigraphic names?

Has permission been obtained to use and/or modify copyright material such as any illustrations and other material that is published by another author, ensuring that the GSC and Federal Government are protected from possible litigation procedures?

Geological time scales

The Geological Survey, as an organization, does not possess or maintain a particular position regarding geological concepts, and this also applies to geological time scales (*see* 'Critical review of manuscripts'). Several Survey scientists have proposed time scales for various epochs that are particularly applicable to Canada, but there has been no consensus on their use. Several time scales are shown in Appendix D.

Geographic names

In a bilingual country like Canada, questions arise regarding the official use of toponyms, or geographical names, and their translation. The names on our official, federal government maps have been authorized through the Canadian Permanent Committee on Geographical Names.

Geographic names shown on maps are not to be translated and are to be spelled according to their official form shown in the *Gazetteer of Canada*, the *Répertoire toponymique du Québec*, and the *Gazetteer of Undersea Feature Names*, or on the Internet at this URL: **http://GeoNames.NRCan.gc.ca/**. Names of pan-Canadian or historical significance (listed below) have both official English and French spellings. On the other hand, certain names are

spelled exactly the same in both English and French, for example, one will write 'Montréal, Quebec' on an English map, and 'Montréal, Québec' on the French version, or, 'St. John's, Newfoundland' in English, and 'St. John's, Terre-Neuve' in French. Note that Quebec (the province - a name of pan-Canadian significance) is written in English without the accent, whereas Québec (the city) keeps the accent.

In reports, the names of populated places (cities, towns, etc) are written according to official spellings as for maps and are not translated. For physical features, the generic is translated, but never the specific term. The generic terms, such as lake, river, valley, mountain, island, pond, bay, point, hill, describe the nature of the entity. The specific term is the particular name applied to the location or geographic feature, for example Saguenay (River), St. Elias (Mountain), Wager (Bay).

In the English text, for example, the names of the following geographical features and locations are written as follows:

- à Camille Island (for île à Camille)
- à la Croix River (for rivière à la Croix)
- Lake Saint-Jean (for lac Saint-Jean)
- Lake Trois Rivières (for lac Trois Rivières)
- Little Lake à l'Argent (for Petit lac à l'Argent)
- Saint-Jovite
- Sarrazin Beach (for plage Sarrazin)
- Trois-Rivières

Names of pan-Canadian significance

Abitibi, Lake / lac Abitibi
Anticosti Island / île d'Anticosti
Appalachian Mountains / les Appalaches
Arctic Ocean / océan Arctique
Athabasca, Lake / lac Athabasca
Athabasca River / rivière Athabasca
Atlantic Ocean / océan Atlantique

Baffin Bay / baie de Baffin
Baffin Island /île de Baffin
Beaufort Sea / mer de Beaufort
Belle Isle, Strait of / détroit de Belle Isle
British Columbia / Colombie-Britannique

Cabot Strait / détroit de Cabot
Cape Breton Island / île du Cap-Breton
Chaleur Bay / baie des Chaleurs
Champlain, Lake / lac Champlain
Churchill River, Man. / rivière Churchill (Man.)
Churchill River, Nfld. / fleuve Churchill (T.-N.)
Coast Mountains / chaîne Côtière
Columbia River / fleuve Columbia

Davis Strait / détroit de Davis

Ellesmere Island / île d'Ellesmere
Erie, Lake / lac Érié

Franklin, District of / district de Franklin
Fraser River / fleuve Fraser
Fundy, Bay of / baie de Fundy

Georgian Bay / baie Georgienne
Great Bear Lake / Grand lac de l'Ours
Great Slave Lake / Grand lac des Esclaves

Hudson Bay / baie d'Hudson
Hudson Strait / détroit d'Hudson
Huron, Lake / lac Huron

James Bay / baie James

Keewatin, District of / district de Keewatin

Labrador Sea / mer du Labrador
Laurentian Mountains / Les Laurentides

Mackenzie, District of / district de Mackenzie
Mackenzie River / fleuve Mackenzie
Manitoba, Lake / lac Manitoba
Michigan, Lake / lac Michigan (not in Canada)

Nelson River / fleuve Nelson
New Brunswick / Nouveau-Brunswick
Newfoundland / Terre-Neuve
Niagara Falls / chutes Niagara
Nipigon, Lake / lac Nipigon
Nipissing, Lake / lac Nipissing
North Saskatchewan River / rivière Saskatchewan Nord
Northumberland Strait / détroit de Northumberland
Northwest Territories / Territoires du Nord-Ouest
Nova Scotia / Nouvelle-Écosse

Ontario, Lake / lac Ontario
Ottawa River / rivière des Outaouais

Pacific Ocean / océan Pacifique
Peace River / rivière de la Paix
Prince Edward Island / Île-du-Prince-Édouard

Quebec / Québec (province)
Queen Charlotte Islands / îles de la Reine-Charlotte
Queen Elizabeth Islands / îles de la Reine-Élisabeth

Rainy Lake / lac à la Pluie
Rainy River / rivière à la Pluie
Red River / rivière Rouge
Restigouche River / rivière Ristigouche
Rocky Mountains / montagnes Rocheuses

Sable Island / île de Sable
Saguenay River / rivière Saguenay
St. Clair, Lake / lac Sainte-Claire
Saint John River / rivière Saint-Jean
St. Lawrence, Gulf of / golfe du Saint-Laurent
St. Lawrence River / fleuve Saint-Laurent
Saskatchewan River / rivière Saskatchewan
South Saskatchewan River / rivière Saskatchewan Sud
Superior, Lake / lac Supérieur

Timiskaming, Lake / lac Témiscamingue

Ungava Bay / baie d'Ungava

Vancouver Island / île de Vancouver

Winnipeg, Lake / lac Winnipeg
Winnipegosis, Lake / lac Winnipegosis
Winnipeg River / rivière Winnipeg
Woods, Lake of the / lac des Bois

Yukon River / fleuve Yukon
Yukon Territory / Territoire du Yukon

New geographic names

Few geographic names appear on many topographic maps of remote parts of Canada. This causes a problem for geologists who commonly propose new geographic names to facilitate their description of a map area and also to enable them to formally name particular lithological units or structural features.

All new geographic names must be approved by the Canadian Permanent Committee on Geographical Names (*see* Appendix E).

The Committee advises individuals contemplating a publication containing geographic names that are not yet official, to submit proposals well in advance of publication dates, as the consideration and approval of new names may require considerable time. The publication of unofficial names will not necessarily result in their official recognition.

New proposals should be for particular geographic features, and should contain the following information:

- reason for the proposal;
- location by latitude and longitude, either as geographic co-ordinates or Universal Transverse Mercator grid co-ordinates;
- identification on a map indicating the precise extent;
- photographs or sketches;
- origin and meaning of the name proposed.

Formal and informal stratigraphic units

Before describing named stratigraphic units in a report, the author should clearly state whether they are formal or informal geological units.

The name of a formal geological unit is compound, consisting of a geographic name (e.g. Espanola, Ramsay Lake) combined with an appropriate rank term (e.g. Formation, Member, Bed) or descriptive terms (e.g. Sandstone, Marble, Granite) — *see* Appendix F. The first letters of all words in formal geological units are capitalized. Cameron Brook Formation and Typhoon Peak Formation are respectively formal greywacke and slate formations of the Ramah Group, defined according to the North American Stratigraphic Code (Appendix F).

Informal geological units may also be compound, combining a geographic name with a rank or descriptive term, but in such cases first letters of rank and descriptive terms are not capitalized (Bear's Gut anorthosite).

In the GSC style of writing, however, uncertainty could arise when referring to more than one formation collectively because, in such a case, the 'f' in formations is not capitalized. Thus, one would write 'the Cameron Brook and Typhoon Peak formations' instead of 'the Cameron Brook Formation and Typhoon Peak Formation', which could lead to confusion unless it has been previously stated that they are formal units (*see* 'Spelling, usage, and GSC recommendations').

New stratigraphic names

New stratigraphic names must be cleared with the Paleontological Unit of the GSC in Ottawa to avoid duplication. Names must conform to the principles outlined in the 'North American Stratigraphic Code' of the North American Commission on Stratigraphic Nomenclature (*see* Appendix F).

The requirements for formally naming new geological units in a report include the following:

- intent to designate or modify a formal unit;
- designation of category and rank of unit;
- selection and derivation of name;
- specification of type locality, type or reference sections, or area, shown on a geological map;
- description of unit;
- definition of boundaries;
- historical background;
- dimensions, shape, and other regional aspects;
- geological age
- correlations;
- genesis (where applicable).

Writing the report

Although no person can tell another how to write a report, guidance can be given and suggestions made. Because writing is very much an expression of personality, the result of imposing rigid guidelines is a factual but uninteresting report. A writer, however, should never forget that the main aim is information transfer; one believes that what is found or deduced is worthy of a larger audience. To accomplish this aim requires, above all, conciseness and clarity. From the opening lines of the abstract to the concluding sentence of the summary, these qualities should never be forgotten.

Scientific reports need not be stilted although they are not likely to rival a best-selling novel. They must, however, be logical, and every successful report has been written around a clear and concise outline. This outline should be developed as soon as you decide to write your report. It enables you to identify the principal topics that you plan to cover, to see if their treatment will proceed logically, and to identify any gaps in your research. The outline, modified to some degree, will become the contents page.

Before writing a report you should look at similar, previously published Geological Survey reports. It is advantageous for our reports to follow more or less similar plans. This makes it easier for the reader to find their way around, and assists the writer in presenting material in an orderly sequence.

The manuscript packages should consist of double-spaced text, paper copies of figures, tables, captions, and appendices, as well as the digital files of all material.

Title

The title should be concise and informative. Most likely, it may be the first reference to the report that a reader sees, and so the title should be able to rivet that person's attention. The content of the report should be apparent from the title, which should therefore include with the **subject**, where applicable, **geological age**, and **geographic location**, including province or territory. Note that in most instances 'Canada' need not be stated.

The title should start with a key word and not with unnecessary words or phrases like 'A', 'A note on', 'An assessment of the', 'Preliminary report on', or 'The'.

Hanging titles, that is auxiliary titles following a colon or a dash after a main title, are not GSC style and should be avoided where possible.

Unless published together, it is preferable not to use labels such as 'Part 1', 'Part 2', or 'Report 1', 'Report 2', since there is no certainty that circumstances governing the eventual publication of a second installment, such as government funding or divisional approval, will allow it. Therefore, to avoid possible confusion, instead of using, for example:

> Geology of the Hopedale block of Nain Province, Labrador: Report 1
>
> and
>
> Geology of the Hopedale block of Nain Province, Labrador: Report 2

use a more descriptive hanging title for each part as follows:

> Geology of the Hopedale block of Nain Province, Labrador: Florence Lake-Hopedale areas
>
> and
>
> Geology of the Hopedale block of Nain Province, Labrador: Nain-Makkovik boundary zone.

Omission of 'Report 1' and 'Report 2' improves the above title and provides more information to assist the librarians in cataloguing the report . The title could be further improved by providing, where possible, an indication of geological age (e.g. 'Archean geology of the Hopedale block...').

Short titles are preferable. Avoid using several compound words to modify a noun in a title, e.g. 'heavily sedimented back-arc basin', and do not use nouns as adjectives 'Ocean Disposal Symposium'.

National Topographic System (NTS)

National Topographic System map sheet designations are not to appear in the title, but reference must, however, be made to them on the title page, or in the abstract, summary, and/or introduction, as they assist librarians and indexers, as well as users, in locating an otherwise obscure place name.

Authorship

General

Authors should be consistent in the use of their surnames and initials throughout their careers. Changes in surname and initials cause confusion in the work of fellow scientists, librarians, and bibliographers, as a literature search will not identify all of an author's work. Omission of an initial is a remarkably common error!

Although the GSC has no objection to authors using a principal given name and initials, rather than just initials, authors should note that they are identified solely by surname and initials in GSC references.

The author's principal given name and surname may appear on the title page, but only the author's initials and surname appear on the cover.

Senior authorship

In a co-authored publication the senior author, who is normally the project leader responsible for organizing and assembling the entire report, is listed first. Other authors are then listed in alphabetical order if they have made equally significant contributions to the publication, or are listed in the decreasing order of the importance of their contribution. All co-authors are required to indicate, in writing, that they have read and agree with the information appearing in the contribution they have co-authored before its submission to GID.

Joint authorship

Where each author named has made a major and equal contribution, both to the research and to the writing of the report, the names are usually arranged alphabetically.

Volume editor

Where one or more authors in a multi-author bulletin are responsible for collecting the papers for the volume and working with the Editorial unit, they are listed as the bulletin's editors. They act as liaison between the Editorial unit and the authors: they are responsible for getting the papers and illustrations from the contributors to the Editorial unit, distributing the edited copies to the authors, and ensuring that the authors' answers to scientific editor's queries get back to the Editorial unit. They may also edit the papers in the bulletin to ensure uniformity of style.

Supporting contributions

Scientific and technical staff may contribute data in the form of age determinations, rock or mineral analyses, fossil identification, paleomagnetic information, petrography, etc. Where possible, these data should be grouped together in tabular form or as an appendix, preferably as a separate item at the end of the report, under the name of the researcher, so that, if necessary, the results can be cited in other publications.

Where this is not possible, and where such contributions are scattered through the text, then there should be proper acknowledgment in each case, for example, 'These rocks were studied by J.M. Jones of the Geological Survey, who reported as follows ...'.

Tables of analytical or other data should clearly state the name of the laboratory where the work was done, with the analyst's name (if applicable), the method used, and with laboratory identification numbers.

Preface

A preface may be included in GSC Bulletins and other reports to indicate a publication of special importance. The preface is submitted by the author along with the manuscript. It indicates the reason for the study, how the report helps meet departmental objectives, and briefly states the nature of the report. The preface is not an abstract and may not contain figures, tables, illustrations, or reference citations.

The preface is signed off by the senior manager of the Geological Survey of Canada and also serves to give official approval to the report. The preface precedes the contents page.

Contents

'Contents' lists the principal headings of the report and concludes with a list of tables and illustrations (figures and maps), indicating any items that are 'in pocket'. Normally, headings lower than fourth order or repetitive headings are not listed in the contents page of the published report, but the manuscript copy must show the relative importance of all headings used. The order of headings is shown in the contents section by successive indentations:

Paleontology and biostratigraphy
    Introduction
    Trilobites
        Cambrian trilobites
            Middle Cambrian
            Late Cambrian
        Ordovician trilobites
            Early Ordovician
            Middle Ordovician

Chapters, sections, subsections, etc. are not normally numbered in Geological Survey reports (large comprehensive reports such as the 'Geology of Canada' series are the exception), unlike the procedure followed in some scientific journals.

The usual order for the contents page is:

Abstract/Résumé
Summary/Sommaire
Introduction
Acknowledgments
The main body of the text
-
-
-
References
Appendices
Tables
Maps
Photographs
Figures
Plates

Captions for figures and other illustrations listed in the Contents should be only one or two lines long and should not include references. The complete caption shown in the text need not be used in most cases.

Foreword

In certain instances a foreword may be included in a GSC publication. It follows the table of contents. The foreword commonly precedes the introduction to a multi-authored volume and is usually written by the editor or compiler of the volume. It may contain figures, acknowledgments, and references in cases where it replaces an introduction.

Abstract

Abstracts must be submitted with all GSC manuscripts. They should be written in complete sentences and have a maximum length of 250 words (a maximum of 150 words for Current Research). Longer abstracts will be cut to the required length by GSC editors or, time permitting, will be returned to the author to be shortened. A well written abstract enables a reader to decide if the entire report should be read. The abstract should be a concise statement of the report. The title should not be repeated. Abstracts of reports on experimental work should list quantitative conclusions.

No figures, tables, illustrations, or reference citations are permitted in GSC abstracts.

Abstracts are translated into the other official language and the translation (résumé) is published with the report.

Some excellent pointers on writing abstracts appear in articles written over the years, some extracts of which are provided here:

> ...The abstract should comprise a brief and factual summary of the contents and conclusions of the paper, refer to any new information which it may contain, and give an indication of its relevance. It should enable the busy reader to decide more surely than he can from the mere title of the paper whether it merits his reading....Use complete sentences rather than a mere listing of headings... Because the title of the paper usually is read as part of the abstract, the opening sentence should be framed accordingly so as to avoid repetition of the title. If, however, the title is not sufficiently indicative, the opening sentence should indicate the subjects covered. Usually, the beginning of an abstract should state the objects of the investigation...The abstract should indicate newly observed facts, conclusions..., and, if possible, the essential parts of any new theory... (Royal Society of London, 1966).
>
> ...in terms of market reached, the abstract is the most important part of the paper. For every individual who reads [a] paper, from 10 to 500 will read the abstract... The abstract should be a condensation and concentration of the essential information in the paper. (Landes, 1966).

Summary

To improve access in both official languages to the published output of the GSC's scientific programs, manuscripts for publication in the bulletin series should be accompanied by a summary or introduction that will be printed in English and French. Reports that are to be released in both official languages do not require a summary. The latter category includes reports of general interest, broad economic impact, and those dealing with Canada-wide topics. The length of the summary should be related to the length of the report, but should be a minimum 1.5 of double-spaced word-processed pages. Figures, tables, and any other illustrative material may not be used in summaries. Examples of summaries can be found in any recent GSC bulletin.

Introduction

A clear statement of the project objectives and how the project contributes to the work of the Geological Survey should appear in the opening paragraph of the introduction. The nature and scope of the study should be described briefly in the introduction. Other topics that are commonly presented in this section are the location and size of the area, access, economic significance of the area, and physical features.

Acknowledgments

These are made collectively at one place in the report, either in the introduction or, as in the case of Current Research, at the end, before 'References'.

Colleagues at the GSC who have critically reviewed the manuscript or contributed major assistance are mentioned. Field, laboratory, and technical support is recorded. Parents, friends, and pets should not be acknowledged unless they have contributed in the actual preparation of the report.

Assistance rendered by persons not connected with the GSC is acknowledged with suitable expressions of restrained gratitude. This includes outside agencies, such as exploration companies, and sources of financial or logistical support other than the GSC.

Confidential or unpublished data and specimens provided by colleagues and private companies must be noted.

In the case of major collaborative projects such as Mineral Development Agreements, the NATMAP project, LITHOPROBE, etc., the goal is to standardize acknowledgments as much as possible. For example, acknowledgments of the NATMAP project in text manuscript of any kind (papers, bulletins, open files, etc.) should be in the form:

> A contribution of the (project file) NATMAP project

while acknowledgments on maps should include the NATMAP logo and the project title; logos developed for individual project files should not be included. GID routinely provides guidelines and advice to authors for placement and relative size of permissible logos and the manner by which partners should be acknowledged (e.g. the provincial and territorial surveys).

Successive sections

The subject matter of most reports can be subdivided. Except for major volumes, common text subdivisions, such as the chapter, are not used in GSC reports where different heading weights are instead used to indicate individual report sections' relationship to one another and respective importance in the text.

Even if not formally designated 'Introduction', it commonly proves useful to devote the opening paragraph of each major section to a brief statement of what the section contains.

The various parts of a report commonly pass from the general (Introduction, General geology, etc.) to the specific and back to the general (Conclusions). Most parts of a report reflect conceptual links and care should be taken to ensure that the writing reflects these links.

Do not cross-reference using page number, use section title instead.

General geology

Although the number of reports concerned with regional geology has decreased, many reports still warrant a section devoted to this topic. Normally it is divided into three principal parts: general statement, table of formations, and description of formations.

General statement

This is usually brief, though in particular cases it may be expanded to advantage. Its principal purposes are first, to outline the regional geological setting and second, to present in summary a picture of the local geology, with special emphasis on discoveries of outstanding interest. Details should be avoided and conclusions given without supporting evidence.

Table of formations

The word 'formation' as used here and in the table of formations is employed in a general sense to include rocks of all types, whether sedimentary, volcanic, intrusive, or metamorphic, which together or separately constitute a map unit. As such it must be distinguished from the word 'formation' as more properly employed to designate a lithological map unit of sedimentary or volcanic origin.

Few features in the report require greater attention to detail than the table of formations, as few pages will be referred to more frequently for a tabular summary of the geology of the area. All rocks, whether mappable or not, should be included and arranged in their assumed stratigraphic positions. The nature of the contacts between successive rock units should be indicated, where possible, by such terms as unconformity, disconformity, intrusive contact, gradational contact, relations unknown, etc. Four columns generally are employed: for era, period or epoch, the name of the formation, and lithology. Where thicknesses are known or have been estimated, these can be shown in the column containing the formation names.

In preparing the table for formations the exact form, as shown in other recent reports, should be followed, including capitalization, punctuation, and indentations. Hypothetical examples are shown in Figure 1a-d.

System	Series	Formations and thickness (m)	Lithology
Mesozoic	Upper Jurassic or Lower Cretaceous	Coast intrusions	Granodiorite, quartz diorite; minor syenite and granite
		Intrusive contact	
		Eldorado Group 500	Mainly sandstone and shale; some conglomerate (fossiliferous)
	Unconformity		
	Upper Triassic	Tyaughton Group 2500±	Fossiliferous dark grey limestone; quartzitic and argillaceous beds; intercalated volcanic rocks
Unconformity			
Paleozoic	(?)Permian	Fergusson Group 1000+	Crystalline limestone, chert, slate; sheared andesitic lavas (greenstones)

Figure 1a. *Example of Table of formations*

Description of formations

Formations are described in order, from oldest to youngest, and generally in the same order as on the map legend and in the table of formations. Sometimes, however, the sedimentary and volcanic rocks are described first, and the intrusive rocks are taken up in order on succeeding pages.

The Geological Survey follows the North American Stratigraphic codes (*see* Appendix F) in principle, but not necessarily absolutely. However, variations from the code can only be made with the approval of, or as the result of recommendations by, Geological Survey editors in consultation with GSC paleontologists.

Section descriptions. Bed-by-bed descriptions of stratigraphic sections are an important and necessary supporting part of some reports. Such descriptions, however, are commonly voluminous and very expensive to publish. Current Geological Survey practice is as follows:

1. Columnar section descriptions of type sections, principal reference sections, etc., if of reasonable but not excessive length, may be included in the main body of the paper without reduction in type size. Longer columnar sections in this category will be treated as in 2 below.

Radiocarbon years BP	Geological climate unit	Lithological unit		Radiocarbon dates
10 000	Recent	Postglacial sediments	-St. Helens Y tephra- -Mazama O tephra-	GSC-298[1]; 3390 ± 130 GSC-345[1]; 3410 ± 130 GSC-214[2]; 6270 ± 140 GSC-206[2]; 7610 ± 150 GSC-193[2]; 8900 ± 160 GSC-5263; 9750 ± 170 GSC-1524[4]; 10 500 ± 170
	Fraser Glaciation	Kamloops Drift	Upper stratified unit	
			Unstratified unit	
			Lower stratified unit	
20 000 30 000 40 000	Olympia Interglaciation	Bessette Sediments		GSC-194[2]; 20 230 ± 270 GSC-477[3]; 21 630 ± 870
>40 000	Okanagan Centre Glaciation	Okanagan Centre Drift	Upper stratified unit	GSC-479[3]; >22 200 GSC-275[1]; >32 700 GSC-413[1]; >35 500 GSC-258[2]; >37 200
			Unstratified unit	
			Lower stratified unit	
				[1]Dyck et al., 1966 [2]Dyck et al., 1965 [3]Lowdon et al., 1967 [4]Lowdon and Blake, 1973

Figure 1b. *Example of Table of formations*

2. Columnar section descriptions of support sections, if of reasonable but not excessive length, may be included as an appendix (or appendices), of reduced type size.

3. Excessively long columnar sections may be reproduced as a GSC Open File from the author's original typescript and referenced in the printed report. It is, therefore, essential that described sections should be accurately and carefully prepared.

Much editorial time is spend in reorganizing rock unit descriptions and in eliminating errors of description, thickness totals, and metric conversions. Each unit or bed should be described in a logical manner with consistent functions as follows:

> **Rock type**: composition or mineralogy; grain or crystal size(s); fresh colour and weathered colour; bedding characteristics; other structures; fossil content, basal contact; general or additional comments.

Although all section measurements must now be made in metres, it should be borne in mind that, until the 1970s, most sections were measured in feet and inches. As comparisons commonly have to be made with the older published sections, it is a great convenience for the reader to have the conversions available in the text. **In addition, it is most useful, particularly to the editor, if the author identifies the original system of measurement.**

Unit	Description	Thickness m	Total above base
25	Medicine Formation Sandstone: quartz and chert, slightly calcareous; fine- to medium-grained; medium grey-green, weathers medium brownish grey; thin- to medium-bedded; small-scale crosslamination; a few scattered pelecypods in some beds; basal contact uneven, with minor load casts; local bioturbation	5	262
24	Limestone: dolomitic; dark grey, weathers medium brownish grey, medium to coarsely crystalline; thick bedded to massive; relict bioturbation; scattered which chert nodules; abundant stromatoporoids and rare solitary corals (GSC loc. 27124) Units 24 and 25 form a prominent small cliff at the top of the first talus slope above treeline. The contact between units 24 and 23 is an erosion surface.	22	256

As most sections are measured from the base up, but are described from the top down, certain ambiguities sometimes creep into the printed section, and should be avoided wherever possible. For example, do not state that the dolostone of unit 64 is the same as the dolostone described under unit 41, as the reader has not yet read the description of unit 41. Instead, if economy of

Unit	Description		
6	Sandstone, siltstone and shale (interbedded) Sandstone (60%): feldspar and quartz; coarse grained; medium grey, weathers light pinkish grey; thick- to very thick-bedded, large-scale crossbedding; beds have flat upper surfaces, and uneven lower surfaces with common load casts Siltstone (30%): quartz and clay; dark grey, weathers medium brownish gray; thin bedded, with fine parallel laminae; minor small scale crosslamination; minor rootlets and comminuted plant debris. Shale (10%): carbonaceous; very dark grey to black, weathers same; occurs as partings to thin beds This unit is resistant and cliff forming; sandstone beds decrease in number and thickness upward showing a fining-upward trend	15 15	97 97

Figure 1c and 1d. Example of Table of formations

space is required, describe unit 64 in detail, and then state that the dolostone of unit 41 is the same as the dolostone of unit 64. Similarly, describe the basal contact of each unit, as this leads naturally down into the next unit described.

Authors are describing sections for the reader, and since different readers are looking for different levels of information, section description should be readable at different levels. For example, many readers are simply looking for the distribution and nature of, or variations in, the basic rock types in a particular member or formational sequence. For this reason, it is very important that the rock types stand out from the detailed text – as they do in Figures 1c and 1d.

Some authors sometimes describe complex, interbedded sequences as one unit, with the result that individual rock types tend to fade into the background, and descriptions are confusing. To avoid this, the following arrangement is recommended:

When discussing subsurface sections, which are normally measured from the top down, some authors reverse the time sequence of events, particularly when dealing with the transition from one environment to another. For example, in the case of a marine Cretaceous shale overlying a nonmarine Triassic sequence, it is obviously incorrect to state that at the beginning of the Cretaceous there was a marine regression and the area became a desert. At that time, there was a marine transgression as continental gave way to marine conditions. Remember that, regardless of the direction in which a section is measured, the sequence of events only has validity in one direction, from older to younger strata.

Identified fossils should be listed by name under the description of the bed(s) in which they were found and the registered GSC locality number (*see* 'Paleontology') should be given.

Maps and other illustrations

Illustrations comprise maps, figures (photographs, line drawings), and where appropriate, plates. Authors should give careful consideration to the size of the finished product as very large illustrations cannot be reproduced in the book and must instead accompany the publication as a separate item. This causes delays and extra costs. The GSC submits to departmental guidelines on 'no frills' publishing (*see* Appendix G); it has, thus, adopted cost-effective measures in the design, printing, and dissemination of information (e.g. tip-ins are not acceptable).

Maps

The Geological Survey now mainly publishes coloured maps, released as printed copies and Open Files produced on demand. Base maps for field compilation and publication are usually at the standard scales of 1:50 000, 1:100 000, 1:250 000, etc., although for special purposes they may be rescaled to facilitate fieldwork or the release of information.

Details on geoscientific map production are available on the Internet at this URL:

http://www.nrcan.gc.ca/ess/carto/english/reference/reference.html

Authors are responsible for ensuring that all geographic names used in the text are shown on the manuscript map. They are advised to consult their peers, division co-ordinators, and cartographic and editorial staff about map production. A wide variety of recently published examples of similar geological maps should be examined, paying particular attention to map legends.

Figures

Text figures include line drawings and photogaphs (*see* below). The use of colour is discouraged unless absolutely essential to communicate the science as the government-endorsed 'no frills' publishing policy insists on the adoption of cost-effective methods for presenting and producing information. All figures should be referred to in the text in numerical order. Figures should be submitted in a form suitable for direct reproduction (digital files are preferred) and are printed at the same scale (*see* Appendix A – 'Current Research' for instructions on preparing figures).

Perhaps the principal feature to bear in mind in preparing figures, aside from the question of their necessity in a report, is that only the essential information should be shown. Omit all details not referred to in the text or that do not bear directly on the written account. If, for example, the author is describing the system of faults encountered at the surface and in several underground workings of a mining property, the drawing should not be cluttered with details of mine buildings, roads and trails, orebodies, or mine workings unrelated to the fault pattern. If the vein system on this property also requires illustrations, consider a separate figure to avoid clutter.

The directive arrow on a figure should indicate north. In general, a linear scale, or a natural scale, should be avoided and a bar scale used instead as it applies equally well whether the figure is enlarged or reduced from the original drawing.

Separate lists of full captions and short captions should always be furnished. The briefer titles are used in the list of illustrations provided for the table of contents at the beginning of the report. Ensure that all figures and tables are cited in order at least once (this does not apply to appendices). Do not waste time lettering the title within the figure; all titles (and captions) form part of the text and will be indicated as part of the production process.

Photographs

With the exception of grouped photographs of fossils, which are called 'Plates' in Geological Survey publications, all photographs are referred to as 'Figures'. Photographs should be forwarded unmounted. Do not use overlays. Plates should be mounted on stiff cardboard. All lettering and identification should be on the plate when submitted. Plate size for size-as reproduction is 18 by 23 cm (including plate number).

Photographs intended for publication should be submitted with complete caption, and if the photograph is not by the author the figure caption should indicate the name of the photographer. Note that photographs taken by the author are not credited. Photographs of human subjects can be used only if permission to reproduce their likeness is gotten from the person in question.

The following points should be considered when selecting photographs:

1. Originals should be technically good photographs. Little can be done with an underexposed landscape shot. Remember that some clarity will be lost during printing.

2. Panoramic shots, however useful in the office, suffer when reduced to page size. They are too long for their width and end up as narrow strips in which most detail has been lost.

3. Uncatalogued photographs will only be reproduced when credited to another source (authorization forms are provided in Appendix H).

4. If a particular illustration seems worthy to publish, then the chances are someone else will want to use it. However, to have a GSC photograph catalogued, the author should contact the Photo Library or Scientific Editing unit (photo cataloguing forms are provided in Appendix H). Without a number the Photo Library cannot meet outside requests. The series number should be clearly indicated on all air photos (e.g. NAPL T 127L-182).

5. Photomicrographs are not catalogued.

6. Do not over-illustrate. Only photographs that contribute materially to the subject of the report should be selected. Reference must be made to all photographs as figure or plate at least once in the text.

7. Prints must be in good condition without cracks or metal clip marks as these are flaws that cannot be eradicated.

8. Do not write unnecessarily on the back of a photograph. A hard pencil will create an embossed effect. Use a soft pencil or stabilo pencil to note the figure number. Indicate which way is 'top'.

9. Scales should be present in all photographs:

   a) Use a bar scale on photomicrographs rather than stating magnifications. This obviates the chance of a misleading caption should the scale of the photo micrograph be changed for printing.

   b) A rock hammer or compass provides a good scale in outcrop photographs. If using a coin for scale, add diameter in caption. Avoid using people for scale as clearance must be received from that person to use their photograph in a publication.

Tables

Tables should be submitted in digital and hard-copy form according to the specifications in Appendix A. They are given arabic numbers. Titles should be short. Do not make a simple list into a table. If the report includes a large number of tables, or very extensive tables, these should be gathered together and presented as appendix material, or even considered for separate Open File release.

Remember that good, clear tables that can be easily read are an important part of a scientific report.

References

This section follows the main body of the text and is described in the section entitled 'References', which also deals with the author-date citation used in the text to refer the reader to the References list.

Appendix

An Appendix placed after the References is the place for detailed information that does not readily form part of the main report. Long tables, stratigraphic sections, locality lists, analyses, and numerical data are examples of typical appendices that should be numbered. However, to lower printing costs and to reduce the size of a report, lengthy supporting data should be released in an Open File that is referenced in the report. Data that must accompany a publication as an Appendix can be submitted as digital files that can be released with the publication on diskette or CD-ROM.

Footnotes

Footnotes are generally used in GSC reports only for addresses. Detailed comments or explanations that are necessary for the completeness of the text should be incorporated into the text offset by parentheses. When critical pertinent information becomes known to the author after the report is written or is in the proof stage, additional material can be incorporated as an addendum at the end of the report, rather than as a footnote.

Co-operative projects

Authors should inform editorial staff if their report or map is the product of co-operative projects (such as Mineral Development Agreements) involving the GSC with other federal, provincial, or external agencies. This will ensure that the appropriate logos and wording, conforming to departmental standards and standing agreements, can be added to the publication (*see* 'Acknowledgments' above).

Paleontology

The special requirements of paleontological reports are described in the section entitled 'Paleontology'.

Index

If an index is required, the editor will ask the author to highlight index entries at the same time the page proofs are checked by the latter.

Personal names, geographic names, names of mining companies, names of rocks and minerals, geological processes, and geological units and provinces are those commonly included (*see also* Public Works and Government Services, 1997).

The author's responsibility

This overview serves to highlight the author's responsibilities and the means by which this person can ensure expeditious production of a GSC report:

1. Ensure text and illustrations are clear and legible.
2. Ensure that all changes, and critical reviewers comments, are incorporated before submitting the manuscript for editing.
3. Do not affix figures, tables, and photographs to sheets of paper.

4. All photographs taken by staff on GSC projects should be catalogued and given a GSC photo number (*see* 'Photographs' above).

5. Check accuracy of References and obtain permission to use copyright material (for copyright release authorization form, *see* Appendix I).

6. Do a thorough job of checking the proofs. Although it is expensive to make changes when errors are found at this stage, it is cheaper than making last minute changes at the printing stage. Reports containing 'Errata' sheets reflect badly on the author.

Copyright

Copyright laws protect the original producer, writer, and/or publisher of material from the unauthorized reproduction of that material. Scientists must keep in mind that the unauthorized reproduction of material from scientific reports is no different than that of music, novels, and videotapes and is subject to prosecution. It is imperative, therefore, that permission be obtained from the copyright holder to use, in a GSC report, any previously published figure, photograph, or other text material - **and this is the author's responsibility**.

Two Request for Copyright Release forms have been prepared to assist GSC authors in obtaining copyright clearance (*see* Appendix I). Permission is not required for material already published by other federal government departments. Remember that redrafting a figure or making minor modifications to one does not free the author from seeking copyright clearance.

Check the colophon page of the journal or publication to see if written permission must be obtained to reproduce a figure or photograph. For example, the *Canadian Journal of Earth Sciences* grants permission to reproduce figures, etc. provided the source is acknowledged, but recommends that the consent of the original author be obtained.

Authors must secure the proper permission in writing and provide a copy with their manuscript, at the time of submission for editing, to be kept in the publishing unit's files. The author is also responsible for ensuring that the appropriate credit is included in the figure caption. Any costs incurred securing this permission (royalties, licensing fees, etc.) are solely the author/division's responsibility.

When illustrations are reproduced from other publications, the appropriate credit will vary according to whether changes were made to the figure or not, taking care to always indicate the original figure number, as the following examples show:

- (Froese, 1995, Fig. 3) indicates no change in information
- (*after* Froese, 1995, Fig. 3) indicates possible redrafting but no change in information
- (*modified from* Froese, 1995, Fig. 3) indicates change in information

Critical review of manuscripts

Critical review plays an essential role in maintaining the quality of GSC reports and is also of increasing importance in the face of continuing demands to evaluate and monitor the effectiveness of the Survey's research programs. The following guidelines should be carefully read by all who are called upon to undertake critical review.

All scientists of the Geological Survey must expect to be assigned manuscripts for critical review as a normal part of their duties and must also expect their manuscripts to be subject to critical review. As a recognized scientific activity, critical review constitutes a part of a scientist's annual productivity. The names of the critical reviewers (minimum two) are listed in each publication but this procedure is not followed for reports published in Current Research due to the brevity of most contributions. However, acknowledgment should be made to them in the body of the text.

The critical reviewer should have no hesitation in questioning the value of any illustration or in commenting on any apparent wordiness.

No manuscript should be submitted for critical review until the author considers it complete. Formal critical review does not take the place of peer discussion, which may generate new ideas and new material. Critical appraisal cannot be made on the basis of an incomplete manuscript.

A critical reviewer is not a 'ghost writer' and authors should not expect their reports to be rewritten.

Guidelines for critical reviewers

1. Assignment of critical reviewers is the responsibility of the Division Director, although this duty may be delegated to another person. The Director must ensure that the manuscript is in its final draft form, including clear, unambiguous illustrations, **and that it contains a clear statement of how the report meets the project objectives and how it contributes to the mission of the Survey.**

2. It is the responsibility of both the author and critical reviewer to ensure that the factual information is presented clearly and concisely in such a manner that the reader will have no doubt as to the authenticity and accuracy of the factual information presented. Authors and critical reviewers may disagree on the conclusions that may be drawn from the factual information presented, but there should be no disagreement as to the facts themselves.

3. The Geological Survey, as an organization, does not possess or maintain a particular posture regarding geological concepts. The Geological Survey can only reflect the collective wisdom of its past and present scientific staff in consideration of the available facts and in consideration of the evolution in geological concepts occasioned by the discovery of new information. All scientists of the Geological Survey, however, are identified by the scientific community as part of the Geological Survey; thus statements made in approved Geological Survey publications reflect directly upon the Geological Survey. Authors are entitled to present in their manuscripts new hypotheses, and/or variations in previously accepted points of view. Critical reviewers must ensure that such hypotheses are based on the factual information contained in the manuscript. If the factual information lends itself to more than one interpretation, such alternative interpretations should be presented. Authors are entitled to state their preference among multiple working hypotheses, but they must also be prepared to state the basis for their preference.

   Critical reviewers have a responsibility to point out alternative hypotheses or points of view to authors where such are warranted. The critical review process, however, is not intended as the vehicle for 'conversion' of an author or critical reviewer to a single point of view if more than one point of view may be reasonably entertained.

4. Where the required expertise is not available in the GSC, Division Directors may make use of outside critical reviewers.

5. Some of the major points that should be considered by a critical reviewer are as follows:

Reports

a) Do the results presented warrant publication in the form proposed or would another mode of publication be more suitable such as an Open File or in a scientific journal?

b) Does the report provide any significant advances or does it comprise only confirmatory data and if so is it worth formal publication? Does it meet the objectives of the project?

c) Is the organization of the manuscript such that it meets its purpose in the shortest, clearest manner?

d) Is the title appropriate and likely to serve its purpose?

e) Is the abstract informative and representative of the report and not merely a summary?

f) Does the introduction of the report set the stage and provide adequate background for the reader to appreciate and fully understand the communication that follows?

g) Are all the tables and figures essential; could some be combined? Can you suggest improvements to them? Can some of the text messages be better conveyed through more well designed illustrations? Pocket items add to the cost and complexity of publishing and should be avoided whenever possible. The large format used by the GSC provides a wide scope for page-size figures.

h) Do the text or illustrations contain any errors of fact, interpretation, or calculation?

i) Has the author cited the pertinent, and only the pertinent, literature?

j) Has the author made use of material already presented in another publication, and, if so, has this been adequately referenced? Could any parts of the report be considered as dual publication? Has the author given full credit to other authors whose data and conclusions have been used?

k) Do geographic or geological names that are referred to in the text and with which the reader may not be familiar appear on one or more of the maps or illustrations?

l) Is the report too long? Is it padded? Should parts be deleted or condensed? Should some of the supporting data be treated as an appendix, or released as an Open File?

m) Should some sections be expanded in order to convey the message adequately?

n) Does geophysical, geochemical, stratigraphic, geological, and biological terminology meet accepted standards?

o) Are measurements expressed in SI units wherever possible?

p) Does the critical reviewer's experience allow an assessment of all aspects of the report or are there sections that should be reviewed by someone else?

Maps

a) Are there any geological conflicts or geometrically unlikely interpretations?

b) Are all units labelled and are all formations in legend and cross-section also on the map?

c) Are all geographic locations mentioned in text also shown on map? Are they spelled correctly?

d) Do colours and patterns match in legend, map, and sections?

e) Are bar scales drawn correctly and consistently for map and cross-sections?

f) Is wording in a consistent sequence for each legend description, e.g. lithology, colour, texture, and interbeds and minor structures?

g) Are authorship, contributions, credit lines, and title properly recorded?

h) Check stratigraphic affects to determine that faults portrayed as thrust or normal are indeed thrust or normal.

i) Check cross-sections in detail against mapping along the line of section.

j) The reviewer should recommend the appropriate scale for the map, and should ensure that there is no duplication, so that maps are not released at different scales but with identical information.

All critical reviewers must, as part of their responsibility, submit a brief, written evaluation of the report to the division sponsoring the publication. In the rare cases in which a critical reviewer and an author cannot reconcile their differences, a division may send the manuscript to yet another critical reviewer for evaluation, and the name of the first reviewer will not be listed in the publication as a critical reader, as such listing implies general agreement with the scientific content of the report. Written comments and the author's response should be forwarded to the division for use by the GSC scientific editor. Division Directors should ensure that the author sees the critical reviewer's written evaluation.

Proofreading

The use of personal computers by authors when preparing a manuscript for publication has led to the declining need for traditional proofreading services. Texts need only be corrected after each stage of the critical review or scientific editing process and such corrections or additions can be safely made without necessitating retyping and reproofreading of the manuscript as a whole. Thus, the final edited version that is used to produce the printer's copy should contain few if any grammatical or spelling errors; however, no one is perfect and occasionally revisions are required at the final stages.

Authors are given a page-proof copy of the final version of the publication to check for typos, misplaced figures, and missing text. Any corrections should be clearly indicated in red on the proof and returned to the Digital Design unit. Although one should try to use traditional proofreading symbols, the aim is to ensure that the correction or revision is legible and correctly placed. The operative word is correction, rewriting is not permitted at this time. Any major additions, necessitated perhaps by new scientific findings, are better handled by an addendum. Changes of this order must be approved by the appropriate editor who will, in consultation with the Digital Design unit, determine the most appropriate solution. Authors must note that the GSC no longer has access to a proofreading service and the onus is on the authors at this stage of final checking to proofread the text and ensure accuracy.

Additional information on proofreading and on proofreader's marks can be found in some of the reference works cited at the end of this chapter.

Proofreader's marks

sc	small capitals		delete
;	semicolon	;	comma
caps	upper case, capitals	stet	leave as is
lc.	lower case	¶	Paragraph
:	colon	'	apostrophe or single quote
c & sc	initial caps and lower case	no ¶	no paragraph
ital.	italics	run on	run on
" "	quotation marks	=/	hyphen
bf.	double strike (bold)	#	insert space
⌐	move to right	⌒	close up
m n	dash	(/)	parentheses
⌐	move to left	rom	roman
‖	align vertically	[/]	brackets
tr.	transposition	sp.	spell out in full
⌐	insert	⌐	break line or word
⌐ ⌐	set in centre	⊙	period
⌣	less space between words		

GSC contributions

Although the 'Guide to Authors' is concerned with GSC publications, hopefully it will assist in preparing papers for outside journals. However, each journal has its own style of writing, and authors should consult their 'Instructions for Authors'.

The GSC identifies contributions in scientific journals by means of a number: 'Geological Survey of Canada Contribution 0000'.

Information on the GSC Contribution Number can be found in Appendix J.

Selected bibliography

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GRAMMAR

Introduction

Grammar is the study of words and the rules governing their formation and interrelationships, and the rules themselves. Correct grammar is essential in writing. The reader's confidence and the credibility of writers and editors will be quickly destroyed by grammatical errors and misspelled words. Language may change with the times, but grammar is still the guide for combining words correctly to express thought. Writers, therefore, should always distinguish between the colloquial form and the simple grammatical sentence free from worn phrases and jargon.

The following notes are not comprehensive: they are intended merely to draw attention to the basics and common pitfalls.

Sentences

In composing a sentence, place the related parts as closely together as possible. The following examples show how poor construction can confuse the reader:

> The reported occurrence of agglutinated grains in the wall by the same authors remains unconvincing. (The words *by the same authors* should follow *occurrence* or the sentence should be rewritten: *The same authors' report of the occurrence of agglutinated grains in the wall remains unconvincing.*)

> The writer began a detailed regional study of the Upper Cretaceous rocks of the area with fieldwork in 1980, when the Blackstone section was first studied in detail, with G.H. Turner. (The sentence should be rewritten: *The writer began a detailed regional study of the Upper Cretaceous rocks of the area in 1980. During that field season the Blackstone section was first studied in detail by the writer and G.H. Turner.)*

Jargon and contrived or redundant words

Jargon is obscure (specialized technical or scientific vocabulary) and often pretentious language characterized by circumlocution and long words. Jargon effectively clouds what an author wishes to say, and should be avoided. The following sentence is an example of jargon:

> The position in regard to this whole thing is that active consideration cannot be given to it until present conditions change and the matter can be settled and the situation clarified in due course.

Many contrived words have recently been coined:

assessability	de-hire
identicability	definitize
futurize	performability

These contrived words have little place in scientific writing, however common their use may be in conversation.

Many reports are littered with the expressions such as *there is, there are, there were*, implying, in most instances, either careless writing or loose thinking. Generally, such words can be avoided and the sentences rewritten in more compact form. The statement 'In most specimens *there is*

more biotite than hornblende', can be rewritten to advantage as *Most specimens contain more biotite than hornblende*. Similarly, '*There are* eight veins exposed on this property' should be rewritten as *Eight veins are exposed on this property*.

Use the following verb forms sparingly:

cave in	divide up	make up	reported on
climb up	empty out	meet with	split up
close down	flow down	operated on	start up
dealt in			

Usually the extra word is redundant, or such compound expressions can be replaced by single words, as shown in italics in the following examples:

in close proximity to - *near*
in the vicinity of - *near*
in those areas where - *where*
carry out - *perform*
look after - *watch*
fall off - *decline*
prove up - *test*
dies out - *ends*

The following are other examples of unnecessary words (shown in quotations):

All 'of'
Square 'in shape'
He walked 'for a distance of' 10 km
At 'the' present 'time'
At this 'point in' time
Few 'in number'
'First' initiated
Exposed 'at the surface'; or, 'surface' outcrops
Mining is carried on 'extensively' throughout the area
Near 'to'
Covered 'over'
Pyrite, chalcopyrite, and 'also' free gold
The rock is dark green 'in colour'
The conditions were favourable for landslides 'to occur'
'An' innumerable 'number of' tiny veins
Contemporaneous 'in age'
A rough estimate of the 'approximate' position
'Subsurface' well sections
Subsurface 'well' sections
'Age' dating

Change: 'good lighting conditions were absent at many outcrops' to *light conditions were poor at many outcrops*; and 'bedded to completely unbedded' to *bedded to massive.*

The following sentence illustrates the use of unnecessary words (in quotation marks) and the advantage gained by their elimination (the words in parentheses are added to complete the sentence):

'All of' the wells in this township are in the glacial drift, and 'the majority' (most) of them are less than 10 m (deep) 'with only a few deeper ones'.

The following are other overused words that can become pretentious or irritating (shown with alternatives in italics):

ascertain (*determine, establish*)
cartoon (*schematic diagram*)
constrain (*control, restrict, define, limit*)
essentially (*generally, commonly, practically*)
generate (*produce*)
irregardless (*regardless, irrespective*)
ongoing (*continuing, current*)
portion (*part*)
scenario (*postulated circumstances*)
show (*demonstrate, illustrate, suggest, indicate, imply*)
ubiquitous (*widely distributed*)
signature (*characteristics*)
utilize (*use*)

Compounding of words

Words frequently used in close association tend to become unified in form as they are in meaning, and ultimately to acquire a single accent. There are three stages in the development of compounds. At first the components of the compound expression are written separately; next they are united by a hyphen; finally, when the separate significance and accent of these components have been lost sight of, they are combined into one word. The hyphenated stage may thus be considered merely preparatory to the coalescence of the various members into one word. Many such compounds have now fully coalesced and are written as one word (e.g., footwall, landmass, offshore, rockburst).

Words used in their ordinary grammatical relationship — for example, noun and attributive adjective — ought not to be hyphened. A typical example of this rule is afforded by adverbs ending in *ly* standing before the words they modify, for example *thinly banded rocks*. The relationship in this case is clear, and the hyphen is omitted. When, however, it is desired to show that the syntactical relationship between two words is closer than if they stood side by side without it, use the hyphen.

Whenever the compound expression has a meaning different from that borne by its components in their ordinary grammatical relationship, the hyphen is used, as in the expression *bird'-eye* (referring to a spot, blob, or irregular patch of sparry calcite commonly found in limestones and some dolomites, as a precipitate that infills cavities). *See* 'Hyphen' in 'Punctuation' section for details.

Numerical expressions

Numerical information must be understood correctly by the reader. Most rules for the use of *numerical expressions*, therefore, are based on the general principle that figures are easier and clearer for the reader to understand. The following rules cover most instances where the writer must choose between a number expressed in words and in figures:

1. Write out one-digit numbers (i.e. numbers less than ten) except when they represent measurements:

   five sections 5 ft. 5 m

   Abbreviations are acceptable in the imperial system, and take periods.

2. Write out numbers or the word number where they occur at the beginning of a sentence as well as any related numbers that follow closely:

   Three thousand line-kilometres must be flown this summer.

   Number 6 should not be included in the total; number 5 was the last in the series (*not* No. 6, or no. 5).

   Twenty-five of the three hundred samples were contaminated (*or* Of the 300 samples collected, 25 were contaminated).

3. Do not mix figures and numbers expressed in words in the same phrase:

   nine out of ten samples *not* nine out of 10 samples

4. Where one numerical expression directly follows another, the smaller number generally is written out to avoid ambiguity:

   300 six-inch core samples ten 43 cent stamps

   120 one-gram samples

5. In expressing large numbers, write out the word *million* and similar terms, unless the number represents a metric or imperial measurement, or is in a table:

   $25 million 4.1 million people *but* 2 000 000 t of ore 1 000 000 km^2

   Figures are used for any number less than one million:

   250 000

6. A space is not used with a four-digit number:

   1500

   To facilitate the reading of longer numbers, a space is inserted between three-digit groups:

   15 000 250 000 1 250 000

7. Figures are used for specific numbers, as follows:

   GSC locality 23 report 680
   pages 99 to 146 sample 224

8. Write out indefinite expressions:

   the mid-sixties the seventies
   but 1990s (*not* 1990's)

9. A number that is written out should be repeated in figures only in legal documents.

10. Figures are used for measures and quantities:

2.1 m	4 cm	20/20 vision	8 by 12 cm (*not* 8x12 cm)
a 7 km course	250°C	latitude 60°13′14″N	longitude 85°22′10″W

    To express a tolerance the form should be 30 ± 2°C

11. Fractions standing alone are generally written out. A fraction in figures should not be followed by *by a* or *of an*. Fractions must not be used with SI units. Fractions used as modifiers and written in full are hyphenated, except when the numerator or denominator already contains a hyphen:

    one-half inch
    one half of the sample was lost
    the long axis is 0.25 cm (*not* ¼ cm)
    twenty-nine fiftieths calcium (29/50 is preferable)

12. Decimals are always given as figures. The decimal marker is the *point*. A zero is placed before the decimal point for numbers less than one:

    2.75 cm 3.5 kg 0.12 m

13. Use figures to express clock time, but duration of time or time of day should be written out unless exact or precise time is to be emphasized:

    10:00 h
    The helicopter left at four o'clock
    Our day starts at half-past seven (*or* seven-thirty, *or* 7:30 h)
    We worked an eight-hour day

    Calendar dates use figures for the year and day, but the month is written in full:

    21 March 1987

    Although the International standard is for year, month, and day, to be listed in that order, this is not universally accepted, so that 1994-10-11 may mean the eleventh of October or tenth of November 1994. To avoid ambiguity, write out the month.

14. Consecutive numbers are joined by *to* in the text and by an *en-dash* (–) in parentheses:

    1 to 2 m (140–150 m)
    5 to 50% (5–50%)

15. Do not hyphenate between the numeral and unit in compound adjectival expressions:

    a 100 m high cliff (*not* a 100-m high cliff)
    the 200 ft. level (*not* the 200-ft. level)

Parallel structures

Parallel structures commonly yield economy of words, clearer meaning, and pleasing effects. The parallelism of ideas is most frequent in phrases, but can also be in clauses and other word combinations, such as compound subjects and predicates (the part of a sentence that makes a statement about the subject). Some of the most valuable uses pertain to descriptions and involve whole sentences and paragraphs:

Phrases: The lava flowed down the mountain, over the road, and into the town.
Clauses: The eruption began slowly, continued sporadically, and ended catastrophically.

With compound subjects, the individual subjects should have the same form:

Awkward: Augite in large phenocrysts and small grains of olivine are common in the lava.
Parallel: Large augite phenocrysts and small olivine grains are common in the lava.

With compound predicates, be sure the verbs are correct and in the same tense throughout:

> *Incorrect*: Magma erupted on Friday and continued on Saturday.
> *Nonparallel*: Magma erupted on Friday and continued to erupt on Saturday.
> *Parallel*: Magma eruptions commenced on Friday and continued on Saturday.

For items in lists, give parallel information in parallel forms:

> *Poor*: The rock contains abundant quartz, much biotite, and garnet.
> *Parallel*: The rock contains abundant quartz, much biotite, and rare garnet.

Even though the missing information may have little importance, sentences such as the second last can give readers wrong impressions, or throw them off stride and break their concentration. A more exaggerated example:

> *Poor*: Two dykes can be seen: one, 5 m wide, composed of granophyre and pegmatite, is exposed at the top of the mountain; the other is gabbro.
>
> *Better*: Two dykes can be seen: one, 5 m wide, composed of granophyre and pegmatite, is exposed at the top of the mountain; the other, 2 m wide, consisting of gabbro, outcrops in the cirque to the north.

Parallel structure is especially useful for making detailed descriptions and comparisons more readable. For example, if you describe the different minerals in a rock with their features (such as modal abundance, grain size, and habit) always in the same order, then readers can assimilate the information more easily. Or in comparing two rocks, if you deal with their features in parallel groups (say of three), the you do not have to switch back and forth as much. You may even find it helpful to construct successive paragraphs in parallel.

Nouns

There are two kinds of noun — proper and common.

Proper nouns

A proper noun names a particular object, person, or place, or group of objects, persons, or places. It always begins with a capital letter: *Ottawa* is a proper noun.

Common nouns

These may be concrete, naming people or things that you can touch, see, hear, taste, or smell, such as *rock*, *geologist*, or abstract, naming things you cannot perceive directly with your senses, such as *geology*, *education*. Always choose a concrete over an abstract noun.

Common nouns used as an essential part of a name (i.e. as generic terms) are capitalized: *Shuswap Lake*. When the generic term is used in the plural, it is not commonly capitalized: *Shuswap and Okanagan lakes*; *lakes Huron and Ontario; Pekisko and Shunda formations*.

See 'Capitalization', below, for details.

Collective nouns

Collective nouns such as *board, cabinet, commission, committee, council, government, group, majority, number*, and *series* take their verb or pronoun in either the singular or plural, depending upon the context in which they are used. Use the plural when the action is taken by the individual members considered in their separate capacities, and use the singular when the group acts or thinks as a whole:

> The committee *have* discussed all aspects of the case and have not yet reached agreement.
>
> The committee approved the motion unanimously and directed *its* subcommittee to take immediate action.

Government Although the singular form of the word Government is preferred and is always correct, whether singular or plural is used, the verb and pronoun must agree, and the writer must be consistent:

> The Government takes a serious view of the strike, and will do *its* best to bring about a settlement.

Group, Series These are singular when used following the North American Stratigraphic Code (*see* Appendix F), but otherwise can be singular or plural:

> A series of varves *was* deposited (but, if two or more different series are involved: *two series of varves were compared.*)

Limestone not limestones (as a collective):

> The unit comprises limestone, sandstone, and shale.

Majority The party's majority *was* small, but:

> Although the complexes are mapped in detail, the majority *are* not accurately dated.

Number A large number of problems were encountered (*but* the number of solutions *was* limited). *See* 'Verbs', below for further examples.

Pronouns

Pronouns take the place of nouns. Use them freely rather than the noun unnecessarily. Too often the word *such* is added to the repeated noun to stress the particular reference:

> The duck-billed dinosaurs developed a complex social unit and strongly defended it (not *defended strongly such a unit,* or even *this unit*).

If confusion may result when pronouns are used with reference to a number of formations, units, etc., or locations of outcrops, avoid beginning sentences with the words *there, this*, or *it*:

> The Rockland Formation may easily be distinguished from the Chaumont in the field. The Rockland (*not* It) is bright red-brown.

'Former' and 'latter'

The terms *the former* and *the latter* are used instead of a pair of names, nouns, or groups, to avoid repetition. These terms should be used sparingly. They often confuse and irritate the reader, who must look back to be sure of the reference. Short sentences may be clearer if the noun is repeated. If three or more persons or objects are referred to, the words *first* or *last* should be used. *Latter* is frequently and unnecessarily used for another pronoun, as in the following sentence:

> During the first week of fieldwork, the party chief sent the students home because of the latter's injuries (*their* injuries).

Note that had there been only one student, the use of *latter's* instead of *his/her* would be necessary to avoid the implication that the party chief was injured.

Pronouns taking singular verbs

There can be a problem deciding if some indefinite pronouns take a singular or a plural verb.

None Singular when it means 'no one, not one, no person, no thing', but plural when it means 'no persons, no things, not any':

> None of us *was* hurt (not one of us).
> None *were* hurt (not any).

Either, neither, each, and *everyone*:

> Neither of the members *warrants* formation status.
> Everyone *wants* their work published quickly.

The words *any* and *none* replace *either* and *neither* when the reference is to more than two.

Relative pronouns 'that' and 'which'

These relative pronouns are commonly misused for each other. *That* should be used when introducing an essential fact, without which the antecedent is incomplete or undefined, as a restrictive adjective clause (a restrictive adjective clause is one that defines, identifies, or restricts the noun that it modifies): *The fossils are in the part of the section that Brenda measured*; or, *The temperatures and pressures of reactions that produce these assemblages can be no more than 2.8 kbar*; or, *This is the sample that Jack collected.* The last sentence could be modified to read: *The sample, which Jack collected, was lost in transit*; but, in this revised sentence, the emphasis is transferred from Jack to the loss of the sample, and the fact that Jack collected it has become supplementary information (and the clause has, therefore, become nonrestrictive). Note that a restrictive adjective clause has no commas on either side of it.

That in a sentence restricts or defines the meaning of the word or phrase that goes before it:

> The new paleontological report that I prepared is now ready.

Which should be used when introducing a new fact about the antecedent as a nonrestrictive adjective clause (a nonrestrictive adjective clause is one that supplies information about the noun that it modifies, but supplementary information, non information essential to the identification of the person, place, or thing to which it refers): *The process, which is of recent invention, extracts both the gold and the silver*; or, *The outcrop, which is on the left bank of the river, consists of sandstone, siltstone, and shale.* Note that a nonrestrictive adjective clause is enclosed within commas.

Which neither restricts nor defines, but comments on, or expands, the meaning of the preceding phrase, usually by adding a new thought:

> The new paleontological report, which is much longer than the first, is now being printed.

There is some disagreement regarding the use of *that* and *which* but it may be safely said that *that* introduces the 'restrictive clause' and *which* introduces the 'nonrestrictive clause'. Note the difference in meaning between the following two sentences:

> I collect brachiopods that are interesting. (I collect only interesting brachiopods.)
> I collect brachiopods, which are interesting. (Brachiopods are interesting things to collect.)

The choice of that or which sometimes changes the meaning of a sentence. In *I am returning the reports, which I have read,* the borrower implies that he or she has read them all. If the borrower says *I am returning the reports that I have read*, it means that the borrower is returning only those reports that he or she has read. Make sure that your choice of *that* or *which* conveys the meaning intended.

A test of whether a clause is restrictive or nonrestrictive is to omit it. If its omission changes the meaning, or results in a sentence that does not make sense or is incomplete, it is restrictive.

> A locked subduction zone that periodically releases the strain in huge earthquakes explains the observed pattern (Savage et al., 1991; Dragert et al., 1994).

If it can be omitted without changing the meaning, it is nonrestrictive.

> Numerous older sand layers, which are also interpreted to be tsunami deposits, are present in a sequence of fine-grained intertidal sediments at Port Alberni on Vancouver Island.

The restrictive clause should not be set off by commas, even if it is decided, for reasons of euphony, clearness, or emphasis, that a *which* is better than a *that* to introduce it. A nonrestrictive clause generally is set off by commas, but there are sentences in which, because of context or because of other punctuation, the nonrestrictive clause is not set off by commas.

The omission or inclusion of commas can change the meaning of the sentence, so the writer should bear in mind the importance of commas to accurate communication. For example, consider the difference in meaning between: *The hillsides that consist of mudstone and bentonite are unstable* (i.e. *only specific hillsides*), and *The hillsides, which consist of mudstone and bentonite, are unstable* (i.e. *all the hillsides under discussion*).

That is used after a superlative:

> The *best* example of crossbedding *that* has been found in the area....

In current usage *that* replaces *who* when the preceding phrase is general in its implication and does not refer specifically to a person or persons:

> The *staff that* work in the Publications Section....
> The *technician who* works in the Publications Section....

Phrases such as *and which*, *and who*, or *and whose* require a preceding relative pronoun to justify the *and*:

> This district, *which* is the largest and *which* contains the principal mine, is in the western part of the country.

The statement applies also when the conjunction *but* is used.

Where a restrictive clause is followed by an *and which* clause, both clauses take *which:*

> The district *which* is the largest, *and which* contains the principal mine....
> *not* The district *that* is the largest, *and which*....

Relative pronouns 'who' and 'whom'

The purist is as likely to be criticized for insisting on whom in awkward cases as the careless writer who rarely uses it in the proper place. There are exceptions, but none, however, to the following rule. *Who* is always used as subject; *whom* as object. In the following two examples the reasoning behind the choice of *who* or *whom* is shown in parentheses:

> They are hiring people *who* they know are not qualified. (Who are not qualified? *They* are not qualified — subject.)
>
> They are hiring people *whom* they know. (Who do they know? They know *them* — object.)

Whom is used after every preposition, because prepositions take the objective case, for example, *to whom, from whom. Whom* is used after *than*; (never use *than who*).

Possessive pronouns

Use the possessive forms *my, your, his, her, our, your* (pl.), *their, whose*, when the present participle form of a verb is used as a noun; that is, words ending in *-ing*:

> Count on *my* doing all in my power (*not* Count on me).
> This will not affect *his* going (*not* him going).

Verbs

Verbs may be *transitive*, denoting action, or *intransitive*, describing a state of being. The verb *to be* is a typical intransitive verb because it reflects back on its subject. It is also one of the important auxiliary verbs. It combines with almost all verbs, both transitive and intransitive, in their present and past participle forms. It is in dealing with the verb *to be* that most difficulties arise. A study of this verb and the verb *to have*, which also acts as an auxiliary, is recommended to all who are interested in good grammar.

The verb always agrees in number with the subject:

> The *collection is* unique.
> The *collection* of brachiopods from these areas *is* unique.

A singular verb is necessary when the subject is singular and the complement plural:

> The only *problem was* the thrust faults.
> *but* The *thrust faults were* the only problem.

The word *what* takes a singular verb even if its complement is plural:

> *What* we need *is* more samples.

Words joined to the subject by *with, together with, including, as well as*, and similar connectives do not affect the number of the verb:

> The *helicopter*, together with two light planes, *was* loaded and waiting.

If the word *number* is used collectively, the verb is singular:

> The *number* of field assistants *is* larger this year than last.

If individual units are referred to, the word *number* takes the plural verb:

> A number of the *field assistants are* taking summer courses.

See 'Collective nouns' above for further examples.

Tense

There are many tenses with numerous applications, and only a few general recommendations are made here:

1. Describe rocks in the present tense:

   > The sill *occupies* an unconformity, and its roof rocks *are* highly altered.

2. Describe events of geological history in the past tense:

   > The magma *intruded* the unconformity, forming a sill, and shortly after, a hydrothermal system *developed* in its roof rocks.

3. Describe experimental activities and phenomena in the past tense; they presumably are completed by the time of writing:

   > We *heated* the charge to 1500°C at 20 kbar, and the mineral assemblage partly *melted.*

4. Discuss experimental results in both past and present tenses, as appropriate to the conditions and observations:

   > The experiments *showed* that the mineral assemblage *is* stable under these conditions.

5. Describe specific conclusions in the past tense to emphasize that they represent special conditions, in contrast to general conclusions, principles, or truths, which should be described in the present tense:

   > The Hawaiian hotspot evidently *stayed* fixed, even though oceans *are* spreading and continents *are* drifting.

6. Refer to other authors in the past tense; they may since have changed their minds — or even died:

   > Darwin (1859) *argued* for evolution of the species by survival of the fittest.

   But, if you make reference to their work by its title, then because the document still exists, discuss its contents in the present tense:

   > The *Origin of Species* contains other examples.

Verbals

In English, there are three verb forms, which, in addition to their verb-like functions, perform the work of another part of speech at the same time. These verb forms are the *participle*, the *gerund*, and the *infinitive*.

Participles

An English verb has two participles: the *present participle* always ending in *-ing*, as in *finishing*, and the *past participle,* which ends in *-d, -ed, -n, -en*, or *-t*, as in *finished.* A participle is a verb form that can act as an adjective:

> The fossils were evidence of a *flourishing* fauna in the area during the Eocene.
> His reports from the field were *discouraging.*
> There was no shortage of *running* water in the camp, especially under the tents.

Dangling participles

Avoid the common error of opening a sentence with a *participle*, thus misrelating phrases, so that the participle becomes unattached from its correct noun or implies a wrong noun, as in the following examples:

> Shattered into fragments, the student picked up the calcite crystal.
> Traversing across the fold belt, the rocks become increasingly gneissic.
> Going westward, the craton becomes part of a mobile belt.

Such sentences with *dangling participles* range from amusing to ridiculous — where they should be easy to spot. Students may be fragile, but rocks and cratons are remarkably stable.

Make sure that phrases are related to a proper subject in the main clause. This can be done by examining the participles (*present participles* end in *-ing*; *past participles* end in *-d* or *-ed*) and asking: *Who or what is -ing* or *-ed*? If the answer is not logical, then rewrite the entire sentence.

Care should be taken to avoid the *hanging participle*, gerundial, or infinitive phrase, that is, one for which the subject is missing. Amusing illustrations have been quoted, such as: *Having eaten our lunch, the boat sailed for Quebec*; or, *When three years old* (or, *At the age of three), my grandmother died.* However, these are no more absurd than the following: *Approaching the contact, the phenocrysts decrease in size; On crossing the ridge, the quartz veins appeared at closer intervals;* or *Reviewing the preceding paragraphs, the Cache Creek Group...*

Gerunds

A gerund is a verbal noun: *mining*, *geochemical prospecting*.

When used as a subject or object, the gerund should be used with a noun or pronoun in the possessive:

> The company's *drilling* in the area delineated the gold deposit.
>
> Delegation of its authority would be contingent upon the Commissions' *establishing* procedures to be followed.

This rule is most often ignored when words are inserted between the preposition and the gerund:

> The seismic-equipment operators were removed from the site because of their provincial licences *being* revoked.

Writers should not allow themselves to fall into this trap. It can be avoided by rewriting the sentence:

> The seismic-equipment operators were removed from the site because their provincial licences had been revoked.

Infinitives

This verbal form may be used as a noun, an adjective, or an adverb. It is usually preceded by the word *to*, which in this case is not a preposition, but the *sign* of the infinitive.

Split infinitives

The intrusion of an adverb or an adverb phrase between the *to* and the verb of the infinitive is called the *split infinitive*. Split infinitives are unpleasant to the ear and jolt the reader by interrupting the action implied by the verb, for example:

> to abruptly truncate to greatly diverge

The following two examples do not sound so distinctly jarring, but are nevertheless split infinitives:

> The shale appears to eventually be replaced by the limestone.
> The limestone appears to eventually replace the shale.

At times, however, it is permissible for emphasis to split an infinitive when it would be awkward to put the adverb before or after the infinitive.

Auxiliary verbs 'shall' and 'will'

To express the simple future, use the auxiliary *shall* in the first person and *will* in the second and third persons. These auxiliaries are reversed to express determination or command, as *I will, you shall, they shall.* This has always been the rule, but the modern trend is to neglect the *shall* and the conditional form *should* and to use instead *will* and *would* in the first person, as in *I would like to do it* rather than *I should like to do it.* Colloquialism is so strong an influence in the use of these auxiliaries that it is doubtful that fixed rules would help the writer. When in doubt, use *will.*

Subjunctive

The present subjunctive has the same form as the 'bare' infinitive or imperative: *be, save, demand.* The subjunctive is rapidly falling into disuse. Its few remaining regular uses include the following:

1. certain common expressions:

> come what may if need be

2. legal or quasi-legal language:

   I move that the meeting be held in Quebec.

3. conditional sentences where the hypothesis is not a fact:

   If I were you, I would write to the Director General today.
   If he were here, I would tell him what I think of it.

4. the expressions *as if* and *as though*, if the hypothesis is not accepted as true:

   He spoke of his proposal as if it were a complete solution to the difficulty.
   He talks as though he knew the location of the 'Lost Lemon Mine'.

5. expressions of uncertainty, doubt, or supposition:

   He wondered if he were right.

Active and passive voice

The consistent use of the active voice wherever possible makes for better and clearer writing. Make the initiator of the action, not the object acted upon, the subject of the sentence:

> Miller (1996) investigated the gold potential of the Old Woman greenstone belt.
> *not* The gold potential of the Old Woman greenstone belt was investigated by Miller (1996).

Douglas mapped the fold belt is the *active voice*. *The fold belt was mapped by Douglas* is the *passive voice*. The passive voice (sometimes referred to as passive construction) is made up of a tense of the verb *to be* plus the *past participle* of another verb: *I was shown; It is determined that.*

In writing, do not change from the *active voice* to the *passive voice*, or vice versa, with a sentence or within a paragraph. Indeed, in current scientific writing, the active voice is preferred over the passive voice, and is more concise, avoiding the use of *was* and *by*. The sentence: *The writer spent the last two field seasons in the area, and it is expected that he will return next year* should be written: *The writer spent the last two field seasons in the area, and expects to return next year.* The corrected sentence is shorter, and avoids a circumlocution.

Sometimes authors lose sight of the logical subject of a sentence. They begin a sentence with a clause containing an active verb and then ineptly introduce a new subject that leads to the use of a passive verb:

> These vugs carry no gold and *do not affect* the tenor of the vein.
> *not* These vugs carry no gold and the tenor of the vein *has not been affected* by them.
>
> The workings were closed and *could not be examined.*
> *not* The workings were closed and *examination of them could not be made.*
>
> This series is made up largely of shale but *includes* much sandstone and limestone.
> *not* This series is made up largely of shale though much sandstone and limestone are *included.*

Avoid using *it* as a subject, such as *It should be noted that....*

The passive voice can be used for certain routine statements: *Samples were collected from several localities* is just as acceptable as *We collected samples from several localities*. If the state of the bedrock is the point of significant interest in a report, then it is more acceptable to write *The bedrock was covered by talus* than *Talus covered the bedrock.*

The best advice is: *prefer the active voice*, but *do not eliminate the passive voice.*

The passive voice is used where it is intended to stress the thing done rather than the doer, or when the doer is unknown: *My hammer was broken* stresses the breakage, whereas *The assistant broke my hammer* stresses the action of the assistant.

Adverbs

Place adverbs so that there is no doubt which word or words they modify. Adverbs are usually placed immediately before or after verbs, and before adjectives and other adverbs that they modify. Take special care with the adverbs *only, merely, just, almost, ever, hardly, scarcely*, and *nearly.* Depending on the meaning write:

> Only visiting scientists may remove *Dynamosaurus* bones from the area.
> *or* Visiting scientists may remove only *Dynamosaurus* bones from the area.

Resist the temptation to use *very* too frequently. Use *quite* only in its proper sense of 'completely'.

Related words and phrases should be kept together. Some writers misplace adverbs and adverbial phrases, especially the adverbs *only, principally, mainly, chiefly, alone, also*, and *too*. Note the following sentences:

> Their presence can be determined *only* by tests.
> *not* Their presence can only be determined by tests.
>
> The sediments were derived *principally* from quartzite.
> *not* The sediments were principally derived from quartzite.

Adjectives

A sentence with only one or two adjectives or qualifying adverbs may be stronger than one overflowing with them:

> This sentence is boring.
> *not* This sentence is exceedingly long winded and very boring.
>
> The laboratory staff worked efficiently.
> *not* The laboratory staff did its utmost, and worked extremely well and very efficiently.

Do not combine an abstract noun with an adjective when an adjective alone would do:

> The grains are rounded.
> *not* The grains are of a rounded shape.

Conjunctions

When *that* is used as a conjunction, do not use it again after an interjected clause, however long the sentence may be:

> The Director knew *that*, however great the travel difficulties to be overcome, *that* his assistant would be there. (Omit the second *that*.)

Use *while* only in its true sense of time:

> He continued the traverse while I collected samples.

Otherwise, use *and* or *although* instead of *while*, such as in the following sentence:

> At the conference the terrain scientist gave a talk on sampling procedures *and* (*not* while) the geophysicist spoke on new instrumentation.
>
> *Although* (*not* while) we found no evidence of fossils in the field, laboratory analysis revealed an abundant fauna.

Do not use *also* as a conjunction after *and*.

The word *like* can be used as a conjunction in constructions such as *He ran like a rabbit* but it ought not to be used in the sense of 'as' or 'as if':

> The field assistants worked *as if* they were possessed.
> *not* The field assistants worked *like* they were possessed.

The indefinite articles 'a' and 'an'

The indefinite article *a* is used when the word following begins with a consonant (i.e. a letter of the alphabet other than a vowel) or a consonant sound. *An* is used when the following word begins with a vowel (i.e. the letters a, e, i, o, u). The form of the indefinite article fluctuates, however, before some words beginning with *h*, depending upon the pronunciation of the *h*, this includes the aspirated *h* (with an audible *h*-sound), and the *y*- and *w*-sound heard in *union* and *one*.

> a horst, a history, a habit, a halide, a hand level, a halo, a hand specimen, a hanging wall, a hardpan, a heavy liquid, a hinge, a hill, a hiatus, and a hoodoo.

Some words are spelled with an initial vowel but pronounced as a consonant: *a European fossil, a euphemism*, etc. Conversely, words spelled with an initial consonant but pronounced with a vowel, take *an*: *an MP*.

The article *an* is used for *a* before vowels and before an unaspirated *h*:

an elevation	an IUGS scientist
an n-n log	an hour
an M.A.	an oolite
an honours degree	

Prepositions

Preposition means 'pre-position', and in grammar this part of speech is intended to be placed before its object. A preposition can, however, end a sentence as follows:

1. when the spontaneity of the sentence would be lost by inverting the preposition:

   He is the greatest stratigrapher I have ever heard *of.*
   not He is the greatest stratigrapher *of whom* I have ever heard.

   Officials worth talking *to.*
   not Officials *to whom* it is worthwhile talking.

   That depends on what you write *with.*
   not That depends on *with what* you write.

   They split every concretion they could lay their hands *on.*
   not They split every concretion *on which* they could lay their hands.

2. when the preposition is part of a contrived verb. There are combinations of words that appear to end with a preposition but in reality they are verbal forms. The verb *put*, for instance, can have many meanings when what seems to be a preposition is attached to it, such as *put about, put away, put back, put by, put down, put forward, put in, put off, put over, put through, put up, and put up with.*

   Do not confuse these verb forms with the superfluous preposition added to such expressions as *meet up with, visit with*, and *study up on*, when the meaning is the same without the preposition.

Distinguish between *between* and *among*. The first refers to two persons or things; the second to more than two:

Divide money *between A and B.*
but Divide the money *among A, B, and C.*

However, *between* is still used where the more than two items are considered severally divided, and also in cases where every relationship is a well defined two-way relationship:

We found coal between the beds of shale.

Saskatchewan lies between Alberta, Manitoba, the Northwest Territories, and the United States.

With is frequently misused, especially for *and*:

The vein has a northeast strike *and* a vertical dip.
not The vein has a northeast strike *with* a vertical dip.

The rocks are indurated, tilted, *and slightly folded.*
not The rocks are indurated *and* tilted, *with some slight folding.*

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

The rocks are mostly grey slate *but include* some greywacke.
not The rocks are mostly grey slate *with* some greywacke.

The water is very clear but has a faint bluish tinge.
not The water is very clear *with* a faint bluish tinge.

The surface of the bedrock is fairly even *but contains* depressions representing temporary channels of the shifting creek.

not The surface of bedrock is fairly even, *with* depressions representing temporary channels of the shifting creek.

With is sometimes used erroneously in place of a verb:

The rock is even grained, finely laminated, and well bedded, and *exhibits* clearly defined jointing.

not The rock is even grained, finely laminated, and well bedded, *with* clearly defined jointing.

Do not omit the preposition in the following cases:

1. where a different preposition is required in a series:

   He had a knowledge *of*, and a keen interest *in*, geology.

2. in expressions of time:

   He was appointed *on* 1 October 1986.
   The earthquake occurred *on* Thursday, 18 June 1987.

Compound prepositions

Use the conjunction *because* rather than the compound preposition *inasmuch as*. Another compound, *as to*, can be left out of most sentences without changing the meaning. Avoid such hybrids as *herewith, thereof, thereon,* or *thereunder*.

Appropriate prepositions with nouns, verbs, adjectives, and adverbs

Idiom calls for certain nouns, verbs, adjectives, and adverbs to be followed by particular prepositions. Some of the more common are listed below:

accord with (*but*, of one's own accord)
account for
acquiesce in
adhere to
adverse to
agree on terms
agree to a proposal
agree with a person
aim at
alien to
averse to (*not* averse from)
aware of

begin by doing something
begin from a point

begin with an act
benefits of the benefactor
benefits to the beneficiary

capable of
capacity for
circumstances (in the)
compare with (to note points of resemblance and difference)
compare to (only when used in the sense 'to liken to')
concur with a person
conditions (under the)
conform to (adapt one's self to)
conform with (in harmony with)
consist in (definition: Memory consists in a present imagination of past incidents.)
consist of (material: The meal consisted of fish.)
consistent with
content one's self with
content others by
contrast (When *contrast* is used as a verb, it is followed by *with*. Either *to* or *with* may be used when the word *contrast* is used as a noun.)
conversant with
correspond to (resemble)
correspond with (communicate)

demand for a thing
demand a thing from, or of, a person
derive from
differ, different, from (*not* than, to)
differ with a person in opinion
disagree with a person

embark in a mining venture
endowed with
evidence of (something)
evidence for (a theory)

find a fault in a person or thing
find fault with a person
free from

indifferent to
infected with disease, bad qualities
infested with insects, vermin
initiative in (to take) (on one's own initiative)
insight into
interpreted as (avoid *interpreted to be* as this implies cause and effect)
invest in a business

join in a project
join with some person or thing

labour at a task
labour for a person, for an end
labour in a good cause
labour under a disadvantage

look after a business
look at a thing
look for a missing article
look into a matter
look over an account

moment (on the spur of the)
moment's notice (at a)

order of (in the)

parallel with or to
perpendicular to
point at a thing
point to a fact
point with an object
prefer one to the other
prefer to do one thing rather than another
preference for
prevent from doing something
proceed to an act not previously started
proceed with an act already started
prohibit from doing something
provide against ill luck
provide for an emergency
provide one's self with something

pursuant to (in pursuance of)

range from X to Y (*not* range between)
ready to do something
ready with a reply
reckon with a person, a contingency
reference to (preceded by *with*, not in)
regard for a person (with regard to a subject)
regard for one's own interest
relief to suffering (to bring)
relieve one from a duty
responsibility for (an act or situation)
responsibility of deciding, of a position
responsibility to a person for an action
result from an event
result in a failure
result of an investigation
right of doing
right to do

satisfied of a fact
satisfied with a thing
secure against attack
secure from harm
secure in a position

tamper with
tinker at gemmology
tinker with an engine

unconscious of

variance on certain topics (at)
variance with a person (at)
versed in
view of circumstances (in)
view to a purpose (with a)

wary of a danger

Capitalization

In the English language certain words are written with capital letters for emphasis, and to guide the reader in meaning and phrasing, in much the same way as punctuation. There are rules to define which words require capitals, but modern usage has introduced a degree of flexibility not tolerated in earlier writing. Basic rules are given here. Examples of capitalization are listed in alphabetical order throughout the section entitled 'Spelling, usage, and GSC recommendations'.

First word of a sentence

Begin every sentence or sentence equivalent with a capital letter. In subdivisions of conclusions, recommendations, or decisions, if the complete thought can be stated briefly, it is unnecessary to introduce the subdivisions with capitals:

> Every year GSC summer students receive
>
> 1. firearms training,
> 2. first aid instruction, and
> 3. general instruction on safety in the field.

If the conclusion, recommendation, or decision cannot be stated briefly, introduce each subdivision with a capital letter and end it with a period.

The first word of a direct quotation that is a complete sentence is capitalized (*see* 'Quotation marks' *in* 'Punctuation') as is the first word of a complete sentence in parentheses, when it stands alone (*see* 'Parentheses' *in* 'Punctuation').

Proper nouns

Capitalize all proper nouns. Difficulty sometimes arises in making the distinction between common and proper nouns. Common nouns do not require capitals because they refer to everyday objects in a general sense. Proper nouns are so named because they belong and are proper to certain people, groups, or objects set apart, or are words derived from these sources. Hence the names of months and days, derived from names of pagan gods and planets, are proper nouns, whereas the seasons of the year, being common nouns, do not take capitals, except when used poetically.

Proper nouns include these categories:

1. names of persons and places (countries, regions, counties, cities, and other political and geographical divisions) and the names substituted for them:

William Logan	Canada
the Arctic	Carleton County
the Northern Hemisphere	Montreal
the International Boundary	Pickle Lake
the Continental Divide	Elm Street West
the Interior Plains	the Canadian Shield
Prince Edward Island	the Prairies
the Atlantic Provinces	

   The examples *Pickle Lake* and *Elm Street West* are made up of common nouns transformed into proper nouns because they have become parts of the place names.

   Avoid the overuse of substitute terms. Reports scattered with *the Bay, the Island* reflect a parochial attitude.

2. names of the months and days, languages, races, geological and historical periods and events, and documents:

October	French
Wednesday	Inuit
the Neolithic	World War II
the Silurian Period	the Archean
the Ice Age	

3. names of organized bodies and the distinguishing names substituted for them:

   the Parliament of Canada, Parliament
   the House of Commons, the House
   Natural Resources Canada, the Department

4. names of institutions, churches, schools, libraries, buildings, hotels, clubs, corporations, ships, etc.:

Toronto General Hospital	Logan Building
Prospectors and Developers Association of Canada	Geological Survey of Canada
Canadian Institute of Mining and Metallurgy	Chateau Laurier
BC Hydro	Vancouver Public Library
CSS *Hudson*	

5. official titles of persons when used without their personal names:

the Prime Minister	the Chief Scientist
the Premier	the Resident Geologist
the Assistant Deputy Minister	the Director General

Common nouns

Common nouns automatically become proper nouns and are capitalized in these cases:

1. when they refer specially to events, institutions, or similar objects and are therefore no longer used in the general sense:

   world, food, bank, *but* World Food Band
   decade, geology *but* Decade of North American Geology

   Capitals are not used in any general reference to departments, branches, committees, and positions, but *only when naming a particular one*:

   The positions of research scientists in the Department of Natural Resources range from Research Scientist 1 to Research Scientist 8.

   Use capitals to designate a functioning body but not when referring to the component members of that body:

   All the division directors were present at the last Division Directors' Committee meeting.

2. when they become an essential part of the proper name:

   Carling Avenue Brighton Pier Ramah Group
   but
   Carling and Bronson avenues
   Ramah and Mugford groups

3. when common nouns such as north and east are used to name a specific region and its inhabitants:

   the West people of the South
   the Westerner

   Note that the points of the compass when abbreviated take capital letters but no period:

   N NW E SSW

Stratigraphic names

A good general rule is not to capitalize unless specific convention warrants it. Thus the modifying names of informal members, units, beds, etc. should be capitalized if, either, 1) the modifying name already is a proper noun, such as *Banff member*; or, 2) there is a logical and arguable reason for doing so (clarity or emphasis). To conform with the 'North American Stratigraphic Code', the rank or unit term at the end of a specific name is not capitalized unless the unit is formal. Thus *Calcareous member, Sandstone member*, and *Lower member* are informal. Terms such as *unit A*, *member B*, etc. are obviously informal (*see* Appendix F).

Authors are advised to state clearly, at the start of their report, what formal and informal stratigraphic nomenclature they are using. They should also state if they are naming, defining, and describing new stratigraphic units in accordance with the 'North American Stratigraphic Code' (*see* Appendix F).

Proper adjectives

Capitals are used for proper adjectives because they are derived from proper names:

Tyndall limestone Douglas fir

A proper adjective is associated with the person or place from which the adjective is derived. When this association is more common, the adjective no longer takes a capital:

portland cement leda clay

Quotations

Use a capital letter for the opening word of a quoted sentence or sentences, but not of quoted phrases:

John said, "They have gone."
Their report mentioned only "height, width, and breadth".

Titles of books

Capitalize every important word in literary titles. Prepositions, articles, and conjunctions do not take capitals unless one of them is the initial word in the title:

Glossary of Geology
An Early History of Canada
Surficial Geology of the Lethbridge Area, Alberta
Paleozoic Limestones of Ontario: a Review
Canadian Journal of Earth Sciences

Hyphenated compounds

A proper noun or adjective in a hyphenated compound retains the capital:

mid-Paleozoic trans-Arctic
but transatlantic

Abbreviations

Abbreviations of decorations, radio and television stations, certain government agencies, and other organizations are capitalized but not punctuated, unless they are geographical or refer to a person:

CBOT	GSC	GSA
MBE	IAEA	NRCan
DVA	USGS	CGSB
but		
U.K.	U.S.A.	N.W.T.

Groups of initial letters that can be pronounced as a word, or *acronyms*, like certain United Nations and government agencies and programs, are also capitalized but not punctuated:

NATO UNESCO NATMAP PERD

See 'Abbreviations' for details.

Biological classification

The scientific name of a phylum, class, order, family, or genus is capitalized, but the name of a species or subspecies, or a common name, is not:

the phylum Arthropoda
the class Trilobita
the species *Olenellus thompsoni*
but
arthropod trilobite acritarch

See 'Paleontology' for details of paleontological terminology.

Parts of a book or report

Capitalize words followed by a number or letter to indicate the parts of a book or report when they are used in text references. Note that they are capitalized in the singular and plural, and also in parentheses — with the exception of 'figures' in paleontological plates:

Appendix 1	Appendices 3 and 4	(Appendix 1)
Chapter 2	Chapters 2 and 3	(*see* Chapters 2, 3)
Figure 4	Figures 5 to 7	(Fig. 4) (Fig. 5-7)
Plates 2 and 3		(Pl. 2) (Pl. 2, 3)
Plate 1, figure 6a		(Pl. 1, fig. 4, 6a)
Part 2	Parts 2 and 3	(Pt. 2) (Pt. 2, 3)
Table 10	Tables 12 and 13	(Tables 12, 13)
Volume 2	Volumes 1 and 2	(*see* Volume 2)

The International System of Units (SI)

See the section entitled 'The International System of Units (SI)' for details of SI (metric) symbols that are capitalized. Note that *Celsius* is capitalized when written out, and that the symbol for litre is 'L'.

Other guidelines

Capital letters are used for awards (the Badge of the Order of Canada); degrees (Doctor of Philosophy); official documents (The Report of the Mackenzie Valley Pipeline Inquiry by Mr. Justice Thomas R. Berger); cultural periods (the Bronze Age); trade names; scientific laws, theorems, etc. (Boyle's law); chemical symbols and elements (H_2SO_4, ^{14}C, Au); computer language (BASIC, FORTRAN); single letters used as words (X-ray); the titles of magazines and newspapers (*The Northern Miner*).

Italics

The following are some examples of the use of italics in GSC reports:

1. for emphasis, as in this *Guide to Authors*, to indicate the correct use of a word, phrase, or sentence and punctuation:

   The word *greywacke* has a number of different definitions.

2. for foreign words and phrases that are not yet established in the English language:

   Caveat emptor *fait accompli*
   modus operandi *nostra culpa*

3. for certain Latin terms:

   idem *infra* *vide*

   Many Latin terms (such as versus, ibid, in situ) are now accepted as fully English forms, and are not italicized. Abbreviations for Latin terms (such as ca., cf., etc., e.g., et al., op. cit., viz, vs.) are never italicized.

4. The Latin word *sic* meaning 'thus, so' is used to inform the reader that an unlikely quotation is, in fact, correctly worded (quoted), and also to indicate that an error in a quotation is not to be attributed to the author(s). The word *sic* is written in square brackets thus: [*sic*] immediately after the error:

   The northwestern Canadian shield [*sic*]

5. the titles of publications (books, periodicals, plays, newspapers, studies, etc.) in the text, but not in the References list:

   Although most geologists have heard of Beringer's *Lithographiae Wirceburgensis*, few have read the book.

6. the names of ships:

   the submersible *Pisces IV*

   CSS *Baffin* CFAV *Sackville*

7. letters, words, and sentences referred to as such:

   the letter *s*
   the words (nouns) *abstract* and *concrete*
   the sentence should be rewritten: *The fault strikes northeast*

8. technical (i.e. scientific Latin) names of genera and species in botany, zoology, and paleontology:

   Betula glandulosa
   Homo sapiens
   Hildoceras bifrons

9. Italic type is used to indicate that a figure or table has been reproduced from another publication, and also to show that the illustration has been altered:

   after indicates that the figure or table is reproduced as it was shown in a previous publication.

   modified from indicates that changes or redrafting have been made to the original figure or table.

   In both cases reference must be made to the original source of publication: *modified from* Smith (1993).

10. Italic type is used in the text when making reference to figures, tables, plates, maps, or references:

    (*see* Fig. 1.5) *See* Time terms.
    See also Anthropomorphism
    ...*in* Current Research, Part D; Geological Survey of Canada, Paper 90-1D, p. 55-60.

Verbosity

Avoid verbosity, the use of two or more words where one will do. Verbosity leads to redundancy, two technical terms for which are *pleonism* and *tautology*.

Pleonism

This is the use of more words than are required to give the sense intended:

The shale is red.
not The shale is red in colour.

Because
not Owing to the fact that

Now
not At this point in time

Near
not In the vicinity of *or* In close proximity to

Tautology

Tautology is the repetition of an idea in different words:

free gifts past history
future prospects present time
Gondwanaland (Gondwana means 'land of the Gonds')

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PUNCTUATION

Introduction

"Punctuation", according to Eric Partridge (1977, p. 12), an authority on the subject, "is not something you add to writing, even the humblest: it forms an inescapable part of writing." The function of punctuation is to help the reader understand what is written by making clear the relationship between the various parts of the sentence. Improper punctuation can, and often does, alter the meaning and confuse the reader. The writer, however, ought not to rely on punctuation to improve a poorly constructed sentence; the sentence should be rewritten.

There are at least fourteen recognized punctuation marks: period, ellipsis, colon, semicolon, comma, hyphen, dash, question mark, exclamation mark, quotation marks, parentheses, brackets, apostrophe, and oblique. Using them correctly is largely a matter of learning a few simple rules and then applying them with common sense. The modern trend is toward inserting only as much punctuation as the sense requires, rather than sprinkling the copy with numerous commas, dashes, and hyphens.

The following sections are intended to serve as a guide to logical punctuation. The order of decreasing importance of the main punctuation marks is period, colon, semicolon, comma.

Period

The period, or full stop, is the first, most important punctuation mark.

The period is used in these cases:

1. at the end of a sentence that is neither a question nor an exclamation:

   The formation is only 30 m thick at this locality.
   Take out your map.

2. after an abbreviation:

   Dr. Fig. ca.

   In abbreviating the names of organizations, the periods are usually omitted:

   RCAF CMA GSC IUGS

   The period that marks an abbreviation is never omitted before a mark of sentence punctuation, except when the abbreviation comes at the end of a sentence. In this situation, the period marking the abbreviation also serves as the period marking the end of the sentence:

   The firm of Allan and Co., of which I am a partner, has its head office in Ottawa.
   I was made a partner in the firm of Allan and Co.

   See also 'Abbreviations' in 'Grammar'.

3. to mark the end of an independent sentence placed inside parentheses. (The period is placed inside the parentheses and the material in parentheses starts with a capital letter and ends with a full stop, as in this example.) If, however, a sentence contains material in parentheses, then the period falls outside the parentheses (as illustrated here).

4. inside quotation marks when the end of the sentence quoted coincides with the end of the main sentence:

   The excursion guide said, "This unconformity is marked by a regolith, not a shear zone."

The period is not used in these cases:

1. after display lines and titles:

   Stratigraphy of the Upshot River valley

2. after paragraph headings on separate lines:

   Detailed stratigraphy of the upper 50 m

3. after box headings in tables:

   Total organic carbon (%)

4. after date lines and signatures:

   10 October 1910 Allen J. Moore

5. after SI symbols:

   All the major events took place within about 15 Ma in that region.

6. after individual letters in acronyms and initialisms:

   NATO UNESCO DNAG CIMM

Ellipsis (pl., ellipses)

The period is used in series, to mark an ellipsis: i.e. something left out of a sentence. If the ellipsis comes in the middle of the sentence, three dots are used; if it comes at the end of a sentence, four (a period, with no space between it and the preceding word, followed by three dots):

> An iceberg is a large, massive piece of floating or stranded ice detached from the front of a glacier into a body of water.
>
> An iceberg is a large, massive piece of...ice detached from the front of a glacier into a body of water.
>
> An iceberg is a large, massive piece of floating or stranded ice....

Colon

The colon is a valuable punctuation mark, but it is neglected today, perhaps because few people know how to use it properly. It ranks in value between a period and a semicolon: it indicates a pause, or degree of separation, longer than that marked by a semicolon but shorter than a period. It marks the end of the first of two very closely related sentences. The first word following a colon is not capitalized unless it is a proper noun or the first word in a quoted sentence.

The colon is used in these instances:

1. between two sentences that present contrasting ideas, or between independent clauses when the second clause amplifies or interprets the first:

   > We did not find shale: we found sandstone.
   >
   > Bird-hipped dinosaurs were not slow-moving: on the contrary, they were probably quite agile.
   >
   > The anticline is asymmetrical and faulted: its development was related to compression beneath the McConnell Thrust.

2. to introduce a formal statement, or a statement that explains, proves, or enlarges on one that precedes it. In this case, the colon acts as a substitute for a word like *for, viz.*, or a phrase like *that is to say*:

   The purpose of this paper is twofold: to explode the myth of the Cannon Embayment, and to reconstruct the depositional environment of the Triassic Fodder Formation.

3. to introduce a formal quotation:

   The party chief looked at his crew and said: "We're stuck here until the fog lifts, I'm afraid."

4. to introduce a series of particulars, such as a list or an enumeration:

   In a mere 50 m of section, we found the following materials: fine-grained sandstone, siltstone, shale, fossiliferous limestone, and chert.

   Sandstone: calcareous; fine grained; medium greenish grey, light-brown-weathering; thin bedded, crosslaminated.

   The following structures are found in the Foothills: (1) thrust faults, (2) culminations, and (3) triangle zones

Not all lists need to be introduced by a colon. Care must be taken to use the colon correctly.

Do not place a colon between a preposition and its object.

Stratigraphic information about the Fraser delta is important for understanding the processes that have shaped the delta (Luternauer et al., 1994); allowing possible aquifers and aquitards to be identified (Ricketts, 1998); and providing the basis for geotechnical assessments of earthquake hazards (Harris et al., 1995).

not Stratigraphic information about the Fraser delta is important for: understanding the processes that have shaped the delta (Luternauer et al., 1994); allowing possible aquifers and aquitards to be identified (Ricketts, 1998); and providing the basis for geotechnical assessments of earthquake hazards (Harris et al., 1995).

Do not place a colon between a verb and its object or object complement.

From structurally lowest to highest, the four volcanic and plutonic units are 1) Skinner Cove Formation, 2) Old Man Cove Formation, 3) Little Port Complex, and 4) Bay of Islands Complex.

not From structurally lowest to highest, the four volcanic and plutonic units are: 1) Skinner Cove Formation, 2) Old Man Cove Formation, 3) Little Port Complex, and 4) Bay of Islands Complex.

A colon is used where the introductory clause is an independent clause.

The seismic reflection profiles (Fig. 5) indicate that the sedimentary sequence beneath the southern Fraser River delta comprises four main units: Holocene topset (unit 1) and foreset (unit 2) deposits, underlying Pleistocene sediments (unit 3), and Tertiary bedrock (unit 4).

not The seismic reflection profiles (Fig. 5) indicate that the sedimentary sequence beneath the southern Fraser River delta comprises: Holocene topset (unit 1) and foreset (unit 2) deposits, underlying Pleistocene sediments (unit 3), and Tertiary bedrock (unit 4).

(The example above is incorrect because the colon is placed between a verb and its objects.)

Mineralization in the area consists of the following: massive sulphides and barite in the Macumber limestone (Magnet Cove deposit), barite-siderite without associated sulphides in the Macumber limestone, and hematite-limonite in the Horton sandstone.

not Mineralization in the area consists of: massive sulphides and barite in the Macumber limestone (Magnet Cove deposit), barite-siderite without associated sulphides in the Macumber limestone, and hematite-limonite in the Horton sandstone.

(The example above is incorrect because the colon is placed between a preposition and its objects.)

5. before a final clause that summarizes preceding matter:

   Before establishing a formal geological unit one must describe the unit, define its boundaries, dimensions, shape, age, and other regional aspects, and attempt to establish its correlation with other units and its genesis: in other words, a very thorough examination of the unit must be made.

6. between hours and minutes in a notation of time:

   08:45 13:30

Colons should be placed outside closing quotation marks and parentheses (*see* sections on 'Quotation marks', 'Parentheses').

Semicolon

The semicolon comes third in the descending order of punctuation: period, colon, semicolon, comma. It indicates a pause or degree of separation less than a colon but more than a comma.

The semicolon is used in these instances:

1. to separate clauses that are too closely related in meaning to be written separately:

   Phyllitic slate, phyllite, and fine-grained, argillaceous sandstone are the dominant rock types; they are penetratively cleaved and weather greenish grey and brown.

2. to separate closely related clauses in a compound sentence where the connecting conjunction is omitted:

   In this section there are many graptolitic beds; in section 2, there are none.

3. to separate principal clauses in a long sentence from phrases or subordinate clauses marked off by commas:

   The succession is composed of the Carnival Formation, a quartz sandstone unit; the Greentree Formation, a marine shale; and the Blackbird Formation, a second, less extensive sandstone unit.

4. between the clauses of a compound sentence when there is a contrast of ideas:

   In GSC publications, we refer to a fine-grained sandstone, not a fine sandstone; a coarse-grained granite, not a coarse granite.

5. before a conjunctive adverb (*therefore, however, moreover, indeed, in fact, that is, for example, consequently,* and *furthermore*) when it connects independent clauses:

   Corrections can be made for variations in topography along a survey line during data processing; however, surface conditions and the depth to the water table are likely to vary with the topography, and these changes may affect the frequency characteristics and resolution of the data.

A semicolon is not used before a conjunctive adverb if it is being used in a transitional sense (i.e. not joining independent clauses):

Uranium-lead dating, however, suggests that the volcanic rocks in this succession are not significantly younger than the Coldbrook Group (Bevier et al., 1994).

Therefore, although great uncertainties remain, the most sophisticated models available for developing long-term predictions of climate change suggest that the Palliser Triangle region will be warmer, and likely drier, in the future.

Semicolons following quotations and parentheses should be placed outside the closing quotation mark and parenthesis.

Comma

The comma is perhaps the most widely used punctuation mark. Frequently it is overworked and made to take the place of other punctuation. Modern practice favours using commas with restraint.

The following are examples of when the comma is used:

1. to mark off an introductory adverbial phrase or clause from the rest of the sentence, but not if the phrase or clause is short and the omission is not misleading:

   When deposition finally ceased, at least 2000 m of sediments had accumulated.

   At present the equipment needed for monitoring the earthquakes is not available to our scientists.

2. to separate or enclose a *nonrestrictive* (or *commenting*) *relative clause*. A *restrictive* (or *defining*) *relative clause* is never set off by commas. The distinction appears difficult but really is not. A restrictive (defining) clause contains some information that is essential to the meaning of the sentence; a nonrestrictive (commenting) clause contains additional information:

   Restrictive clause The man who discovered the fossil beds was not a geologist.

   Nonrestrictive clause The man, who was not a geologist, discovered the fossil beds while on holiday. (*Who was not a geologist* is a nonrestrictive [commenting] clause that contains no essential information and is set off by commas.)

   Note how the presence or absence of commas can affect meaning:

   a. The geologists who knew about slope instability detoured around the talus. (Some of the geologists)

      The geologists, who knew about slope instability, detoured around the talus. (All the geologists)

   b. The samples that were in the helicopter were all lost. (Only the samples in the helicopter)

      The samples, which were in the helicopter, were all lost. (All the samples)

   In b) above, the example of a nonrestrictive clause is introduced by the relative pronoun *which*. Whereas a restrictive clause is introduced by the relative pronoun *that*, a nonrestrictive clause cannot be introduced by the relative pronoun *that*. *See also* under 'Pronouns' in 'Grammar'.

3. between independent clauses when they are linked by the co-ordinating conjunctions *and, for, but, or, nor, yet, so*:

   The fossils were not identified in the field, for nobody there knew anything about them.

But if the clauses are long and already contain commas, a semicolon is used to separate them (*see* 'Semicolon', above).

4. to separate words and phrases in a series, particularly when they have the same construction:

   The formation comprises beds of sandstone, siltstone, shale, and argillaceous sandstone.

   It is important to remember to separate the last and second last items in a series by placing a comma before the *and*. Otherwise, the items will be construed as being joined in some way. *Beds of siltstone, sandstone and shale* are different from *Beds of siltstone, sandstone, and (beds of) shale. Grey, red, and green mudstone* indicates three discrete colours, but *Grey, red and green mudstone* indicates two, a grey and a mixed or mottled red and green.

   If an adjective is closely related to the noun, it should not be set off by a comma:

   The lower part of the section contains significant amounts of gritty feldspathic sandstone.

   However, avoid usage that defines a colour as coarse pink, by adding the comma to *coarse, pink feldspar*.

5. to mark off 'appositional' material — that is, a noun or noun phrase that follows another directly and explains or describes it. If the appositional material is a *restrictive* (or *defining*) *phrase*, commas are not required:

   The unit at the base of the mountain, the sandstone member, is 300 m thick.
   Peter Smith the Director is in Europe.

6. to set off parenthetical words and phrases from other parts of the sentence, when parentheses or brackets are not used for this purpose. In such instances commas are used in pairs, just as parentheses would be:

   The scarcity of blue and green algae, as previously noted by Schlink and Schlime (1979), suggests that sedimentation took place under open-water marine, low-energy conditions.

   These oil shales are black, however, and do not exhibit banding or lamination.

   Note that there is no comma before parentheses (i.e. round brackets); any punctuation that is required comes after the parentheses.

7. to separate adverbs and adverbial phrases that modify a whole clause:

   For the third time, the field party set off, only to be hampered by bad weather.

8. to indicate the omission of a word that is, or words that are, common to two parts of a sentence (i.e. to indicate an ellipsis):

   The rocks of this area were studied by Greener (1950), Max and Scheel (1981), and Kemper (1985).

   In 1980 more than 500 wells were drilled; in 1985, 76; and in 1986, so far, only 32.

9. between the day of the month and the year (in the sequence month-day-year), but not between the month and the year:

   June 19, 1986 June 1986 19 June 1986

   There should be a comma between the day and the date or between the place and the date:

   Tuesday, 4 May 1993 Ottawa, 4 May 1993
   Monday, May 4, 1998 Ottawa, May 4, 1998

Avoid using dates written as 4-5-93, as this can mean the 4th of May or 5th of April 1993.

10. between titles and degrees used with names:

    John Jones, M.A., Ph.D.

11. to separate two words or numbers that might otherwise be misunderstood:

    In July 1980, 36 geologists went into the field.
    In 1980, 500 wells were drilled.

12. to separate 'co-ordinate' (modifying the same noun/verb) adjectives and adverbs:

    It was a small, weathered, lichen-covered outcrop.
    The geologist climbed slowly, carefully, and safely.

    Commas are not used if the modifiers are not 'co-ordinate' (i.e. the word order cannot be switched without affecting the meaning):

    It was a pink granitic rock.

13. to separate a series of independent clauses, including the final clause (i.e. the comma precedes the conjunction):

    The outcrops are extensive, they are severely fractured, and show little evidence of bedding.

14. to set off a nonrestrictive dependent clause following the main clause, but not a restrictive clause:

    Pebbles of volcanic rock are scattered throughout the conglomerate, but it is difficult to explain their origin.

    It would have been possible to date the pebbles if I had collected more samples.

    But, if a dependent clause precedes the main clause it should be followed by a comma regardless of whether it is restrictive or nonrestrictive:

    If the thrust faults developed before the normal faults, retrothrusting (normal movement on an existing thrust plane) may have occurred.

15. to set off a quotation that does not form part of a phrase or clause in the sentence:

    According to Douglas (1957, p. 92), "the easternmost syncline...is isoclinally folded" in the Mount Head map area.

The comma is not used in these instances:

1. before an ampersand (&);
2. before a parenthesis (or a bracket);
3. between the parts of a compound predicate (two or more verbs with the same subject):

    He had collected the fossils carefully and was annoyed to find that the more fragile ones were broken.

    The pegmatite veins are widespread in this area and show traces of gold.

Hyphen

The hyphen (-) looks like a short dash, but the hyphen and the dash are very different: whereas the hyphen unites, the dash separates.

In general, the hyphen is used between a word and a prefix, suffix, or other word-element, to prevent ambiguity of meaning or awkward-looking combinations of letters.

Words frequently used in close association tend to become unified in form as they are in meaning, and ultimately to acquire a single accent. There are three stages in the development of compounds. At first the components of the compound expression are written separately; next they are united by a hyphen; finally, when the separate significance and accent of these components have been lost sight of, they are combined into one word. The hyphenated stage may thus be considered merely preparatory to the coalescence of the various members into one word. Many such compounds have now fully coalesced and are written as one word, as (e.g. *footwall, landmass, offshore, rockburst).*

Although the modern trend is to use hyphens sparingly, hyphens are notoriously troublesome; no two dictionaries or books on grammar or style consistently give the same advice. This section therefore outlines the rules to be followed in GSC publications.

Nouns

Hyphenate the following:

1. nouns of equal value (or when used as adjectives):

basin-and-range	salt-and-pepper sandstone
silver-gold anomaly	cusp-ripple
strike-slip fault	lead-zinc vein
shale-arenite	vein-dyke
stoss-and-lee topography	

2. nouns written as two words, when they have a modifier:

dispersed mineral-matter	*but* mineral matter
fixed entropy-ratio	*but* entropy ratio
isolated point-bar	*but* point bar
red colour-filter	*but* colour filter

Do not hyphenate the following:

a compound noun that has become a single specialized word:

aircraft	snowfall
fieldwork	seabed
mudflow	seashore

But if such a noun has a modifier that modifies only the first part, the compound is separated by a hyphen:

cut-glass ware	structural-iron worker
sulphurous-mud flow	inland-sea shore

Adjectives

Hyphens should be used to clarify possible ambiguities, so hyphenate in these instances:

1. compound adjectives when they precede the noun they modify:

coarse-grained granite	ice-marginal channel
large-scale feature	Hawaiian-type eruption
low-pressure conditions	high-angle fault
low-velocity zone	high-energy environment
Mid-Atlantic Ridge	high-grade metamorphism
shallow-marine environment	ice-contact deposit
small-scale map	ice-flow direction
thin-bedded limestone	

2. combination colour terms placed before or after the noun:

blue-green amphibole	the amphibole is blue-green
orange-red shear zone	the shear zone is orange-red

Compounds with the suffix *-ish* are hyphenated only when they precede the noun:

bluish-green amphibole	*but* the amphibole is bluish green

Adjectives indicating a specific shade, such as *light, pale, bright, dark* are not hyphenated if they are placed before or after the noun:

light grey gneiss	the gneiss is light grey
pale yellow zone	the zone is pale yellow

3. compound adjectives made up of a noun, adjective, or adverb and a present participle whether used before or after the noun:

far-reaching events	the effects were far-reaching
gold-bearing deposit	north-trending fault
the dyke is north-trending	odd-looking feature

But if the compound is preceded by an adjective modifying the first word in the compound, use two hyphens:

mid-oceanic-ridge basalt	north-northwest-trending striae
light-green-weathering rocks	

4. compound adjectives made up of a noun or adverb and a past participle when they precede the noun they modify:

contact-metamorphosed sediment	intrusion-hosted deposits
ice-rafted material	shear-zone-hosted deposits

5. compound adjectives when the adverb of the combination could be misread as the modifier of the noun:

more-open creek bottoms	shows much-improved growth

6. compound adjectives ending in an adverb of direction or place (*in, out, up, down*, etc.) when they precede the noun:

built-up area	ice break-up season
rip-up clasts	fining-upward cycles
melt-out till	trickle-down theory

7. compound adjectives made up of a preposition and a noun:

   in-house program per-day basis

8. where the meaning would not be clear without hyphens:

   elongated-clast fabric measurement
   stony, matrix-supported, subglacial till
   high sea-level beach
   subaqueous, sediment-flow deposit

9. compound adjectives that follow the noun in map legends:

   quartzite: white, thin-bedded, fine-grained, ripple-marked

Do not hyphenate the following:

1. compound adjectives that follow the noun modified (exceptions, *see* points 2, 3, and 9, above):

   The granite is coarse grained.
   The metamorphism is high grade.
   The sediments are contact metamorphosed.

2. adjectives used in the name of an institution or place:

   grand jury room school board members

3. compound adjectives made up of adjective and noun when both are capitalized:

   Safety First rules Merit Award survey

4. compound adjectives used in foreign expressions:

   in situ mining methods en échelon folding

5. if the adverb in a compound adjective cannot be misread as an adjective modifying the noun (the use of hyphens with adverbs ending in *ly* and with the adverb *well* are the most common errors):

   all too complacent attitude highly shattered rock
   carefully prepared samples poorly defined hypothesis
   equally productive means well developed feature
   glacially eroded landscape well known author
   thinly bedded limestone (*prefer* thin-bedded limestone)

6. if the compound adjective is preceded by an adverb modifying the first word of the compound:

   a reasonably tall growing tree but a tall-growing tree

7. a two-word unit modifier, the first element of which is a comparative or superlative:

   best preserved specimen highest priced coal
   better drained soil larger sized grains

8. Chemical terms used as adjectives:

   calcium carbonate powder hydrogen sulphide solution

Phrases

Hyphenate in these cases:

1. many well known compounds:

ball-and-pillow	crag-and-tail
cone-in-cone	stoss-and-lee
basin-and-dome	topsy-turvy

2. compound phrases of more than two words, at least one of which is an adverb or preposition used as attributive adjectives:

the cost-of-living index	salt-and-pepper sandstone
subject-by-subject analysis	up-to-date approach

Prefixes

Hyphenate the following:

1. when the prefix is joined to a proper noun, unless usage demands otherwise:

mid-Cretaceous	pre-Wisconsinan
neo-Gothic	pro-Canadian
trans-Arctic	post-Tertiary
mid-1980s	
but Subarctic, transatlantic	

2. expressions beginning with the prefixes *ex* (meaning 'former'), *self*, *quasi*, and *all*, where used to form adjectives or nouns, and those beginning with *quasi* used to form adjectives:

all-inclusive	self-assured
ex-student	self-control
quasi-stellar	self-possessed

But do not hyphenate when *self* is the base word to which a suffix is added:

selfish, selfless, selfsame

Do not hyphenate in these instances:

compounds with *after, ante, anti, bi, co, counter, de, down, extra, infra, inter, intra, iso, macro, micro, multi, non, over, photo, poly, post, pre, pro, pseudo, re, retro, semi, stereo, sub, super, trans, tri, ultra, un, under, uni*, and *up*, except where clarity demands otherwise:

anticlimax	macrofossil	semiannual
anticusp	microclimate	semianthracite
bilateral	multicoloured	subcommittee
bimonthly	multistage	subsurface
coaxial	nonactive	superglacial
coexist	noncalcareous	transcontinental
downsection	postdate	triservice
downthrow	preglacial	unidirectional
interchannel	readvance	upsection
interdepartmental	rebuild	upvalley

But use a hyphen when a) two similar letters occur together, b) the appearance of the word is confusing without the hyphen, and c) the word written without a hyphen has another meaning:

co-operate
co-ordinate
de-icing
down-ice (adj.)
multi-author
post-tectonic
re-cover
re-educate
re-sign
re-solve
semi-invalid
semi-opal.
up-ice (adj.)

Suffixes

Hyphenate the following:

words ending in *wide*, depending on usage and the degree of familiarity of the word:

Canada-wide
industry-wide
but nationwide, worldwide

Do not hyphenate in these cases:

compounds composed of nouns ending in *like*:

businesslike
childlike

But hyphenate occasional compounds:

drumlin-like

and root words ending in double *l*:

bell-like

Do not combine adjectives with *like* as in 'globularlike'. Write either *globule-like* or *globular.*

Numerals

Hyphenate in these cases:

1. compound numbers from twenty-one (twenty-first) to ninety-nine (ninety-ninth):

   Twenty-two trenches were cut through the overburden.

2. an adjectival compound in which one component is a cardinal number (one, two, three, etc.) and the other a noun or adjective:

   one-sided affair
   three-dimensional image
   two-person tent

   Note

   two-rod rows (compound adjective and noun)
   two rod-rows (adjective and compound noun)

3. ordinal numbers (first, second, third, etc.) when they precede the word they modify:

   fifth-story room
   third-rate accommodation
   first-class assistant
   twenty-first-century technology

4. compounds of a number with *odd*:

   60-odd 140-odd

   But write as one word compounds with fold and score:

   fourscore sixtyfold
   but 24-fold (because a compound number is used)

Do not hyphenate the following:

1. before a symbol that is not a letter:

   a 100°C thermometer 27‰ salinity

2. between a cardinal numeral and a unit of measure:

   25 m section 10 km traverse 100 m cliff

3. between a unit of measure and the following adjective in a compound modifier:

   25 m thick section 10 km long traverse
   5 m, 10 m, and 25 m thick beds 100 m high cliff

Fractions

Hyphenate in these cases:

fractions used as modifiers and written in full, unless the numerator or denominator already contains a hyphen:

a one-third share
twenty-fiftieths calcium
but twenty-nine fiftieths calcium (29/50 is preferable)

Fractions with numerators and denominators greater than ninety-nine should be written as numbers rather than words, except at the beginning of a sentence.

Do not hyphenate the following:

fractions used as nouns:

Four fifths of the sample was sand, and one fifth was silt.

Suspended compounds

Hyphenate in these instances:

when a component common to successive compound adjectives is omitted:

first- and second-class fares
medium- to coarse-grained granite
thin- to thick-bedded limestone

Compass points

Compass points consisting of two directions are written as one word:

northwest southeast

Hyphenate after the first point when there are three points:

north-northwest south-southeast
Note also: north-trending, north-northwest-trending, west-central

Single letters, figures, and signs

Hyphenate a letter, figure, or sign, and the word it modifies:

H-bomb	X-ray	24-fold	U-turn
S-wave	Z-fold	$-mark	3-D

Do not hyphenate a unit modifier when the second element in the modifier is a letter or figure:

Class II railroad Type III kerogen Grade A product

Element ratios

Hyphenate element ratios unless they involve isotopes:

U-Pb ratio K-Ar age *but* $^{207}Pb/^{206}Pb$ ^{40}Ar

Dash

There are two kinds of dashes: the *en dash,* which is longer than the *hyphen*, and the *em dash* (space-long dash-space), which is twice as long as an *en dash*:

hyphen - en dash – em dash —

En dash

The *en dash* is used in these cases:

1. to join inclusive numbers or series:

   p. 9–15 W.E. Logan (1798–1875)
   10–15°C January-June

   but -8 to -20°C

2. in compound expressions joining place names:

   the Great Lakes–St. Lawrence Lowlands
   the Laurentide–Greenland ice sheets

3. in joining a one-word noun to a two-word noun in a compound adjective

   a granodiorite–quartz monzonite phase

Em dash

This is usually referred to as the dash, and is a useful, but overworked, punctuation mark. The *em dash* is used in these instances:

1. as the equivalent of, or as a substitute for, parentheses. A pair of dashes sets off material in parenthesis more directly and decisively than a pair of commas:

   The Gadfly Formation — the name is the subject of much controversy — is found at only one locality in the map area.

2. to mark an unexpected turn of thought, particularly one that causes an abrupt break in sentence structure:

   The Englishman must not express great joy or sorrow or even open his mouth too wide when he talks — his pipe might fall out if he did.

   — E.M. Forster

3. to mark the insertion of material that explains, amplifies, complements, or corrects:

   The outcrop consists of limestone, gneiss, and salt — an unlikely combination that had been juxtaposed by faulting.

4. to gather up the subject of a sentence when it is a very long one:

   Rich stores of minerals, good agricultural land, forests stretching over millions of acres, coastal waters teeming with fish, and energetic and enterprising people — all these assure Canada a bright future.

The em dash is not used immediately after a colon, semicolon, or comma.

Question mark

The question mark is used in these cases:

1. at the end of any sentence that is a direct question:

   Where is the contact between the two formations?

2. after every direct question of a series that makes up a single sentence:

   When trying to identify any hand sample, we must ask ourselves these questions: what is the grain size? the texture? the colour? the mineralogy? the rock type?

3. enclosed in parentheses, to express a doubt about the correctness of a statement:

   The quartzite of the Ludding Formation is overlain by fine-grained sandstone of the (?) Packs Formation.

Note:

(?) is a query expressing doubt.
? is a punctuation mark, placed at the end of a question.

Position the (?) carefully in order to define exactly what is questionable:

(?) Lower Devonian	questions the entire statement.
(?)Lower Devonian	questions only Lower.
(?) Silurian–Devonian	questions both ages.
(?)Silurian–Devonian	questions only the Silurian age.

Silurian–(?)Devonian	questions only the Devonian age
(?)[Upper Bathonian]–Callorian	questions only Upper Bathonian

4. to indicate missing digits:

   Stanley Greenshields (1909–198?).

The question mark is not used in the following:

1. after indirect questions:

   The geologist asked the students which formation the samples came from.

2. if the sentence is technically a question but actually a request or command:

   Will you please return my manuscript immediately.

Exclamation mark

The exclamation mark is used in these instances:

1. after true exclamations, which express surprise, fear, or some other emotion:

   What a magnificent specimen!

2. occasionally, enclosed in parentheses, to indicate irony:

   After a long and careful (!) search the assistant tripped on the missing hammer.

The exclamation mark should always be used with restraint.

Quotation marks

The exact words of a speaker or writer are indicated by the use of quotation marks or by a variation in type or indentation. In the latter methods no quotation marks are used. For quotations of less then 50 words or five lines, quotation marks are used. For quotations greater than 50 words, the quoted text is offset, set in smaller type, and no quotation marks are used. Whichever method is used, the author must reproduce in every detail the spelling, punctuation, and other characteristics of the original, even to the extent of reproducing errors, though attention may be called to such mistakes by writing *sic* (Latin meaning 'thus so') in square brackets thus: [*sic*] immediately after the error. Other interpolated matter must be enclosed in square brackets.

1. Quotation marks are used to enclose direct quotations. They are not used with indirect quotations:

   The party chief said, "I think the bear is gone now."
   The student said that, indeed, it had gone.

2. Double quotation marks are used for the main quotation, single ones for inside quotations, and double ones for a third quotation within the matter between single quotation marks. Quoted matter rarely ought to go beyond the third set of quotation marks:

   Walters (1994, p. 12) stated, "The outcrop reported by Kingsley as Green Formation and by Smith as 'probably "upper" Markum' is actually neither of those."

3. Titles of chapters, appendices, articles, essays, lectures, and short poems are placed in single quotation marks. Titles of books, plays, newspapers, journals, periodicals, and magazines given in the text are italicized:

   According to the article 'Coals in the North' in *Fuel*, exploration in the Tuktoyaktuk area should be continued.

4. Single quotation marks are used to enclose technical terms in nontechnical writing, colloquial words in formal writing, nicknames, slang, coined, or humorous words. Care must be taken to use single quotation marks and not the scarcely visible apostrophe marks as a substitute. If the term or word is repeated after the first use, the quotation marks are not required.

   The ore will have to be 'upgraded' to make mining profitable.
   Government policy in the matter has been to 'play it down'.
   Many 'experts' were called into consultation. (The word *experts* is used here in an ironical sense.)

5. Single quotation marks may be used to indicate an informal name or part of a name for a unit, zone, member, or formation:

   This section of the 'upper' Banff Formation is over 500 m thick.

   The 'lower member' consists of sandstone with minor shale.
   In this paper, these strata represent the 'Cadoceras' zone.

6. Matter following the terms *entitled, marked, specified, as, endorsed, signed, indicated as, mentioned as, termed, the word, the name, the term*, is usually either enclosed in single quotation marks or put in italics:

   The word 'greywacke' has had a number of different definitions.
   The use of the name *Turtle Formation* is a matter of some dispute.

7. Quotation marks are not used around a proper name, a company or firm name, or a slogan:

   The field party is grateful to Hector LaChance of Leadwing Helicopters Limited.

8. Quotation marks with other punctuation marks:

   a) *Commas and periods* (full stops) are always within the enclosing quotation marks, whether or not they are part of the quoted material:

      "Study carefully," the professor said, "the section on 'Tectonics', which appears at the end of the book."

   b) A closing *semicolon* or *colon* that was part of the quoted matter should be placed outside the closing quotation marks, or replaced by a *period, comma*, or *ellipsis points* within the quotation marks:

      The original text — *No; you cannot.* — becomes: "No," the captain wrote; "you cannot."

   c) The *question mark* and *exclamation mark* remain true to the original text by appearing within the quotation marks:

      Is the question "What are we doing?" or "What are we going to do?"

   d) The *em dash* is placed inside the quotation marks when it stands for something left unsaid, and outside when it is used as an ordinary punctuation mark:

      "Oh, but I thought — ," the student exclaimed.

"It would be better not to go ahead with it," the field leader said — " the plan may be an utter failure."

e) *Parentheses* are placed outside the quotation marks when the parenthetical clause is quoted, otherwise they are placed inside:

Her very words ("I owe them nothing") indicated her feelings on the matter.

"I realize (and with shame)," he wrote, "that I have neglected them."

f) A *quotation* is separated from the rest of the text by commas, unless the meaning requires other punctuation (*see* examples above).

Parentheses

Parenthesis means literally 'an insertion beside: something outside the basic meaning of the sentence'. The sentence is logically and grammatically complete without the material contained within the parentheses (round brackets).

Parentheses are used in these cases:

1. to set off words of explanation or comment, or an afterthought:

Access to the area is by plane (the landing strips are not always usable), helicopter, or pack horse.

The study by Hopkins (1949) is the best one completed to date.

A complete sentence that stands alone in parentheses starts with a capital letter and ends with a period:

The speaker gave a synopsis of the stratigraphy of the six new formal members. (Detailed measured sections are given in Appendix 5.)

2. to enclose letters or numbers designating items in a series, either at the beginning of a paragraph or within a paragraph:

The objectives of this study are 1) to provide vitrinite reflectance profiles, 2) to provide time-temperature histories, and 3) to assess conditions of bitumen reflectance evolution.

3. For the use of parentheses in systematic paleontology, *see* 'Paleontology'.

Brackets

Square brackets, often simply called brackets, are more disconnective than parentheses. They may be used in these cases:

1. to enclose material inserted into the text by an editor or a critical reviewer, not the author:

The Harvey Formation [referred to as the Landing Formation, below] can be recognized at three localities in the area.

2. to enclose such phrases as [*to be continued*], [*continued on page 10*], [*sic*].
3. to enclose translations of titles.
4. to enclose a second set of parenthetical material inside material already enclosed by parentheses:

(More controversial views were published recently [*see* Smith, 1990; Jones, 1991].)

If the second material is slight, such as an initial or number, it may be enclosed in a second set of parentheses instead or brackets of other shapes such as those used in the mathematics and optics field (braces):

(*see* Smith's (1967) reference to...) (*see* indices of cleavage flakes {001})

Apostrophe

The apostrophe is used as follows:

1. to indicate the omission of letters or numerals:

can't	cannot
doesn't	does not

Be careful to distinguish between *it's* as a contraction of *it is*, and *its*, the possessive pronoun. The first takes the apostrophe; the second does not.

Note that the apostrophe is not used with dates such as the *1980s* or plural abbreviations such as *PGEs*.

2. to form the possessive of nouns not ending in an *s* or *z* sound:

formation's boundaries cliff's edge river's course

If the noun ends in an *s* or *z* sound, the apostrophe alone is used for the possessive:

Davey Jones' Locker	fines' characteristics
provinces' resources	forests' trees

The apostrophe is often omitted in instances where the word is not used in a truly possessive sense:

Prospectors and Developers Association
several minutes delay
seven days leave

Oblique

This punctuation mark, indicated by a diagonal stroke (/) is also known as the *slash, solidus, diagonal,* and *stroke*. Among its many applications, the oblique is commonly used to separate alternatives (*he/she, and/or*), in certain abbreviations (*A/Director* for Acting Director), to indicate singular or plural (*rock/s*), in writing fractions (*3/4*), where it stand for the word *upon*, in writing element ratios ($^{238}U/^{248}Pb$), and NTS area designations (31 M/6), for reporting strike and dip measurements (125°/30°) and isotopic ages (*2658 +9/–8 Ma*), and instead of the word *per (100 km/h)*.

Avoid using dates written as 4/5/97, as this can mean 4th of May or 5th of April 1997.

Note that an en dash is usually used instead of the oblique when time expressions are not successive (1992–97; January–June).

Use *Cretaceous–Tertiary* boundary (*not Cretaceous/Tertiary* boundary), *K-Ar* ratio (*not K/Ar* ratio), and *K-Ar* age (*not K/Ar* age).

Order of punctuation

Double punctuation is used only with abbreviations, quotation marks, run-in side headings, parentheses, and brackets. Difficulty sometimes arises over the order of the punctuation marks when double punctuation is needed.

1. In abbreviations, the period marking the abbreviation comes first and the punctuation mark second.
2. If the abbreviation comes at the end of the sentence, no final period is needed.
3. In run-in side heads, the period may be followed by a dash.
4. If material enclosed in parentheses is not directly related to the statement preceding it and makes a complete sentence, the period goes inside the closing parenthesis and the sentence in parentheses begins with an upper case letter; if it forms part of the sentence, the period goes outside (the same rule applies when using brackets).

For the usage of quotation marks, see the section on 'Quotation marks'.

Selected bibliography

See 'Selected bibliography' at the end of 'Grammar' section.

ABBREVIATIONS

Introduction

Abbreviations in technical publications are generally used in parenthetical and bracketed expressions, tables, figures, footnotes, and bibliographies. It is best to avoid abbreviations in running text although a few, such as *i.e., e.g., viz., AD, BC, BP,* and *Ma*, are permissible. The style of the text is followed in legends, tables of contents, and indexes. If the abbreviation of a term is new or may not be recognized, it is wise to write it in full the first time, with the abbreviated form in parentheses immediately following. Thereafter the abbreviated form may be used by itself.

Abbreviations should not be used at the beginning of a sentence.

> Loss-on-ignition (*not* LOI) data were also collected for these samples.

Several types of construction resemble abbreviations. These include 'contractions' (e.g. *can't*), which are abbreviations that end with the last letter of the word abbreviated (e.g. *Dr.*), and 'clipped forms of words' (e.g. *'phone*). Many abbreviations that are actually clipped forms of words are now accepted and are spelled without any apostrophe, for example, *bus* (omnibus), *cello* (violoncello), *taxi* and *cab* (taximeter cabriolet), and *zoo* (zoological gardens). Other constructions are 'acronyms', 'initialisms', and 'scientific terms' (weights and measures [metric and imperial symbols] and chemical symbols).

A list of abbreviations, including other constructions, is given at the end of this chapter. Approved SI symbols (not abbreviations) appear in the section entitled 'The International System of Units (SI)', popularly referred to as the metric system.

Periods

In recent years, there has been a marked trend toward the deletion of periods from abbreviations for scientific and engineering terms, particularly in tabular matter. When an abbreviation that takes a period comes at the end of the sentence, do not add another period; one performs both functions.

Do not use periods with the following:

1. chemical symbols and mathematical abbreviations: H_2O, cos, log, Ca, Fe
2. SI symbols: L, m, km, Ma
3. abbreviations for points of the compass: NNW (an exception is for an address: 32 Street N.W.)
4. acronyms and initialisms: NATO, UNESCO, GSC, CIMM *but* U.S.A., N.W.T.
5. these Latin words (which are not abbreviations):

via	et	*finis*	par	pro
ad	ex	in	per	*sic*

Plurals

The plurals of most abbreviations are formed by adding an *s* but not an apostrophe:

Dr. Drs.

In GSC publications, however, some abbreviations remain the same in the plural as in the singular:

p. (page, pages)	v. (volume, volumes)
Fig. (Figure, Figures)	pt. (part, parts)
Pl. (Plate, Plates)	no. (number, numbers)

Note that symbols for metric units do not take an *s* in the plural:

1 m	10 m	1 kg	3 kg
1 mm	50 mm	1 L	18 L

Capital letters and hyphens

An abbreviation is capitalized or hyphenated only if the unabbreviated word is capitalized or hyphenated:

Ontario	Ont.	foot-pound	ft.-lb.

Geographic names

The names of provinces, territories, and districts may be abbreviated in addresses when they follow the name of a city, town, village, or geographic feature. These abbreviations may be used in figures and tables where space is limited; however, in GSC publications, they are spelled out:

Toronto, Ontario	Mount Robson, British Columbia

The following abbreviations are used officially for the names of provinces and territories of Canada. Postal symbols, however, do not use periods and are listed here in the third column:

Alberta	Alta.	AB
British Columbia	B.C.	BC
Manitoba	Man.	MB
New Brunswick	N.B.	NB
Newfoundland	Nfld.	NF
Northwest Territories	N.W.T.	NT
Nova Scotia	N.S.	NS
Ontario	Ont.	ON
Prince Edward Island	P.E.I.	PE
Quebec	Que.	QC
Saskatchewan	Sask.	SK
Yukon Territory	Y.T.	YT

Do not abbreviate the words *County, Township, Fort, Mount, North, Point, Island, Port*, and *Saint* when they are part of a proper name, unless the abbreviated form is used in the official name (official spellings can be found in provincial gazetteers and on the Internet at this URL: **http://GeoNames.NRCan.gc.ca/**).

Port Radium
Fort McMurray
Saint John River valley
Saint John, N.B.

but
St. John's, Nfld.

On first use of an organization or program name, put the abbreviation in parentheses immediately following the spelled-out name as it can be used to substitute for the name throughout the text.

See also under 'Abbreviations' in the 'Grammar' section.

Latitude, longitude, and compass directions

Latitude and longitude are never abbreviated where used alone or in ordinary text:

What is the latitude of section 3?

In technical publications and in lists where co-ordinates are given, the abbreviated forms are used:

lat. 42°15′30″N long. 59°17′45″W
lat. 42°15′00″N long. 59°00′00″W

Note that the abbreviations for latitude and longitude are not capitalized.

Compass directions are abbreviated as follows:

N	S	E	W
NE	SW	NNW	ESE

The abbreviations *NE, NW, SE, SW*, may be used to denote town and city divisions in literary text, but the words *north, south, east*, and *west* should always be spelled out.

In designating lands covered by Canada Lands Surveys, abbreviations of the following type may be used in the order shown:

NE ¼ sec., twp. 22, rge. 7, W 3rd mer.
l.s. 16, sec. 29, twp. 22, rge. 7, W 5th mer.
Edith Township, Edith Twp. (on figures)

Acronyms and initialisms

Periods and spaces are omitted between the letters of acronyms and initialisms.

An acronym is a pronounceable word formed from the first letters of a series of words:

DNAG	NAFTA
MORB	SHRIMP
IAGOD	UNESCO

Acronyms also serve to identify commonly used terms, but only after these are defined:

platinum-group elements	PGEs
rare-earth element	REE

An initialism is formed from the first letters of a series of words and may not be pronounceable:

GSA	CIMM
CBC	GAC

PGC	CSPG
CGC	GSC
AAPG	IAEA
but	
U.S.A.	N.W.T.

Use upper case letters for acronyms and initialisms in their entirety, even if some of the component words are not normally capitalized. Acronyms (but not initialisms) formed from company names are an exception:

Stelco	Steel Company of Canada Ltd.

Note that the legal titles of corporate names should be used. Words such as *Company, Corporation, Association*, and *Limited* should not be abbreviated unless they appear in such form in the corporate name. Also, the ampersand (&) should not be used unless it is part of the official name.

Months and days

The names of months are always spelled out in the text and in text footnotes, except when used in citations or references. They may be abbreviated in tabular matter and sidenotes. *May, June*, and *July*, however, should not be abbreviated:

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

The names of the days of the week should not be abbreviated, except in tables:

Sun. Mon. Tues. Wed. Thurs. Fri. Sat.

Parts of the text

Where there is a reference in the text to a large subdivision of a publication (Volume, Number, Part, Book, Section, Chapter), or to a smaller section (Figure, Table, Plate), the word is capitalized and not abbreviated except when referring to a figure in parentheses. Such a word is always followed by a number:

Part 4	Table 10
but	
The locality (Fig. 2) can be....	

The exception is in the figures of a paleontological plate, e.g. *Plate 1, figures 1 to 3* or (Pl. 1, fig. 1–3).

Smaller subdivisions (paragraph, line, page) in the text are written in full, but are not capitalized except in main headings:

The exact location is page 247, line 13.
Notes on pages 17 to 19.

See under 'Capitalization' in the 'Grammar' section for details.

In bibliographies, reference lists, tables, and figures in a plate, words referring to parts of a publication should be abbreviated as follows:

article	art.	page	p.
book	bk.	paragraph	par.
chapter	chap.	plate	Pl.
figure	fig.	part	pt.
section	sec.	number	no.
volume	v.		

The word *Figure* in a legend or caption is not abbreviated:

Figure 2. Hoodoos on the west bank of the Milk River.

The figure caption should be a normal sentence. The article can be omitted in the information that follows the figure number.

A general list of abbreviations

Although the plural of most abbreviations is formed by adding an *s*, in many cases the same abbreviation serves for both the singular and plural forms of a word. This list includes some acronyms, initialisms, and scientific terms. Approved SI symbols appear in their own section. Abbreviations of Latin terms used in paleontology are listed in the section entitled 'Paleontology'.

a	year(s)
abbr.	abbreviation
abstr.	abstract(s)
AD	(*anno Domini*) in the year of our Lord; AD should always be placed before the numerals, e.g. *AD 1066*
adj.	adjective
adv.	adverb
AFM	alkalis-iron-magnesium
a.m.	(*ante meridiem*) before noon
approx.	approximate, approximately
art.	article
a.s.l.	above sea level
assoc.	associate, association
asst.	assistant
ATV	all-terrain vehicle
av.	average
B.A.	Bachelor of Arts
BC	before Christ; BC should always be placed after the numerals, e.g. *500 BC*
bldg.	building
BP	before present (specifically before 1950); BP should always be placed after the numerals, e.g. 11 000 BP
B.Sc.	Bachelor of Science
C	Celsius, carbon
ca.	(*circa*) about (used for dates only, not for measurements)
CAI	Colour Alteration Index
can./CDN	Canada, Canadian
cap.	capital letter (pl. caps.)
c.c.	carbon copy

CC	200
CCC	300
CD-ROM	compact disc–read-only memory
cf.	(*confer*) compare
chap.	chapter(s)
CIS	Commonwealth of Independent States
cm	centimetre
cm^3	cubic centimetre
c/o	care of
col.	column(s)
congl.	conglomerate
cont.	continued
cos	cosine
crit.	critical, criticized
crm	certified reference material
cu.	cubic, e.g. *cu. yd.*
c.v.	(*curriculum vitae*) summary of a career (résumé)
ddh	diamond-drill hole
deg.	degree(s)
del.	delete
dept.	department
dia.	diameter
DNAG	Decade of North American Geology
doz.	dozen
Dr.	Doctor, Drive
D.Sc.	Doctor of Science
ed.	editor(s), edited
e.g.	(*exempli gratia*) for example
Eh	standard oxidation-reduction potential
EM	electromagnetic
et al.	(*et alii, et aliae*) and others (in citation of references)
etc.	(*et cetera*) and the rest, and so forth, and the remaining things
et seq.	(*et sequens*) and the following
ext.	extension, extinct, external
Fig./fig.	figure(s)
f./F.	fault/Fault
Fm	Formation
ft.	foot (feet)
g	gram(s)
G	giga, 10^9 the SI symbol for a billion
Ga	thousand million (i.e. 10^9) years; Ga should always be placed after the numerals, e.g. *2.5 Ga*
gal.	gallon(s)
geol.	geology, geologist, geological
Gp	Group
GSC	Geological Survey of Canada
GSC loc.	Geological Survey of Canada locality, e.g. *GSC loc. C-25304*
h	hour(s)
ha	hectare
hf.	half

hp	horsepower
HREE	heavy rare-earth element (pl. HREEs)
ht.	height
Hwy	Highway
I.	Island(s), Isle(s)
ibid.	(*ibidem*) in the same place (Note: do not use for references, except when pages, figures, tables, etc. have been cited above in a reference, and you wish to refer to the same page or figure.)
id.	(*idem*) the same, as mentioned before
i.e.	(*id est*) that is (not followed by a comma)
in.	inch (inches)
inst.	institute(s), instant
int.	international, interior
ISBN	International Standard Book Number
ital.	italic
itin.	itinerary
Jr.	junior
k	kilo, 10^3; the SI symbol for a thousand
ka	thousands of years before the present
K-Ar	potassium-argon
kbar	kilobar (1 kbar = 0.1 kPa)
KB	kelly bushing
KE	kinetic energy
km	kilometre(s)
km/h	kilometres per hour
L	litre(s) (The symbol *L* for *litre(s)* is used to distinguish this symbol from the numeral *1*.)
L.	Lower
Lab.	Labrador
lat.	latitude
lb.	pound(s)
l.c.	lower case
loc. cit.	(*loco citato*) in the place cited (requires a publication and page reference)
log	logarithm
LOI	loss on ignition
long.	longitude
LREE	light rare-earth element (pl. LREEs)
l.s.	legal survey
lst	limestone
m	metre(s)
mo.	month(s)
M	mega, 10^6; the SI symbol for a million
Ma	million years; Ma should always be placed after the numerals, e.g. 500 Ma. Note that the GSC uses the symbol Ma (millions of years ago or before present) to indicate an age or date, and also to indicate a time interval or age difference. **The GSC does not use the abbreviation m.y.**
M.A.	Master of Arts
mag.	magazine
max.	maximum
Mb	Member

memo	memorandum
mer.	meridian
Mes.	Mesozoic
min	minute(s)
misc.	miscellaneous
mm	millimetre
mol %	molecular per cent
MORB	mid-ocean-ridge basalt
m.p.	melting point
Mr.	Mister – title of a man
Ms.	Miz – title of woman
m/s	metres per second
M.Sc.	Master of Science
MSWD	mean standard weighted deviate
Mt.	Mount (pl. Mts.)
Mtn.	Mountain (pl. Mtns.)
mV	millivolt
mW	milliwatt
n.	note, noun
n.a.	not applicable, not available
N. Amer.	North America
NB	(*nota bene*) note well
n.d.	no date given, no data, not determined
no.	number(s)
NTS	National Topographic System
OD	Ordnance datum
OGS	Ontario Geological Survey
op. cit.	(*opere citato*) in the work, article cited (no page reference). Use for general reference to articles by authors cited earlier in the same paragraph or page. Do not use (ibid.) as a substitute for (op. cit.)
org.	organic, organization
p.	page(s)
Pal.	Paleozoic
paleont.	paleontology
pen.	peninsula
pers. comm.	personal communication (give date)
PGE	platinum-group element (pl. PGEs)
pH	measure of hydrogen ion concentration; acidity or alkalinity
Ph.D.	Doctor of Philosophy
Pl.	Plate(s)
pl.	plural
p.m.	(*post meridiem*) after noon
ppb	parts per billion (i.e. 10^9)
ppm	parts per million (i.e. 10^6)
PC	Precambrian
pref.	preface, preference
prep.	preposition
Prof.	Professor
proc.	proceedings
Prov.	Province
prov.	provisional

PS	(*post scriptum*) postscript (pl. PSs)
Pt.	Point, Port
pt.	part(s), point
pub.	publication, publish, published
q.e.	(*quod est*) which is
QED	(*quod erat demonstrandum*) which was to be demonstrated
QFM	quartz-feldspars-mafics
qtz	quartz
qtze	quartzite
quad.	quadrant
q.v.	(*quod vide*) which see; refers to singular
R.	River
RAM	random-access memory
Rb-Sr	rubidium-strontium
R&D	research and development
Re	Reynolds number
re	with regard to. This preposition is a contraction of the Latin *in re*, meaning 'in the matter of'.
rec.	receipt, record
REE	rare-earth element (pl. REEs)
ref.	reference
rel.	relative
repr.	reprint
rept.	report
res.	research
rge.	range
R_{max}	mean maximum reflectance
R_o	reflectance in oil
ROM	read-only memory, Royal Ontario Museum
rom.	roman type
r.p.m.	revolutions per minute (in scientific or technical work, rev/min is used)
RR	railroad, rural route
Rwy.	railway
s	second(s)
s.a.	(*sine anno*) without date
sb.	substantive
s.c.	small capitals (sc in proof correction)
sci.	science, scientific
SD	standard deviation
sec	secant
sec.	section(s)
SEM	scanning electron microscope
sg	specific gravity
sh	shale
SHRIMP	sensitive high-resolution ion microprobe
SI	Système international d'unités (International System of Units)
slts	siltstone
sing.	singular
s.l.	(*sensu lato*) in the broad sense
sp.	species, specimen(s) (pl. spp.)
sq.	square, e.g. *sq. in., sq. ft., sq. yd.*

Sr.	senior
ss	sandstone
s.s.	(*sensu stricto*) in the strict narrow sense
St.	Street, Saint
Sg.	Supergroup
suppl.	supplement
syn.	synonym, synonymous
syst.	system
T	temperature
t	metric ton = tonne
TAI	Thermal Alteration Index
tan	tangent
TD	total depth in a well
tr.	translation
twp., Twp.	township, Township
u.c.	upper case
U-Pb	uranium-lead
U.	Upper
U.S.A.	United States of America
USGS	United States Geological Survey
UTM	Universal Transverse Mercator
UV	ultraviolet
v.	volume(s)
var.	variety
vb.	verb
viz.	(*videlicet*) namely, to wit, it is permitted to see
vol %	volume per cent (used only in tables)
vs.	(*versus*) against
v.v.	vice versa
wt %	weight per cent (used only in tables)
XRD	X-ray diffraction
XRF	X-ray fluorescence
yd.	yard(s)

THE INTERNATIONAL SYSTEM OF UNITS (SI)

Introduction

The International System of Units (Système international d'unités, abbreviated SI in all languages), which is in use in most European countries, has been adopted by Canada, and is popularly called the metric system. This system of weights, measures, and physical quantities is decimal throughout.

The SI units are of three kinds: base, supplementary, and derived. There are seven base units, one for each physical quantity, and two supplementary units (Table 1). Derived units are obtained by the multiplication and division of base and supplementary units. Several of these derived units have been given special names and symbols (Table 2), and can be expressed in terms of other units and base units (Table 3). Table 4 gives examples of SI prefixes and symbols. Several conversion factors are listed in Table 5. Some units continue to be used with SI (Table 6), whereas other units should not be used (Table 7).

General rules for writing unit symbols, names, and numbers

1. The symbols are always in upright type, usually roman type.
2. Symbols remain unaltered in the plural.
3. Symbols are written without a period, except at the end of a sentence.
4. When the symbol for a unit comprises letters, a full space is left between the number and symbol, e.g. *45 kg*, except when the first character of a symbol is not a letter, e.g. *32°C*.
5. Symbols for SI units should always be used; unit names should not be written out except in general terms such as *several metres west*. Names and symbols should not be mixed.
6. In North America, a period or dot is used as the decimal marker, and should be positioned in line with the base of the numerals. Outside of North America and in French text, the comma is used in place of the period.
7. In numbers with many digits, the numbers are broken into readable blocks of three digits each starting from the right and left of the decimal point, e.g. *1 000 000*. No space is left in a four-digit number (e.g. *1000*) except for uniformity where four-digit numbers occur in tables.
8. When a decimal fraction is used, a zero should always be placed to the left of the decimal marker, e.g. *0.78 g*.

Multiplication and division of units

The product of two or more units in symbolic form is indicated by a dot that occurs above the base of the line of text. The dot may be placed at the base of the line of text if the software used to generate the text cannot accommodate special symbols. For example, $N{\cdot}m$ (newton metre) and $N.m$ are both acceptable. However care must be exercised as $N.m$ means newton metre, but mN means millinewton: $m{\cdot}s^{-1}$ means metre per second, but ms^{-1} means reciprocal millisecond.

To express a compound formed by division, an oblique, a horizontal line, or a negative power with a dot to indicate multiplication may be used. For example, m/s, $\frac{m}{s}$, or $m{\cdot}s^{-1}$

The oblique must not be repeated in the same expression. For example, m/s^2, but not *m/s/s*.

Where the names of units are used, multiplication is indicated by a space and division, by the word 'per'. For example, *pascal second*, and *kilograms per square metre*, respectively.

Table 1. SI units with their names and symbols.

Physical quantity	Unit name	Unit symbol
length	metre	m
mass	kilogram	kg
time	second	s
electric current	ampere	A
thermodynamic temperature	kelvin	K
amount of substance	mole	mol
luminous intensity	candela	cd
plane angle	radian	rad
solid angle	steradian	sr

Table 2. SI derived units with special names and symbols.

Physical quantity	Unit name	Symbol	Definition of SI unit	Equivalent forms of SI unit
energy work	joule	J	$m^2 \cdot kg \cdot s^{-2}$	$N \cdot m$
force	newton	N	$m \cdot kg \cdot s^{-2}$	$J \cdot m^{-1}$
pressure stress	pascal	Pa	$m^{-1} \cdot kg \cdot s^{-2}$	$N \cdot m^2$
power	watt	W	$m^2 \cdot kg \cdot s^{-3}$	$J \cdot s^{-1}$
electric charge	coulomb	C	$s \cdot A$	$s \cdot A$
electric potential difference	volt	V	$m^2 \cdot kg \cdot s^{-3} \cdot A^{-1}$	$W \cdot A^{-1}$
electric resistance	ohm	Ω	$m^2 \cdot kg \cdot s^{-3} \cdot A^{-2}$	$V \cdot A^{-1}$
electric conductance	siemens	S	$m^{-2} \cdot kg^{-1} \cdot s^3 \cdot A^2$	$A \cdot V^{-1}$
electric capacitance	farad	F	$m^{-2} \cdot kg^{-1} \cdot s^4 \cdot A^2$	$C \cdot V^{-1}$
magnetic flux	weber	Wb	$m^2 \cdot kg \cdot s^{-2} \cdot A^{-1}$	$V \cdot s$
magnetic flux density	tesla	T	$kg \cdot s^{-2} \cdot A^{-1}$	$Wb \cdot m^{-2}$
inductance	henry	H	$m^2 \cdot kg \cdot s^{-2} \cdot A^{-2}$	$Wb \cdot A^{-1}$
luminous flux	lumen	lm	$cd \cdot sr$	$cd \cdot sr$
illuminance	lux	lx	$m^{-2} \cdot cd \cdot sr$	$lm \cdot m^{-2}$
frequency	hertz	Hz	s^{-1}	s^{-1}
activity of radionuclides	becquerel (replaces currie)	Bq	s^{-1}	s^{-1}
absorbed dose (of ionizing radiation)	gray (replaces red)	Gy	$m^2 \cdot s^{-2}$	$J \cdot kg^{-1}$

Table 3. Examples of some SI derived units and derived symbols.

Physical quantity	SI unit	Symbol
mass	gram	g
length	kilometre	km
length	centimetre	cm
length	millimetre	mm
length	micrometre	µm
area	square metre	m^2
area	hectare	ha
volume	cubic metre	m^3
volume	cubic centimetre	cm^3
magnetic field strength	ampere per metre	$A \cdot m^{-1}$
pressure	kilopascal	kPa
time	thousand years	ka
time	million years	Ma
time	10^9 years	Ga
grade of ore	grams per tonne	$g \cdot t^{-1}$

Table 4. SI prefixes and symbols.

Multiple	Prefix	Symbol	Multiple	Prefix	Symbol
10^{-1}	deci	d	10	deca	da
10^{-2}	centi	c	10^2	hecto	h
10^{-3}	milli	m	10^3	kilo	k
10^{-6}	micro	µ	10^6	mega	M
10^{-9}	nano	n	10^9	giga	G
10^{-12}	pico	p	10^{12}	tera	T
10^{-15}	femto	f	10^{15}	peta	P
10^{-18}	atto	a	10^{18}	exa	E

Table 5. Conversion factors for some common units.

Unit name	Conversion factor
1 inch	= 2.54 cm
1 foot	= 0.304 8 m
1 mile	= 1.609 344 km
1 mile (international nautical)	= 1.852 km
1 square inch	= 645.16 mm^2
1 square foot	= 929.030 4 cm^2
1 square mile	= 2.589 988 km^2
1 acre	= 0.404 685 6 ha
1 cubic inch	= 16.387 064 cm^3
1 cubic foot	= 28.316 85 dm^3
1 ounce (avoirdupois)	= 28.349 523 g
1 ounce (troy)	= 31.103 476 8 g
1 pound	= 0.453 592 37 kg
1 fluid ounce	= 28.4 mL
1 ton (short, 2000 lb)	= 0.907 184 74 Mg
1 ton (long, 2240 lb)	= 1.016 046 908 8 Mg
1 tonne	= 1.102 311 short tons
1 tonne	= 0.984 206 5 long tons
1 kilobar	= 10^5 kPa
1 atmosphere	= 101.3 kPa
Fahrenheit temperature	= 1.8 °C + 32
Celsius temperature	= 0.555 (°F-32)
1 centimetre	= 0.393 700 7 inches
1 metre	= 3.280 839 8 feet
If the values were not recorded originally in SI units, the equivalent should be given in parentheses (e.g. the section was 421 ft. (128 m) thick.)	

Table 6. Some units that continue to be used with SI.

Physical quantity	Unit name	Symbol	Definition of unit
time	minute	min	60 s
time	hour	h	60 min = 3600 s
time	day	d	24 h = 86 400 s
time	year	a	–
angle	degree	°	(π/180) rad
angle	minute	′	(π/10 800) rad
angle	second	″	(π/648 000) rad
volume	litre*	L	1 dm^3
temperature	degree Celsius	°C	1 K
mass	tonne	t	10^3 kg = 1 Mg
*The 'L' is used in North America, both alone and with a prefix			

Table 7. Some units that should not be used with SI.

Physical quantity	Unit name	Symbol	Definition of unit
length	ångström	Å	10^{-10} m = 10^{-1} nm
length	micron	μ	10^{-6} m
force	dyne	dyn	10^{-5} N
pressure	torr	Torr	(101 325/760) Pa
pressure	bar	bar	10^{5} Pa
energy	calorie	cal	4.1868 J
energy	erg	erg	10^{-7} J
dynamic viscosity	poise	P	10^{-1} Pa·s
kinematic viscosity	stokes	St	10^{-4} $m^2 \cdot s^{-1}$
conductance	mho	mho	1 S
magnetic field strength	oersted	Oe	$\frac{1000}{4\pi}$ $A \cdot m^{-1}$
magnetic flux	maxwell	Mx	0.01 μWb
magnetic flux density	gauss	Gs, G	10^{-4} T
magnetic induction	gamma	γ	10^{-9} T

Selected bibliography

Berkman, D.A. and Ryall, W.R. (ed.)
1982: Field geologists' manual; Australasian Institute of Mining and Metallurgy, Monograph Series no. 9 (second edition).

Canadian Standards Association
1980: Glossary of metric units; CSA Special Publication, 2351-1980, Canadian Standards Association, Rexdale, Ontario, 57 p.
1980: Metric editorial handbook; Canadian Standards Association, CSA Special Publication Z372-1980, Rexdale, 46 p.
1989: Canadian metric practice guide; Canadian Standards Association, CAN/CSA-Z234.1-89 (reaffirmed 1995), Rexdale, Ontario, 82 p.

National Bureau of Standards
1977: The International System of Units (SI); National Bureau of Standards, Special Publication 330, United States Government Printing Office, Washington (translation of 'SI Le Système International d'Unités').

Royal Society of London
1975: Quantities, units, and symbols; Royal Society of London, 54 p. (second edition).

PALEONTOLOGY

Introduction

In publications of the Geological Survey of Canada, there are two ways of documenting the occurrence of fossils in an area: by formal, systematic descriptions or taxonomic remarks, or by less formal lists of fossil names.

In the latter form, Survey paleontologists or outside consultants may provide lists of fossil names and scientific interpretations, usually in the form of unpublished Fossil Reports, which subsequently may be included in the reports of other Survey scientists. If they are so included, the paleontologist who identified the fossils should be named in the text, as he or she is responsible for the accuracy of the lists, as well as any opinions on age and correlation that might be derived from the fossil identifications. Also, before a manuscript that incorporates a paleontologist's data and interpretations is submitted to the scientific editor, the paleontologist must be given an opportunity to check and update, if necessary, the relevant sections. A preamble to every Fossil Report (*see* below) is a reminder to users of the data that this is a condition that must be met. If the paleontologist's contribution is substantial, it should be included as an appendix under his or her authorship. In addition, the GSC locality numbers of the fossil occurrences must be cited in the text. Before publication, the accuracy and completeness of the curatorial data should be checked by a curator appointed by the Chief Paleontologist.

Systematic descriptions

Systematic descriptions of genera and species should conform with accepted international standards and should include, preferably in the following order:

1. name of taxon, including authorship (date not necessary if in synonymy);
2. plate and figure, and figure numbers;
3. synonymy (*see* below);
4. derivation of name (if a new taxon);
5. if it is a new genus, designation of a type species (zoological), or a type (botanical);
6. if it is a new species, designation of a holotype and any other type specimens used in the description of the species. This should immediately follow the diagnosis or description according to recommendations of the International Code of Botanical Nomenclature (ICBN).
7. diagnosis (for a new taxon) or description. Under the ICBN a new taxon may be accompanied by a description or diagnosis. Authors are encouraged to use telegraph style (omitting verbs, articles, complex sentences) in systematic descriptions. This saves a considerable amount of space, and results in succinct descriptions.
8. discussion or remarks, to include the means by which a new taxon is differentiated from similar, previously named taxa;
9. material: to include GSC type specimen numbers and GSC locality numbers. For example, 'Hypotype GSC 65111 from GSC loc. C-60126'.

   Several independent series of numbers exist for GSC paleontological collections, and it is essential that they be used carefully and consistently to avoid confusion for the reader and future workers. Some are designated by prefixes. Specimens catalogued in the National Type Collection of Invertebrate and Plant Fossils contain a prefix including the nature of the type

specimen followed by the abbreviation 'GSC' - eg. 'Hypotype GSC 65111'. Numbers for type specimens can be supplied by the Curator of the National Type Collection or by the Chief Paleontologist.

GSC locality numbers generally refer interchangeably to collecting localities and to the samples that derive from those localities, and are preceded by 'GSC loc.' or 'GSC locality'. As a general rule, numbers with a 'C-' prefix indicate samples curated by GSC Calgary, 'D-' for those in Dartmouth, and 'O-' for those curated recently in Ottawa, from GSC loc. O-102540 onward. Numbers for collections and locality data can be supplied by the curator at each regional office. Samples previously curated in Ottawa without prefixes retain their original (i.e. unprefixed) numbers, and terminate with GSC loc. 102397. The discontinued numbers in the old plant locality series are designated by the prefix 'GSC plant locality'. Publications should not include the one or more '0's (zeros) that have been introduced prior to the digits in order to satisfy requirements for certain digital data systems in the early stages of development of a computerized curation system.

There is a great risk of confusion with these different numbering systems. Please consider that clarify for the reader is paramount, even if a slightly longer explanation is needed to ensure that clarity. The numbers published should be those that appear on the specimen itself and in existing available catalogues, unpublished notes, and publications, in order to prevent confusion by future scientists and to provide a unique and consistent number throughout the historical treatment of the specimens and the localities.

Publication of illustrations or designation of individual specimens requires that they be placed into a valid type specimen repository, and it is an expectation that Canadian specimens will be placed into a Canadian repository. The National Type Collection is most appropriate for specimens treated in GSC publications.

10. illustration: at least one illustration showing the essential characters of the taxon, or a reference to a previously published illustration.

11. According to the ICBN, the name of a new taxon must be accompanied by a description or diagnosis, designation of holotype, and indication of repository. In addition, from 1996 the name of a new fossil plant taxon must be accompanied by a description or diagnosis in English or Latin (Art. 36.3). If this information is not included, the name will be invalid.

A synonymy is appropriate and necessary for many systematic descriptions. An adequate synonymy, published with the description of new material, is one of the bases for the author's concept of the taxon. It should contain citations verified by the author from original publications. Synonyms may be listed by publication date or by taxon name. There are some differences between zoological and botanical nomenclature and so examples are given for both sciences. Synonyms may be preceded by qualifier abbreviations. Zoological synonyms may be preceded by Richter notations (Matthews, 1973), which should be explained in the text (e.g. vp* in the following examples). The following forms of synonymy are recommended for use in Geological Survey of Canada publications:

1895 *Lytoceras (Gaudryceras) politissimum* KOSSMAT, p. 128, Pl. 15, fig. 7a-c.

cf. 1909 *Lytoceras (Gaudryceras) politissimum* Kossmat. KILIAN and REBOUL, p. 14, Pl. 1, fig. 7, 8.

aff. 1979 *Anagaudryceras politissimum* (Kossmat). KENNEDY and KLINGER, p. 154, Pl. 5, fig. 3, Pl. 7, fig. 2A-D, F.

vp* 1985 *Anagaudryceras politissimum* (Kossmat). MATSUMOTO, p. 23, Pl. 3, fig. 1-6, Pl. 5, fig. 5-8.

or:

?*Astropentagnathus irregularis* MOSTLER, 1967, p. 298-300, Pl. 1, fig. 4.

Astropentagnathus irregularis Mostler. OVER and CHATTERTON, 1987, p. 10, Pl. 2, fig. 2, 3; cf. MÄNNIK and VIIRA, 1990, Pl. 17, fig. 24.

vp* *Hadrognathus irregularis* (Mostler). SCHÖNLAUB, 1971, p. 42, 43, Pl. 1, fig. 4, 11.

Either of the styles of zoological synonymy given above may contain annotations in brackets:

e element

Oistodus nevadensis ETHINGTON and SCHUMACHER, 1969, p. 467, 468, Pl. 68, fig. 1-4, Fig. 5C (part.).

Multi-element

Ansella nevadensis (Ethington and Schumacher). FÅHRÆUS and HUNTER, 1985, p. 1175, 1176, Pl. 1, fig. 7, 10 (= *e, b* elements), Pl. 2, fig. 11a-b, 13a-b, 14 (= *b, e, c* elements), Fig. 2a-c (= *e, c, b* elements; includes synonymy); vp* BERGSTRÖM, 1990, p. 25, Pl. 1, fig. 11-14.

non *Belodella* sp. STOUGE *in* STOUGE and BOYCE, 1983, Pl. 6, fig. 2-8 (fig. 2, 3 = *c, f* elements of *A. sinuosa*; fig. 4-8 = *c, a, e, f, b* elements of *A. jemtlandica*).

The botanical style immediately below lists the synonyms by publication date:

1932 *Sporonites bireticulatus* IBRAHIM *in* POTONIÉ et al., p. 447, Pl. 14, fig. 1.

1933 *Reticulati-sporites bireticulatus* IBRAHIM, p. 35, Pl. 1, fig. 1.

1934 *Reticulata-sporites bireticulatus* (Ibrahim) LOOSE, Pl. 7, fig. 28.

1955 *Reticulatisporites mediareticulatus* auct. non Ibrahim. KNOX, p. 323, Pl. 18, fig. 253.

1967 *Dictyotriletes bireticulatus* (Ibrahim) Potonié & Kremp, 1955, emend. SMITH & BUTTERWORTH, p. 194, 195, Pl. 11, fig. 14, 15.

Note that in this botanical example, a period is not placed between '(Ibrahim)' and 'LOOSE' in the 1934 citation because this represents a recombination of Ibrahim's species by Loose. If it were simply a citation of the Ibrahim species by Loose, a period would follow the former author's name. This example also illustrates the use of abbreviations (discussed elsewhere), and the importance of citing the taxonomic name verbatim (e.g. including hyphens).

Under the ICBN, a misidentification should be followed by the words 'auct. non' and then the name(s) of the original author(s) and full bibliographic reference of the misapplied name. If the misidentified taxon is a synonym, its citation should be included within the synonymy:

1955 *Vallatisporites ciliaris* (auct. non Luber) SULLIVAN, p. 370, Pl. 59, fig. 14, 15, Fig. 3.

or:

1963 *Klukisporites pseudoreticulatus* auct. non Couper: SAAD, p. 121, Pl. 34, fig. 31.

If it was formerly mistakenly regarded as a synonym, or could be regarded erroneously as such because of its misapplied name, its citation should not be included in the synonymy, but listed after it, preceded by 'non':

non 1955 *Vallatisporites ciliaris* (auct. non Luber) SULLIVAN, p. 370, Pl. 59, fig. 14, 15, Fig. 3.

Taxonomic remarks

Systematic treatment may not be needed for some taxa. A taxon may be illustrated but not included in the systematic descriptions because no new or significant information is available. Conversely, a taxon may be discussed in the text but not illustrated, in which case it may be appropriate to include the discussion within a section titled 'Taxonomic Remarks' or 'Taxonomic summaries', with only a minimum of information provided, for example name and authorship of the taxon; Plate and figure, and Figure numbers; and GSC type specimen numbers (e.g. GSC Bulletin 417, p. 46-47).

Fossil reports

Fossil Reports are numbered, unpublished reports by Survey paleontologists and outside consultants that identify and/or discuss fossils submitted by collectors. The Fossil Report numbering system includes author initials, year, and commonly abbreviations for geological ages (e.g. Fossil Report No. J2-1991-TTP, or Fossil Report No. 002-GSN-1991). To assist in the cataloguing of the reports, their titles should be as detailed as possible, including number of fossil collections, geological age, geographic provenance (e.g. geographic name, province, or territory), complete NTS number, year of collection or (re)submission, and name and institutional affinity of the person requesting the report. Where practical, fossil group and stratigraphic unit are useful additions to the title:

> Report on 6 Silurian conodont samples from the Allen Bay Formation, Ellesmere Island, District of Franklin, Northwest Territories, collected by T. de Freitas (University of Ottawa) in 1989 (NTS 49D/10, 49D/16, 49F/8).

Immediately following the title of the Fossil Report is the preamble, or qualifying statement, which may vary, depending on the GSC Division. For example, the Cordilleran Division uses the following disclaimer:

> All references to paleontological data and age determinations must quote the authorship of the report, and the unique GSC locality number of the fossil collection.
>
> Reference to, or reproduction of, paleontological data and age determinations in publications must be approved by the author of the Fossil Report prior to manuscript submission. Substantial use of paleontological and age data in publications should be reflected in the authorship.

In order that curators of GSC collections may update the records to show that a Fossil Report was generated for the localities cited, it is useful (especially in lengthy reports) to list on the first page the GSC locality numbers (e.g. 'Material: GSC loc. C-105021 to C-105055').

Formal and informal scientific names

Generic, trivial (species), and subtrivial (subspecies) names should be underlined or italicized in the author's typescript and italicized in the published report. This applies also to tabulated lists and to the adjectival use of names to denote biostratigraphic or chronostratigraphic units (e.g. *Calvustrigis rutherfordi* Zone). If the author does not wish to follow these recommendations, he or she should explain in the manuscript the rationale for not doing so.

When the names of such taxa are used as part of formal lithostratigraphic or paleogeographic terms, they are not italicized in common practice (e.g. Bakevellia Sea, Carbonicola Bed). However, the International Stratigraphic Guide (Hedberg, 1976) recommends that the printing of fossil names for stratigraphic units should follow the rules of the ICZN and ICBN (i.e. italics should be used in GSC publications).

Names of suprageneric taxa are not italicized but are written with a capital initial letter. If the names are used informally as English nouns or adjectives, they should not be capitalized:

> Chonetidae, Ammonoidea, Mollusca, Arthropoda, Ostracoda, Foraminifera, chonetids, ammonites, molluscs, arthropod burrows, ostracodes, foraminifers.
>
> 'The genus *Spirifer* is in the family Spiriferidae, which includes the true spirifers.'

Informal reference to the following suprageneric categories can be indicated by the appropriate termination:

Order:	Pentamerida	pentamerid(s)
Superfamily	Atrypacea	atrypacean(s)
Family:	Atrypidae	atrypid(s)
Subfamily:	Atrypinae	atrypin(s)

Formal scientific names of fossils should conform to the rules and recommendations of the relevant code — the ICZN (International Code of Zoological Nomenclature) or the ICBN (International Code of Botanical Nomenclature) — which are based on the binomial Linnean system, first used by the Swedish naturalist Carl von Linné (Carolus Linnaeus) in 1758. In this system, each species name is a binomial, a combination of two latinized names: 1) the generic, or genus name; and 2) the trivial, or species name, which always follows the generic name. Authors of new names should familiarize themselves with the appropriate code.

If a trivial or subtrivial name is an adjective and not used as a substantive, it must agree in gender with the genus name. It may therefore be necessary to change the endings of adjectival trivial or subtrivial names when a species is reassigned to another genus. For example, if *Peneckiella salternensis* were transferred to the genus *Phacellophyllum*, it would become *Phacellophyllum salternense*.

Abbreviation of scientific names

A **generic name** may be abbreviated to the initial letter followed by a period, for the second and subsequent citations in a single context, but only under conditions that leave no ambiguity. However, at the beginning of a sentence, which should never begin with an abbreviation, the genus name should be written in full (e.g. '*Baculites compressus* is elongate').

The name of a subdivision of a genus is placed in parentheses following the generic name, e.g. *Scaphites (Hoploscaphites) constrictus*. Subsequent citations may be written as *S. (H.) constrictus*. This form may be used in both zoological and botanical citations. However, according to the ICBN, in normal citation the subdivisional name consists of the generic name and a subdivisional epithet connected by a term, as for example *Costus* subg. *Metacostus*.

A **trivial name** follows the generic name and begins with a lower case letter. It may be abbreviated only when followed by a subtrivial name (*see* below). It is not recommended that the trivial name alone be used in citations of biostratigraphic units (e.g. *compressus* Zone). Instead, *Baculites compressus* Zone, or *B. compressus* Zone should be used.

A **subtrivial name** always follows the species name, and its first letter, like that of the trivial name, is always lower case. In zoological citations it may be written as *Coelospira exilicosta orbita* or as *C. e. orbita* for subsequent citations. In botanical citations, the subspecies (or other infraspecific) name is connected to the species name by a term denoting its rank. For example: *Stachys palustris* subsp. *pilosa*.

Author citation

In taxonomic studies, the name(s) of the author(s) and the date of publication for each genus or taxon of lower rank should be cited at least once in the text, preferably at first mention of the taxon, and may be omitted subsequently, provided no confusion is caused. According to the ICZN, the name(s) of the author(s) should not be abbreviated except, optionally, where the author(s) are known by the abbreviated name (e.g. 'L.' for 'Linnaeus'). This topic is discussed under ICBN recommendations - not Articles, but the practice of author abbreviation in GSC reports is not encouraged.

The author's name should follow the name of the taxon without any intervening mark of punctuation. There should be a comma between the author's name and the date. For example: *Orthis umbella* Barrande, 1848; *Cubiceps gracilis* (Lowe, 1843). In these examples, the dates are parts of the species names and thus do not constitute publication citations.

When a zoological species has been transferred from the original genus to another genus, the authors' name (and where necessary, date of publication) is in brackets. For example: *Paltodus recurvatus* Rhodes is now *Panderodus recurvatus* (Rhodes). New combinations under the ICBN must contain the name(s) of the original author(s) in parentheses, followed by the name(s) of the combining author(s) and date of publication. For example: *Baltisphaeridium bimarginatum* (Timofeev) Downie & Sarjeant, 1965.

The ICBN recommends that the names of two joint authors of a taxon be joined by 'et' or an ampersand (&) instead of 'and'. Where there are more than two joint authors, the citation should consist of the first author, followed by 'et al.', with no punctuation between the author's name and 'et al.'. Where an author has described a botanical or zoological taxon in a work by another author, in should be used:

Grandispora longa Chi & Hills or *Grandispora longa* Chi et Hills

Retusotriletes phillipsii Clendening et al.

Spirifer albertensis Warren *in* Allan et al.

Comments on, or additions to, determinations should not be italicized, but should be in square brackets:

Opoa adamsi [juv.]

Cherurus [sic] *insignis* (i.e. error in the spelling of *Cheirurus*)

Nucula chassyana d'Orbigny [Cottreau, 1925, Pl. 40, fig. 1, 2 only]

New genus, new species

The first time a new genus is cited in both the abstract and the text, it should be followed by 'gen. nov.', or 'gen. n.', or 'n. gen.', in roman type (e.g. *Jasperella* gen. nov.). Similarly, the first time a new species is cited in both the abstract and the text, it should be followed by 'sp. nov.', or 'sp. n.', or 'n. sp.' (e.g. *Acanthoscapha brevicristata* n. sp.). If the species cited belongs to a new

genus, the citation should be followed by 'gen. et sp. nov.', or 'gen. et sp. n.' or 'n. gen. et sp.'. References to new taxa in the plate and figure captions should also include these abbreviations. The author should ensure that the abbreviations chosen are consistent throughout the manuscript.

Open nomenclature

In the identification of fossils, varying degrees of confidence of identification can be expressed by using qualifiers. In order to provide some degree of uniformity, the following usages should be followed (*see* Bengston, 1988). The use of qualifiers between the generic and specific names is not regulated by the ICBN or ICZN and thus usages differ amongst authors. For example, *Leptaena* sp. cf. *L. rhomboidalis* ('a species of *Leptaena* compared to *Leptaena rhomboidalis*') may also be written *Leptaena* cf. *L. rhomboidalis* ['a species (implied) of *Leptaena* compared to *Leptaena rhomboidalis*']. Note that terms used to qualify taxonomic determinations are not in italics:

Leptaena sp. aff. *L. rhomboidalis* (Wilckens) — closely related to *L. rhomboidalis* but probably a new species.

Leptaena sp. cf. *L. rhomboidalis* (Wilckens) — similar to *L. rhomboidalis* and possibly conspecific with it.

"*Leptaena*" *concava* Hall, *Leptaena* "*rhomboidalis*" (Wilckens) — quoted names are used in an obsolete or probably incorrect sense.

Leptaena concava Hall sensu lato — in the broad, or general, sense of *L. concava* (in this form, 'sensu lato', and 'sensu stricto', should not be italicized).

Leptaena concava sensu Hall — in the sense of, or as interpreted by, Hall.

When the interrogation mark is used in any of the following ways, it is not italicized (or underlined in the typescript):

Leptaena? *concava* Hall — identification at the generic level in doubt, but species identification believed to be correct.

Leptaena concava? Hall — original identification at the species level in doubt, but generic identification believed to be correct.

Leptaena concava Hall? — subsequent (or present) species identification in doubt.

?*Leptaena concava* Hall — whole identification doubtful.

?*Leptaena* sp. cf. *L. rhomboidalis* — whole identification doubtful.

Documentation in publications and reports

Apart from the internationally recommended formal requirements of systematic paleontology, it is essential that full documentation be given for all fossil collections that are referred to in a geological report. Requirements include the following:

1. all available geological information, including name of stratigraphic unit, geological age, stratigraphic position given as height above a known datum or recognizable contact, and, where appropriate, other information such as name of biozone;

2. adequate, geographic locality information, including locality data, are: GSC locality number, section number or name, latitude and longitude (and/or UTM co-ordinates), and a narrative description of the locality;

3. for fossils taken from boreholes, depth information, the accepted name of the borehole, and a locality description;

4. A statement to indicate that all GSC types are catalogued in the National Type Collection of Invertebrate and Plant Fossils at the Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario K1A 0E8. This statement normally appears on the introductory page to the plates or as an introduction to the section on systematic paleontology.

5. in palynological contributions, the make and registration number of the microscope used, and for each specimen cited, the slide number and England Finder co-ordinates;

6. In plate captions, the taxon name and authorship (date optional), figure numbers, and magnification. Indicate the kind of type specimen (e.g. holotype), or that the illustrated specimen is a 'figured specimen'; the curation number, preceded by 'GSC'; and a statement regarding the view or orientation (e.g. upper, ventral). Where this information applies to all or most figures on a plate, it can be placed in a statement at the beginning of the caption (e.g. 'All specimens are paratypes, except holotype specimen in figure 19').

7. In plate captions, detailed locality and geological data for the illustrated fossils (*see* 1 and 2 above), or, alternatively, reference to a locality appendix or register. Having all necessary information conveniently listed in either a plate caption or locality appendix will assist in the curation of the specimens in the National Type Collection of Invertebrate and Plant Fossils.

8. if appropriate, reference to image production methods (e.g. 'Scanning electron micrographs', 'All specimens at 10 tilt', 'All figures are unretouched photographs').

Notes for format of publications

1. In the table of contents at the beginning of each paleontological publication, all the genera in the systematics section should be listed in the order in which they appear.

2. Full page groups of photographs or photomicrographs are called 'Plates'; subordinate or individual illustrations within a plate are called 'figures'. Where practical, figures should be grouped and numbered in sequence according to the taxonomic order in the systematic descriptions. Figure numbers should be assigned in a logical sequence, and applied to an overlay rather than directly on the plate. All other illustrations of paleontological (less than page size) or other material are called 'Figures'.

3. When in simple tabular form, distribution or occurrence charts should be called 'Tables'. Illustrations in the text should be referred to as 'Figures', with a capital F, to distinguish them from the 'figures' (lower case f) in the Plates.

Latin terms and abbreviations

Abbreviation	Latin term	Definition
aff.	*affinis*	having affinity with but not identical with
auct.	*auctorum*	of authors
auct. non	*auctorum non*	(botanical) not of authors — to follow the citation of a misidentified taxon
cf.	*confer*	compare
comb. nov.	*combinatio nova*	new combination
emend.	*emendavit*	emended, altered, corrected
	emendatus, -a, -um	emended
et al.	*et alii*	and others
ex aff.	*ex affinis*	of affinity
excl. var.	*exclusa varietate*	by the excluded variety
	exclusis varietatibus	by the excluded varieties
ex gr.	*ex grege*	from the herd, of the group
ex par.	*ex parte*	on one side
f.	*forma*	form (a morphological term); a rank of infraspecific taxa (ICBN)
	fide	by faith or trusting in (source)
gen. et sp. nov.	*genus (novum) et species novum*	new genus and new species
gen. nov.	*genus novum*	new genus (*see also* n. gen.)
ibid.	*ibidem*	in the same place (i.e. page or figure reference to a journal or volume)
indet.	*indeterminatus, -a, -um*	cannot be, or has not been, determined
in litt.	*in litteris*	in letters, correspondence (written. comm. may also be used)
	incertae sedis	of a taxon: of uncertain position
	lapsus calami	an error made through carelessness in writing ('slip of the reed')
loc. cit.	*loco citato*	in the place cited (publication and page). Contrast 'op. cit.', in which publication alone is cited
	mihi	belonging to me (as a new species)
nob.	*nobis*	to us (as a new species)
nom. cons.	*nomen conservandum*	a name to be or should be preserved
	nomen conservatum	a preserved name
nom. dub.	*nomen dubium*	(ICZN) a name representing a taxon for which the original diagnosis or type material is inadequate to permit its subsequent recognition (pl. *nomina dubia*)
nom. nov.	*nomen novum*	new name (pl. *nomina nova*)

Abbreviation	Latin term	Definition
nom. nud.	*nomen nudum*	a name without a designation (i.e. without indication, description, or definition), therefore invalid (pl. *nomina nuda*)
	non	not
n. comb.		new combination
n. gen.		new genus (*see also* gen. nov.)
n. sp.		new species (*see also* sp. nov.)
op. cit.	*opere citato*	in the work, article cited (no page reference)
part.	*partim*	in part
	pars	a part of a whole
q.v.	*quod vide*	which see
s.f.	*sensu forma*	in the form (taxonomy) sense
s.l.	*sensu lato*	in the broad sense
s.s.	*sensu stricto*	in the strict (narrow) sense
	sic	thus (to indicate an exact transcription, including errors)
sp.	*species*	species (singular)
spp.	*species*	species (plural)
ssp.		subspecies (*see also* subsp.)
sp. indet.	*species indeterminata*	species indeterminate (cannot be, or has not been, determined)
sp. nov.	*species nova*	new species (see also n. sp.)
subgen., subg.		subgenus
subsp.		subspecies (*see also* ssp.)
sup.	*supra*	above
supra cit.	*supra citato*	cited above
	typus; typicus, -a, -um	typical or type species of a genus
v.	*vida*	indicates the author has viewed the type material (pl. *vidimus*)
var.	*varietas*	variety (as for subdivision of a species); a rank of infraspecific taxa (ICBN)

See also imprint date in the 'Reference' section.

Glossary

allotype A specimen of the opposite sex to the holotype, designated from among paratypes (not regulated by ICBN or ICZN)

binomen or binomial name The combination of two names, the first the generic and the second the species or trivial, that constitute the scientific name of a species (pl. binomina)

CAI Colour Alteration Index (conodonts); plural, Colour Alteration Index values (i.e. not indices)

description A statement of the attributes of a specimen or taxon

diagnosis A statement of those attributes of a specimen or taxon that separate it from others

emendation
1. (ICZN) any demonstrably intentional change in the original spelling of a name, or, in conodont studies, elevation of a form taxon to a multi-element species
2. (ICBN) an alteration of the diagnostic characters or circumscription of a taxon, without the exclusion of the type

epitype (ICBN) a specimen selected as an interpretive type when the type material is demonstrably ambiguous

extant Of a taxon: having living representatives

extinct Of a taxon: having no living representatives

figured specimen
1. (zoological) an illustrated specimen that has been assigned with some degree of uncertainty to a formal species, e.g. *Atrypa* sp., *A. reticularis*? *A.* sp. cf. *A. reticularis* (therefore, there are no type specimens)
2. (botanical) any illustrated specimen that is not a type specimen

holotype
1. (ICZN) the single specimen that was designated by the author as the name-bearer of a species or subspecies when it was established, or the single specimen on which the taxon was based when no type was specified
2. (ICBN) the one specimen or illustration used by, or designated by, the author of a species or infraspecific taxon as the nomenclatural type

homonyms Names that have the same spelling, but that refer to two or more different taxa; 'senior homonym' and 'junior homonym' apply, respectively, to the first, and all later published homonyms

hypotype (ICZN) a subsequently described, listed, or figured specimen of a taxon, other than the holotype or paratypes

invalid A name that is not acceptable (valid) under the codes

isotype (ICBN) a duplicate of the holotype (i.e. part of a single gathering made by a collector at one time)

lectotype
1. (ICZN) a syntype that is designated as the single name-bearing type specimen after the establishment of a species or subspecies
2. (ICBN) a specimen or illustration selected from the original material to be the nomenclatural type when the holotype is missing or was not designated at the time of publication

name-bearing type The type genus, type species, holotype, or other type specimen(s), or type slide, that determines the application of a particular name

neotype
1. (ICZN) a specimen subsequently designated as the name-bearing type of a species or subspecies for which, it is believed, there no longer exists a holotype, lectotype, syntype(s), or prior neotype (i.e. type lost or destroyed)
2. (ICBN) a specimen or illustration designated as the name-bearing type as long as all of the material on which the taxon is based is missing

paralectotype (ICZN) each specimen of a former syntype series that remains after the lectotype has been designated

paratype
1. (ICZN) a specimen of the type series as originally designated, apart from the holotype
2. (ICBN) a specimen or illustration cited at the time of original publication, that is neither the holotype nor isotype, nor one of the syntypes

plesiotype A specimen used in the redescription of an existing species

rank The level at which a taxon lies in the zoological or botanical hierarchy (e.g. all families are at the same rank, which lies between subfamily and superfamily)

synonym One of two or more scientific names applied to the same taxon; 'senior synonym' and 'junior synonym' apply, respectively, to the first, and all later published synonyms

syntype
1. (ICZN) a specimen of a type series from which neither a holotype nor a lectotype has been designated (use of holotype and paratypes is recommended, however)
2. (ICBN) any one of two or more specimens cited by the author when no holotype was designated

TAI Thermal Alteration Index (palynomorphs, etc.); plural (for each kind of palynomorphs, e.g. spores), Thermal Alteration Index values (i.e. not indices)

taxon A taxonomic group of any rank (pl. taxa)

topotype A term, not regulated by the ICBN or ICZN, for a specimen that was found at the type locality of species or subspecies to which it is thought to belong, whether or not the specimen belongs to the type series

trinomen or trinomial name The combination of three names, the first two being the binomen, the third being the scientific name of the infraspecific taxon, e.g. subspecies (pl. trinomina)

type A term used on its own, denoting a kind of type specimen

type genus (ICZN) the genus that is the name-bearing type of a family or subfamily-group taxon

type horizon The stratigraphic horizon from which the name-bearing type of a taxon was collected

type locality The geographic and stratigraphic place where the name-bearing type of a species or subspecies was collected

type series The series of specimens that either constitutes the name-bearing type (syntypes) of a taxon, or from which the name-bearing type may be designated

type species (ICZN) the species that is the name-bearing type of a genus or subgenus. (In contrast, according to the ICBN the type of a genus or subgenus is a specimen.)

type specimen (ICZN) used generally for any specimen of the type series

See also imprint date in the 'Reference' section.

Selected bibliography

Bengston, P.
1988: Open nomenclature; Palaeontology, v. 31, p. 223-227.
Brown, R.W.
1978: Composition of scientific words; Smithsonian Institution Press, Washington, D.C., 882 p. (revised edition)
Greuter, W., Burdet, H.M., Chaloner, W.G., Demoulin, V., Grolle, R., Hawksworth, D.L., Nicolson, D.H., Silva, P.C., Stafleu, F.A., Voss, E.G., and McNeill, J. (ed.)
1988: International Code of Botanical Nomenclature, adopted by the Fourteenth International Botanical Congress, Berlin, July-August 1987; Koeltz Scientific Books, D-6240 Konigstein, Federal Republic of Germany, 328 p.
Hedberg, H.D. (ed.)
1976: International Stratigraphic Guide. A guide to stratigraphic classification, terminology, and procedure; International Subcommission on Stratigraphic Classification of IUGS Commission on Stratigraphy, John Wiley and Sons, New York, 200 p.
Matthews, S.C.
1973: Notes on open nomenclature and on synonymy lists; Palaeontology, v. 16, p. 713-719.
North American Commission on Stratigraphic Nomenclature
1983: North American Stratigraphic Code; American Association of Petroleum Geologists, Bulletin, v. 67, p. 841-875.
Ride, W.D.L., Sabrosky, C.W., Bernardi, G., and Melville, R.V. (ed.)
1985: International Code of Zoological Nomenclature, Third Edition, adopted by the XX General Assembly of the International Union of Biological Sciences; International Trust of Zoological Nomenclature in association with the British Museum (Natural History), London, 338 p. (in English and French)
Schenk, E.T. and McMasters, J.H.
1936: Procedure in taxonomy; Stanford University Press, Stanford, California, 149 p.

REFERENCES

Reference citations in the text

The GSC uses the author-date system in the text to refer the reader to the References list at the end of the report, as in the following examples:

(Currie, 1991)

...Ermanovics (1990, in press) [Note that there are two different references here: 1990 and in press]

...as discussed by Fulton (1980a, b, c, d, 1981b, c)

(Hoffman, 1973; Geological Survey of Canada, 1991)

(Jamieson et al., 1990)

(Rogerson and Bell, 1986)

If possible, the text references should be placed at a suitable break in a sentence, or at the end of a sentence. In the text, a series of references are always cited in chronological order, for instance:

'Earlier workers (Smith, 1927; Graham, 1943, 1958; Jones, 1953; Zaak, 1957, 1990; Andrews, 1991) mapped....'

The accuracy of the References list is the author's responsibility, and so care should be taken when the report is being assembled to ensure that all references cited in the text are in the References list, are correct, and that there are no other references in that list. Inaccurate or misquoted references may be taken by some readers as a reflection on the quality of research and reliability of the report.

All references cited in the References list of scientific reports must be accessible to the public. If the reference is, for example, an unpublished company report or government document that is generally not accessible, then it should be cited only within the body of the text. This applies, for example, to abstracts in the GSC Program with Abstracts for a Current Activities Forum or Minerals Colloquium.

Unpublished material (e.g. R.K. Smith, unpub. rept., 1976) or personal communications (e.g. T.L. Brown, pers. comm., 1994) or electronic communications with date (e.g. e-mail, download from WWW) should be identified as such in the text, but is not to be included in the References list. Theses are the exception to this and can be cited in both text and References list. Where the authors cite additional information of their own in their text, this can be referred to (e.g. Bell and McCallum, work in progress, 1994), but if they cite the unpublished work of others in the text, initials should accompany surnames (e.g. R.G. Anderson and M.L. Bevier, unpub. U-Pb data, 1993).

It is GSC policy not to cite manuscripts that are in preparation, either in the text or in the References list, that is, do not use '(Smith, in prep.)'. The work can, however, be cited in the text only as '(J. Smith, work in progress, 1994)'. Once a manuscript is accepted for publication, it can be cited in the text and References list as 'in press', but without a year of publication, for example, '(Smith, in press)'.

Reference to quoted material in the text must be accurate and should include an indication of the page or pages on which the quotation occurs in the original publication. Authors should also give the page references for specific points that are discussed, rather than frustrate the reader by providing only a general reference to an entire paper.

No reference citations are permitted in GSC abstracts.

References list

Introduction

This section follows the main body of the text and may be entitled 'References', or 'Bibliography', depending upon its nature.

The term 'References' is used when each publication in this list is referred to and cited at least once in the text.

The term 'Bibliography' is used when the author has attempted to list all references bearing on the subject, in some cases even indirectly.

Order in References list

References are arranged in alphabetical order by author and then by year for each author, or series of authors. References with two authors are listed alphabetically, first by the main author, and then by the second author. References with three or more authors are listed alphabetically, first by the main author, then by the second author, and finally by the third and subsequent authors.

Where several 'et al.' references are used in the text and all belong to the same year but have different author combinations, they are to be listed alphabetically and labelled 'a, b, c' in the References list, and identified accordingly in the text as 'et al., a, b, c'.

Where more than two authors are listed in a reference, a comma should be placed before the 'and':

Fulton, R.J.
1986a: Surficial geology, Red Wine River, Labrador, Newfoundland; Geological Survey of Canada, Map 1621A, scale 1:500 000.
1986b: Surficial geology, Cartwright, Labrador, Newfoundland; Geological Survey of Canada, Map 1620A, scale 1:500 000.

Fulton, R.J. and Hodgson, D.A.
1979: Wisconsin glacial retreat, southern Labrador; *in* Current Research, Part C; Geological Survey of Canada, Paper 79-1C, p. 17-21.
1980: Surficial materials, Goose Bay, Newfoundland; Geological Survey of Canada, Map 22-1979, scale 1:250 000.

Fulton, R.J. and Smith, G.W.
1978: Late Pleistocene stratigraphy of south-central British Columbia; Canadian Journal of Earth Sciences, v. 15, p. 971-980.

Fulton, R.J., Hodgson, D.A., and Minning, G.V.
1979: Surficial materials, Lac Brûlé, Newfoundland-Quebec; Geological Survey of Canada, Map 1-1978, scale 1:250 000.
1980a: Surficial materials, Rigolet, Newfoundland; Geological Survey of Canada, Map 26-1979, scale 1:250 000.
1980b: Surficial materials, Groswater Bay, Newfoundland; Geological Survey of Canada, Map 25-1979, scale 1:250 000.
1980c: Surficial materials, Lake Melville, Newfoundland; Geological Survey of Canada, Map 23-1979, scale 1:250 000.
1980d: Surficial materials, Cartwright, Newfoundland; Geological Survey of Canada, Map 24-1979, scale 1:250 000.

1981a: Surficial materials, Ossokmanuan, Newfoundland; Geological Survey of Canada, Map 29-1979, scale 1:250 000.
1981b: Surficial materials, Minipi Lake, Newfoundland; Geological Survey of Canada, Map 1531A, scale 1:250 000.
1981c: Surficial materials, upper Eagle River, Newfoundland; Geological Survey of Canada, Map 20-1979, scale 1:250 000.

Fulton, R.J., Hodgson, D.A., Minning, G.V., and Thomas, R.D.
1980e: Surficial materials, Kasheshibaw Lake, Newfoundland-Quebec; Geological Survey of Canada, Map 28-1979, scale 1:250 000.
1980f: Surficial materials, Snegamook Lake, Newfoundland; Geological Survey of Canada, Map 27-1979, scale 1:250 000.

Fulton, R.J., Hodgson, D.A., Thomas, R.D., and Minning, G.V.
1981d: Surficial materials, Winokapau Lake, Newfoundland; Geological Survey of Canada, Map 21-1979, scale 1:250 000.

Fulton, R.J., Minning, G.V., and Hodgson, D.A.
1981e: Surficial materials, Battle Harbour, Newfoundland; Geological Survey of Canada, Map 19-1979, scale 1:250 000.

Names that start with 'St.' or 'St-' 'Mac' and 'Mc', should be listed alphabetically:

Macnab, R., Verhoef, J., and Srivastava, S.P.
1990: A compilation of magnetic data from the Arctic and North Atlantic oceans; *in* Current Research, Part D; Geological Survey of Canada, Paper 90-1D, p. 1-9.

McCracken, A.D.
1991: Middle Ordovician conodonts from the Cordilleran Road River Group, northern Yukon Territory, Canada; *in* Ordovician to Triassic Conodont Paleontology of the Canadian Cordillera, (ed.) M.J. Orchard and A.D. McCracken; Geological Survey of Canada, Bulletin 417, p. 41-63.

Séguin, M.K.
1978: Paleomagnetism of Cambrian volcanics in the Quebec Appalachians; Geomagnetism and Aeronomy, v. 18, p. 218-224.

St. Julien, P., Slivitsky, A., and Feininger, T.
1983: A deep structural profile across the Appalachians of southern Quebec; Geological Society of America, Memoir 158, p. 103-112.

St-Onge, D.A.
1969: Nivation landforms; Geological Survey of Canada, Paper 69-30, 12 p.

References using 'Jr.':

Clague, J.J., Harper, J., Jr., Hebda, R.J., and Howes, D.E.
1982: Late Quaternary sea levels and crustal movements, coastal British Columbia; Canadian Journal of Earth Sciences, v. 19, no. 6, p. 597-618.

Jackson, L.E., Jr. and Pawson, M.
1984: Alberta radiocarbon dates; Geological Survey of Canada, Paper 83-25, 27 p.

Imprint date

To some authors, the date of issue of a publication is more important than the claimed date of publication (imprint date). Paleontologists are especially concerned about the differences between these two dates, because in naming new species, they are governed by Article 21 of the International Code of Zoological Nomenclature. This Article states that if the imprint date is known to be incorrect, then the earliest day on which the publication was available is to be adopted as the date of publication.

In the following example from the Canadian Journal of Earth Sciences, the imprint date of the volume number is December 1988, but the journal published the actual dates of issue in the following April number and gave the issue date as being 01 March 1989. Thus the two new species described by Lenz, and the citation, are dated 1989, not 1988:

Lenz, A.C.
1989: Upper Llandovery and Wenlock graptolites from Prairie Creek, southern Mackenzie Mountains, Northwest Territories; Canadian Journal of Earth Sciences, v. 25, no. 4, p. 1955-1971 (imprint date 1988).

Language of reference

In the References list, the reference is written in the language of the article cited, that is to say a French title from a French publication dictates that the rest of the reference is in French (i.e. vol. instead of v., n° instead of no.). This does not affect the text of the citation, so a French citation about "Three Hills, Alberta" should not read "Trois monts".

Bouchard, M.A. and Martineau, G.
1984: Les aspects régionaux de la dispersion glaciaire, Chibougamau, Québec; Canadian Institute of Mining and Metallurgy, Special Volume 34, p. 431-441.
Dionne, J-C.
1977: La mer de Goldthwait au Québec; Géographie physique et Quaternaire, vol. 31, p. 61-80.
Dionne, J-C. et Laverdière, C.
1969: Sites fossilifères du golfe de Laflamme; Revue de géographie de Montréal, vol. 23, p. 259-270.

In the References list, do not translate the names of journals or other publications unless the name of the publication or journal exists in both official languages:

Dionne, J-C.
1974 The eastward transport of erratics in James Bay area, Québec; Revue de géographie de Montréal, v. 28, p. 453-457.
Dyke, A.S., Dredge, L.A., and Vincent, J.S.
1982: Configuration of the Laurentide Ice Sheet during the Late Wisconsin maximum; Géographie physique et Quaternaire, v. 36, p. 5-14.
Gross, G.A.
1993: Iron-formation metallogeny and facies relationships in stratafer sediments; *in* Proceedings of the Eighth Quadrennial International Association on the Genesis of Ore Deposits Symposium; E. Schweizerbart'sche Verlagsbuchhandlung (Nagele u. Obermiller), D-7000 Stuttgart 1, p. 541-550.
Michailidis, K.
1989: Gold chemistry from the Gallikos River placer deposits, Central Macedonia, Greece; Chemie der Erde, v. 49, p. 95-103.
Von Damm, K.L., Edmond, J.M., Measures, C.I., and Grant, B.
1985: Chemistry of submarine hydrothermal solutions at Guaymas Basin, Gulf of California; Geochimica et Cosmochimica Acta, v. 49, p. 2221-2237.

When a reference written in a language other than English is cited, the language of the manuscript being written/edited indictates the use of 'and' or 'et' in the citation, e.g. Dionne and Laverdière (1969).

Where its original language is not in the Roman alphabet, the reference should be given in translation, and the original language noted:

Ma, G., Lee, H., and Xue, X.
1980: Isotopic ages of the Sinian in the east Yangtze gorges with a discussion on the Sinian geochronological scale of China; Chinese Academy of Geological Sciences, Bulletin, ser. 7, v. 1, p. 39-55 (in Chinese, English summary).

For references in cyrillic, the title is to be translated and the journal reference transliterated:

Sorokina, N.L.
1966: New species of Upper Devonian spores from the Dniepr-Donets Basin; Geologichnii Zhurnal, v. 26, p. 49-63 (in Ukrainian).

Types of references

There are ten main types of references cited in GSC reports:

1. a GSC Memoir, Bulletin, Economic Geology Report, Paper, Miscellaneous Report, or other government report
2. an article in a journal, periodical, or series
3. an article in Current Research
4. a book, symposium volume, compendium volume (e.g. Contributions to Canadian Paleontology volume), Current Research volume, Geology of Canada volume, or chart
5. an article in a book, symposium volume, compendium volume, (e.g. Geology of Canada volume)
6. an abstract
7. a thesis
8. a map
9. an Open File
10. digital information products (CD-ROMs, etc.)

Abbreviations and usage in References list

Names of journals, periodicals, and publishing agencies are written in full. The words 'Memoir', 'Bulletin', 'Economic Geology Report', 'Paper', etc. are not abbreviated. Terms such as 'volume', 'page', 'number', 'series', and 'part' are abbreviated, and 's' is not added to the plural of the abbreviations:

volume/s	v.	number/s	no.
page/s	p.	series	ser.
chapter/s	chap.	part/s	pt.

In French references 'vol.', 'sér' and 'n°' are used for volume, series, and number.

Only material that has been published or that is 'in press' should be cited in the References list. A paper is 'in press' when it has been accepted for publication by a journal after critical review, or, at the GSC, when it is received for editing after it has been reviewed and a Division Director has signed a Publication Approval Form. The term 'in press' should be used instead of a year of publication.

When referencing an entire book, report, GSC Bulletin, Open File, etc., the total number of pages should be indicated, for instance '302 p.' For a section of pages within a larger work, use 'p. 32-90', and 'p. 31, 32'.

Only initials and surnames are to be used in citations and in the References list.

A GSC Memoir, Bulletin, Economic Geology Report, Paper, Miscellaneous Report, or other government report

The following information is required:

- surnames and initials of all authors
- year of publication
- title, with the first letter of the first word and proper nouns capitalized
- name of publishing organization
- name and number of the report (Bulletin, Paper, etc.)
- total number of pages

The GSC uses a semicolon following the title of a reference:

Eisbacher, G.H. and Clague, J.J.
1984: Destructive mass movements in high mountains: hazard and management; Geological Survey of Canada, Paper 84-16, 230 p.

Gibson, D.W.
1992: Stratigraphy, sedimentology, coal geology and depositional environments of the Lower Cretaceous Gething Formation, northeastern British Columbia and west-central Alberta; Geological Survey of Canada, Bulletin 431, 127 p. (with contributions by J.H. Wall, J.A. Jeletzky, and D.J. McIntyre).

Harris, D.C.
1989: The mineralogy and geochemistry of the Hemlo gold deposit, Ontario; Geological Survey of Canada, Economic Geology Report 38, 88 p.

Higgins, M.W.
1971: Cataclastic rocks; United States Geological Survey, Professional Paper 687, 97 p.

Lambert, M.B.
1988: Cameron River and Beaulieu River volcanic belts of the Archean Yellowknife Supergroup, District of Mackenzie, Northwest Territories; Geological Survey of Canada, Bulletin 382, 145 p.

Morris, S.C. and Whittington, H.B.
1985: Fossils of the Burgess Shale. A national treasure in Yoho National Park, British Columbia; Geological Survey of Canada, Miscellaneous Report 43, 31 p.

Taylor, F.C.
1982: Reconnaissance geology of a part of the Canadian Shield, northern Quebec and Northwest Territories; Geological Survey of Canada, Memoir 399, 32 p.

Authors should use the same name and initials for all their work, otherwise their papers may appear to have been produced by different authors (cf. Hoffman, 1968 and 1973, below).

Hoffman, P.F.
1968: Stratigraphy of the lower Proterozoic (Aphebian), Great Slave Supergroup, East Arm of Great Slave Lake, District of Mackenzie; Geological Survey of Canada, Paper 68-42, 93 p.

An article in a journal, periodical, or series

The following information is required:

- surnames and initials of all authors
- year of publication
- title of the article as it appears in the journal, with the first letter of the first word and proper nouns capitalized
- the full name of the journal, periodical, and/or series
- volume number
- part number (optional)
- relevant page numbers

Examples:

van der Pluijm, B.A., Karlstrom, K.A., and Williams, P.F.
1987: Fossil evidence for fault-derived stratigraphic repetition in the northeastern Newfoundland Appalachians; Canadian Journal of Earth Sciences, v. 24, no. 12, p. 2337-2350.

The publication series (Philosophical Transactions, Proceedings, Journal, etc.) produced by societies should follow the name of the society, for example 'Philosophical Transactions of the Royal Society of London' is referred to as 'Royal Society of London, Philosophical Transactions':

Hoffman, P.
1973: Evolution of an early Proterozoic continental margin: the Coronation geosyncline and associated aulacogens of the northwestern Canadian Shield; Royal Society of London, Philosophical Transactions, ser. A, v. 273, p. 547-581.

Similarly, to avoid confusion, 'Journal of the Geological Society' should be referred to as 'Geological Society of London, Journal':

Searl, A.
1991: Early Dinantian dolomites from East Fife: hydrothermal overprinting of early diagenetic fabrics?; Geological Society of London, Journal, v. 148, p. 737-747.

An article in Current Research

Through the years, the annual product showing the year's field research has changed in the way it is referenced. This should be taken into consideration when referencing what is commonly thought of as 'Current Research'. Previous to 1978 the reports were "Report of Activities" and referenced like this:

Davies, J.L., Topp, G.C., and Annan, A.P.
1977: Measuring soil water content in situ using time-domain reflectometry techniques; *in* Report of Activities, Part B; Geological Survey of Canada, Paper 77-1B, p. 33-36.

In 1978 the series became 'Current Research':

Campbell, R.B. and Dodds, C.J.
1978: Operation Saint Elias, Yukon Territory; *in* Current Research, Part A; Geological Survey of Canada, Paper 78-1A, p. 35-41.

Currie, K.L.
1991: A note on the stratigraphy and significance of the Martinon Formation, Saint John, New Brunswick; *in* Current Research, Part D; Geological Survey of Canada, Paper 91-1D, p. 9-13.

Hacquebard, P.A. and Avery, M.P.
1983: Geological and geothermal effects on coal rank variation in the Carboniferous basin of New Brunswick; *in* Current Research, Part A; Geological Survey of Canada, Paper 84-1A, p. 17-28.

In 1994 the new series was adopted; the letters F and G are reserved for the 'Radiogenic Age and Isotopic Studies' and 'Radiocarbon Dates' volumes, respectively:

Gordey, S.P. and Stevens, R.A.
1994: Tectonic framework of the Teslin region, southern Yukon Territory; *in* Current Research 1994-A; Geological Survey of Canada, p. 11-18.

Jackson, G.D. and Fahrig, W.F.
1994: Ages of diabase dyke intrusions, Cumberland Peninsula, Baffin Island, District of Franklin; *in* Radiogenic Age and Isotopic Studies, Report 8; Geological Survey of Canada, Current Research 1994-G, p. 23-28.

Journeay, J.M. and Mahoney, J.B.
1994: Cayoosh Assemblage: regional correlations and implications for terrane linkages in the southern Coast Belt, British Columbia; *in* Current Research 1994-A, Geological Survey of Canada, p. 165-175.

Sinclair, W.D., Hunt, P.A., and Birkett, T.C.
1994: U-Pb zircon and monazite ages of the Grace Lake Granite, Blatchford Lake Intrusive Suite, Slave Province, Northwest Territories; *in* Radiogenic Age and Isotopic Studies: Report 8; Geological Survey of Canada, Current Research 1994-F, p. 15-20.

McNeely, R. and Atkinson, D.E.
1996: Geological Survey of Canada Radiocarbon Dates XXXII; *in* Current Research 1995-G, Geological Survey of Canada, 92 p.

In Current Research volumes, authors often cite other articles in the same volume, as research is often interconnected. In that case, the citation in the text should be (author, year of publication) *not* (author, this volume). In the reference list, the reference should be written as usual, but without the page numbers:

Anderson, R.G. and Snyder, L.D.
1998: Jurassic to Tertiary volcanic, sedimentary, and intrusive rocks in the Hallet Lake area, central British Columbia; in Current Research 1998-A; Geological Survey of Canada.

A book, symposium volume, compendium volume (e.g. Contributions to Canadian Paleontology volume), Geology of Canada volume, or chart

The following information is required:

- surnames and initials of authors, compilers, or editors
- year of publication
- title of book as it appears on the title page, with first letter of first words and proper nouns capitalized
- edition number, if given
- name of publishing organization
- city, and country of publication where required
- name and number of the report (series), if required
- total number of pages in the book

Examples:

Reineck, H.-E. and Singh, I.B.
1975: Depositional sedimentary environments with reference to terrigenous clastics; Springer-Verlag, New York, 439 p. (corrected reprint of the first edition).

For references with editor(s), compiler(s), or co-ordinator(s), the shortened form (ed.), (comp.), and (co-ord.) is used for both the singular and plural.

All editors or compilers should be listed within a reference, even if there are many:

Barnes, C.R. and Williams, S.H. (ed.)
1991: Advances in Ordovician geology; Geological Survey of Canada, Paper 90-9, 336 p.
Escher, A. and Watt, W.S. (ed.)
1976: Geology of Greenland; Grønlands Geologiske Undersøgelse, Copenhagen, 603 p.
Orchard, M.J. and McCracken, A.D. (ed.)
1991: Ordovician to Triassic conodont paleontology of the Canadian Cordillera; Geological Survey of Canada, Bulletin 417, 335 p.
Stott, D.F. and Aitken, J.D. (ed.)
1993: Sedimentary cover of the craton in Canada; Geological Survey of Canada, The Geology of Canada, no. 5, 826 p. (*also* Geological Society of America, v. D-1).
Van Eysinga, F.W.B. (comp.)
1975: Geological Time Table; Elsevier, Amsterdam (chart, third edition).

Where no author is given for a publication, such as an entire GSC Current Research volume, the agency responsible for the work should be substituted:

Geological Survey of Canada
1991: Current Research, Part D; Geological Survey of Canada, Paper 91-1D, 191 p.
1994: Current Research 1994-A; Geological Survey of Canada, 243 p.

An article in a book, symposium volume, compendium volume (e.g. Geology of Canada volume)

The information required here is as for the previous category, with the surname(s) and initials of the author(s), the title of the article, and the relevant page numbers.

An italicized 'in' is used following the title of the article; however, as shown in Ritchie (1989, below), 'also' is shown in italics. For all references using 'in', a semicolon follows the title of the article and a comma follows the name of the book, symposium volume, or Current Research volume.

Note that the shortened form '(ed.)', (co-ord.), and '(comp.)' are placed before the name(s) of the editor(s) or compilers(s):

Clark, J.C., Johnson, W.J., and Miller, W.A.
1994: The application of high resolution shear wave seismic reflection surveying to hydrogeological and geotechnical investigations; *in* Proceedings, Symposium on the Application of Geophysics to Engineering and Environmental Problems, SAGEEP '94, Boston, Massachusetts, v. 1, p. 231-245.

Dawes, P.R.
1976: Precambrian to Tertiary of northern Greenland; *in* Geology of Greenland, (ed.) A. Escher and W.S. Watt; Grønlands Geologiske Undersøgelse, p. 248-303.

Helbig, K.
1987: Shear waves – what they are and how they can be used; *in* Shear-wave Exploration, (ed.) S.H. Danbom and S.N. Domenico; Society of Exploration Geophysicists, Geophysical Development Series, v. 1, p. 19-36.

Hunter, J.A., Pullan, S.E., Burns, R.A., Gagné, R.M., and Good, R.L.
1989: Applications of a shallow seismic reflection method to groundwater and engineering studies; *in* Proceedings, Exploration '87, Third Decennial International Conference on Geophysical and Geochemical Exploration for Minerals and Groundwater, (ed.) G.D. Garland; Ontario Geological Survey, Special Volume 3, p. 704-715.

Jamieson, R.A., Tallman, P.C., Plint, H.E., and Connors, K.A.
1990: Regional geological setting of pre-Carboniferous mineral deposits in the western Cape Breton Highlands, Nova Scotia; *in* Mineral Deposit Studies in Nova Scotia, Volume 1, (ed.) A.L. Sangster; Geological Survey of Canada, Paper 90-8, p. 77-99.

Jol, H.M. and Roberts, M.C.
1988: The seismic facies of a delta onlapping an offshore island: Fraser River Delta, British Columbia; *in* Sequences, Stratigraphy, Sedimentology: Surface and Subsurface, (ed.) D.P. James and D.A. Leckie; Canadian Society of Petroleum Geologists, Memoir 15, p. 137-142.

Mustard, P.S. and Rouse, G.E.
1994: Stratigraphy and evolution of Tertiary Georgia Basin and subjacent Upper Cretaceous sedimentary rocks, southwestern British Columbia and northwestern Washington State; *in* Geology and Geological Hazards of the Vancouver Region, Southwestern British Columbia, (ed.) J.W.H. Monger; Geological Survey of Canada, Bulletin 481, p. 97-169.

Ritchie, J.C.
1989: History of the boreal forest in Canada; *in* Chapter 7 of Quaternary Geology of Canada and Greenland, (ed.) R.J. Fulton; Geological Survey of Canada, Geology of Canada, no. 1, p. 508-512 (*also* Geological Society of America, The Geology of North America, v. K-1, p. 508-512).

Trettin, H.P.
1991: Tectonic Framework; Chapter 4 *in* Geology of the Innuitian Orogen and Arctic Platform of Canada and Greenland, H.P. Trettin (ed.); Geological Survey of Canada, Geology of Canada, no. 3; (also Geological Society of America, The Geology of North America, v. E).

For references in French, 'dans' is used:

St-Onge, D.A. and Bruneau, H.C.
1982: Dépôts meubles du secteur aval de la rivière Coppermine, Territoires du Nord-Ouest; dans Recherches en cours, partie B; Commission géologique du Canada, Étude 82-1B, p. 51-55.

Note both upper and lower case letters bear diacritical marks where appropriate.

An abstract

For references that are abstracts only, '(abstract)' should follow the page numbers when the reference is not in a volume of abstracts:

Gandhi, S.S. and Mortensen, J.K.
1992: 1.87-1.86 Ga old felsic volcano-plutonic activity in southern Great Bear magmatic zone; N.W.T. Geological Association of Canada–Mineralogical Association of Canada, Abstracts, v. 17, p. A37.

Gordon, T.M.
1974: Algebraic methods in the study of natural mineral assemblages; Geological Society of America, Abstracts with Programs, v. 6, no. 7, p. 761-762.

Kenyon, N.H.
1968: Sand ribbons; Geological Society of London, Proceedings, no. 1650, p. 159 (abstract).

Rogerson, R.J. and Bell, T.
1986: The Late-Wisconsin maximum in the Nachvak Fiord area of northern Labrador; Abstracts, 15th Arctic Workshop, Boulder, Colorado, p. 57-60.

Wyatt, P.H., Thorleifson, L.H., and Kettles, I.M.
1986: Provenance and geochronology of Quaternary glacial deposits in the central Hudson Bay Lowlands, northern Ontario; Geological Association of Canada–Mineralogical Association of Canada, Program with Abstracts, v. 11, p. 323.

A thesis

Theses (dissertations) are not published material but are publicly available and therefore included in References lists. The university name, city and province or state should be given for universities in Canada and the U.S.A. For other countries, the university name, city, and country should be given. The word 'unpublished' is unnecessary:

Herd, R.K.
1972: The petrology of the sapphirine-bearing and associated rocks of the Fiskenaesset complex, West Greenland; Ph.D. thesis, University of London, London, England, 2 v., 608 p.

King, J.E.
1981: Low-pressure regional metamorphism and progressive deformation in the eastern Point Lake area, Slave Province, N.W.T.; Ph.D. thesis, Queen's University, Kingston, Ontario, 187 p.

A map

When referencing maps, a scale must be included if available. No commas should appear in the numbers (e.g. 'scale 1:100 000'). For French references, an oblique is used instead of the colon (e.g. 'échelle de 1/100 000'):

Geological Survey of Canada
1993: Principal mineral areas of Canada; Geological Survey of Canada, Map 900A (forty-third edition), scale 1:7 603 200.

Park, A.F. and Ralser, S.
in press: Geology, southwest part of Tavani map area, District of Keewatin, Northwest Territories; Geological Survey of Canada, Map 1816A, scale 1:100 000.

Rickard, M.J.
1991: Geology, Cowansville–Sutton–Mansonville, Quebec; Geological Survey of Canada, Map 1750A, scale 1:50 000.

An Open File

References to Open File reports should indicate the number of pages of text, the number of maps, and the map scale, as appropriate:

Shaw, J.
1991: Quaternary sediments and seabed conditions offshore from La Scie, Newfoundland; Geological Survey of Canada, Open File 2385, 9 p., scale 1:25 000.

Taylor, R.B. and Hodgson, D.
1991: Coastal studies in the Canadian Arctic Archipelago: Brock, Devon, Prince Patrick, and the Polynia islands, Northwest Territories; Geological Survey of Canada, Open File 2380, 57 p.

SPELLING, USAGE, AND GSC RECOMMENDATIONS

Spelling

General rules

Spelling depends largely on memory. Sound is no guide in recognizing single or double consonants and the rules are so irregular that it is necessary to memorize the exceptions as well as the rules. The best way to learn is to be observant when reading.

These words are frequently misspelled:

accommodate	arctic	precede
gauge	rarefy	consensus
desiccate	separate	liquefy
supersede	unparalleled	naphtha

Some rules and exceptions are given here.

Words with ei *and* ie

The jingle '*I* before *e* except after *c* or when sounded as *a* as in *neighbor* and *weight*' covers the rule.

Exceptions:

foreign	height	seize
leisure	neither	weird

Words ending in cede *and* ceed

Supersede is the only word ending in *sede*. *Exceed, proceed* and *succeed* are the only common verbs ending in *ceed*.

Able *and* ible *endings*

There is no basic rule for the *able* and *ible* endings, but if there is a corresponding word ending in *ation*, the ending is usually *able*; if ending in *sion* or *tion*, the ending is more often *ible*.

duration	durable
division	divisible

Final consonants doubled before a suffix

Double the final consonant in words of one syllable ending in a consonant preceded by a vowel.

bed	bedded
dip	dipper
fit	fitted
sit	sitting

Exception:

Do not double the consonant before a suffix beginning with a consonant.

fit	fitful
sad	sadness

The final consonant is usually doubled in words of more than one syllable ending in a consonant preceded by a vowel, if the accent is on the last syllable and the suffix begins with a vowel.

occur	occurrence
regret	regretted

Exceptions:

avoid	avoidable
refer	referable

Final consonants not doubled before a suffix

For words ending in a consonant preceded by a vowel, and not accented on the last syllable, do not double the final consonant before a suffix beginning with a vowel.

abandon	abandoned
benefit	benefited

Exceptions:

Certain words with equally accented syllables:

model	modelling
label	labelling
handicap	handicapped
sandbag	sandbagged

For words ending in a consonant preceded by a vowel, do not double the final consonant before a suffix beginning with a vowel if the accent is shifted to a preceding syllable.

confer	conference
prefer	preference
refer	reference

For words ending in a consonant preceded by more than one vowel, do not double the final consonant before a suffix.

breed	breeding
cheap	cheapest

Words ending in two or more consonants usually remain unchanged when a suffix is added.

call	called
cost	costing

Combinations with all

The final *l* is usually dropped when *all* is used as a prefix.

all together	altogether
but	
all right	

Words ending in e

Words ending in a silent *e* usually drop the *e* before the a suffix beginning with a vowel.

age	aging
debate	debatable
subdue	subduing

Exceptions:

noticeable	toeing
courageous	mileage
dyeing	singeing

Words ending in a silent e generally retain the *e* before a suffix beginning with a consonant.

complete	completeness
waste	wasteful

Exceptions:

acknowledgment	judgment
argument	wholly

Words ending in c

For words ending in *c* with the sound of *k*, add *k* before *i*, *y*, or *e*.

picnic	picnicking
panic	panicky

Verbs ending in ie

Verbs ending in *ie* change *ie* to *y* before *ing*.

die	dying
lie	lying

Words ending in n

When the suffix *ness* is added to a word ending in *n*, the original *n* is retained.

clean	cleanness
green	greenness
sudden	suddenness

Usage

Introduction

Entries in this section are listed in alphabetical order. They are some of the guidelines followed by editors to ensure uniformity in the style and standard of publications issued by the Geological Survey of Canada. The main abbreviations used in this section are

abbr.	abbreviation	pl.	plural
adj.	adjective	prep.	preposition
adv.	adverb	vb.	verb
n.	noun		

Alphabetical listing

a, an The indefinite article. *See* ' The indefinite articles 'a' and 'an' in 'Grammar'.

a axis, a horizon

abandon, abandoned

about, approximately Usually *about* can take the place of *approximately*. If there is a difference it is that *approximately* suggests a more careful calculation. *Around* should not be used to mean *about*.

abridgment

absorption, adsorption *Absorption* means 'assimilation' (e.g. of liquids in solids, or gases in liquids). *Adsorption* means 'the adherence of gas molecules etc. to the surface of solids'.

abstract, concrete Try to use the *concrete* rather than the *abstract* in writing. Terms implying geological processes, such as *mineralization*, *chloritization*, *granitization*, *shearing*, *faulting*, etc., are *abstract*. *Faulting* cannot 'strike northeasterly', though the *fault*, or *faults*, or *fault zone* may. Another *abstract term* commonly misused in a *concrete sense* is *values*. *Value* is an attribute, not a substance. An ore does not 'carry high *gold values*', though it may contain much of that valuable metal. Nor does a miner 'encounter *good values*' in an ore, but may encounter valuable minerals, or minerals that carry valuable metals. Also, *values* are not lost in sinking, but the orebody may be lost.

abyssal

accede

accessories *See* INTRUSIVES.

accessory As in 'an *accessory* mineral'.

accommodate, accommodation

accumulate, accumulation

accuracy, precision *Accuracy* is 'a measure of how closely a fact or value approaches the absolute or true value'. *Precision* is 'a measure of the fineness of a value'. Thus, 1.0103 is *more precise* than 1.01 but it may not be *more accurate*.

achieve *Achieve* implies 'successful effort and not the mere completion of something'. You may *achieve* a merit increase but you get a statutory raise.

acknowledgment (*not* acknowledgement)

active layer

active voice *See* 'Active and passive voice' in 'Grammar'.

addendum (pl. **addenda**)

adsorption *See* ABSORPTION.

advice (n.), **advise** (vb.) *Advise* means 'offer counsel to' (*not* to notify, inform, or announce).

aegirine

aeolian (not GSC spelling, *see* EOLIAN).

aerial, areal *Aerial* means 'from the air (e.g. aerial photograph, airphoto)', whereas *areal* relates to 'area'.

aerobic, anaerobic *Aerobic* (oxidizing) means 'living, active, or occurring only in the presence of oxygen'. *Anaerobic* (reducing) means 'living, active, or occurring in the absence of free oxygen'.

affect, effect In the noun forms, *affect* signifies 'an emotion or feeling', whereas *effect* denotes 'a result or consequence'. In scientific papers, the noun form is almost always *effect*. As verbs, *affect* means 'to act upon or to have an influence', whereas *effect* means 'to cause, produce, accomplish, or to bring about a change': *The granite affected the position of the fault, and the fault effected a detour around the granite.*

AFM diagram A triangular diagram used to indicate the composition of pelitic schists and gneisses by plotting the molecular quantities of three components: A(Al_2O_3), F(FeO), and M(MgO).

aftershock, foreshock Major earthquakes are commonly preceded and followed by many less intense earthquakes (*foreshocks* and *aftershocks*). These *foreshocks* and *aftershocks* decrease in frequency and magnitude with time, and whereas *foreshocks* may precede a main shock by an interval ranging from seconds to weeks, *aftershocks* can occur many days or months after the main shock. *See also* FORECAST, PREDICTION; INTENSITY, MAGNITUDE.

age, aging

agendum (pl. **agenda**)

aggravate *Aggravate* means 'to increase or intensify, or make worse' (*not* to annoy).

airborne (*not* airborn) *Airborne* magnetometer.

aircraft

air-fall (n. and adj.) (deposition)

airphoto, aerial photograph *See* AERIAL.

alga (pl. **algae**)

alignment

alkali feldspar (no hyphen)

alkalis (*not* alkalies)

all (*not* all of)

all-inclusive

allochthonous

all ready, already *All ready* is an adjectival phrase, as in: *When the whistle blew they were all ready. Already* is an adverb, meaning 'by this time'.

all-terrain vehicle (ATV)

all together, altogether Use *all together* when referring to 'several people, things, or ideas that have been brought together': *the caribou herded all together. The ore-bearing veins are all together in the northern part of the intrusion. Altogether* means 'on the whole, entirely, in all': *not altogether pleased with the assistant.*

allude, elude *Allude* means 'to refer indirectly (to)'; *elude* means 'to escape from'.

allusion, illusion An *allusion* is 'an indirect reference'; an *illusion* is 'an unreal image or false impression'.

alluvial fan

alternate(ly), alternative(ly) *Alternate* means 'by turns'; *alternative* means 'in a way that offers a choice (between two things)': *The stratigraphic sequence consists of alternating mafic and felsic layers. Alternatively, the pluton could be synorogenic.*

although *See* THOUGH.

altitude, elevation The terms *altitude* and *elevation* are essentially synonymous, and mean 'height above sea level'. However, specifically, *altitudes* are 'the approximate heights of geographic features (or aircraft)', whereas *elevations* denote 'exact heights, as indicated by bench marks'.

aluminosilicate

amid, amidst Although both forms are correct, the shorter is commonly preferred.

among, amongst Although both forms are correct, the shorter is commonly preferred.

among, between *Among* is generally used when more than two persons or things are involved: *between* is normally used for two: *between five and nine* (*not* between five to nine). *See* under 'Prepositions' in 'Grammar'.

amount, number *Amount* means 'total (masses or bulks)'. *Number* (noun) refers to 'collective units (things that can be counted one by one)': *The amount of faulting; the number of specimens.*

ampersand (&) The *ampersand* should be used when it forms part of an official corporate name. In paleontological papers governed by the *International Code of Botanical Nomenclature*, the names of two joint authors of a taxon should be joined by an *ampersand*. The *ampersand* should never be used in any other connection in text.

anaerobic *See* AEROBIC.

analogous (*not* analagous), **analogue**

analysis (pl. **analyses**)

analyze (*not* analyse) *See* -ISE, -IZE.

anastomosing

and/or This complex construction is acceptable in scientific texts. Its use indicates that all of the three possibilities linked by *and/or* may be applicable: *The pelite contains kyanite and/or sillimanite.*

ångstrom (Å) 1Å = 0.1 nm. The GSC uses the SI unit 0.1 nm in the place of 'ångstrom'.

anomalous

antecede

anthropomorphism *Anthropomorphism*, *personification*, or *pathetic fallacy*, 'the ascription of human attributes or personality to inanimate objects', should be avoided in scientific writing. Rocks do not '*suffer* deformation or metamorphism', regions do not '*experience* glaciation or uplift', minerals do not '*call for* or *argue for* an explanation', and special sessions do not '*invite* papers'.

anticipate *Anticipate* means 'to forestall by prior action, to foresee, to expect'.

anticlimax

anticusp

anyone, any one and **everyone, every one** *Anyone* (*everyone, no one, someone*) is the correct form when the meaning is 'anybody, everybody', etc. *Any one* (*every one, no one, some one*) is the correct form when 'things and not persons' are meant.

apex (pl. **apices**)

apparent, evident, obvious *Obvious* means 'easily seen, in the sense of discovered'. *Evident* denotes 'the existence of visible signs, all pointing to one conclusion'. *Apparent* goes one step beyond *evident* and implies 'visible signs and some reasoning', as in: *Although faulting was evident from the aerial photographs, its true extent was not apparent until the outcrops had been studied.*

appear *Appear* suggests 'that which is visible'. A person *appears* to be young, but *seems* to be intelligent.

appendix (pl. **appendices**) Capitalized as in *Appendix A*.

appreciate *Appreciate* means 'to place value on', and ought to be used with a noun as object: *I appreciate your kindness.*

apprise

approximately *See* ABOUT.

apt, liable, likely *Apt* means 'having a tendency to do or feel something, because of the subject's character': *apt to take offence. Liable* expresses 'probabilities that the subject will suffer something undesirable'; *likely* expresses 'probability'.

aquifer

arabic numerals (*not* Arabic numerals)

arc Capitalized as in *Great Bear Arc.*

arch Capitalized as in *Boothia Arch.*

Archean (*not* Archaean)

archeology

Arctic *Canadian Arctic, Arctic Islands, Arctic Archipelago, the Arctic*; but *arctic Canada* and an *arctic environment. Compare* BOREAL.

area *The Rouyn–Bell River area.*

areal *See* AERIAL.

areally

Arenig (Series/Epoch; *not* Arenigian)

arguable, argument

armour

around *Around* means 'on every side, enveloping' (*not* about). *Around* should not be used to mean 'about'.

as *See* LIKE.

as far as Distinguish between: '*as far as* Vancouver', which implies 'a fact', and *so far as* is known', which implies 'doubt'.

ash flow (n.), but **ash-flow** (adj.)

Ashgill (Series/Epoch; *not* Ashgillian)

assume, presume Problems occur where both verbs are used to mean 'to suppose or to take for granted'. When you *assume*, you are expressing 'a theory, or even a hypothesis'. When you *presume*, you are expressing 'your belief or opinion'.

asymmetry, asymmetrical

Atlantic Provinces

atmospheric

aulacogen

aurora borealis

autochthonous

auxiliary

avenue Capitalized as in *Carling Avenue, 14th Avenue*, but '*avenue* of exploration'.

avoid, avoidable

avulsion

axial plane (n.), but **axial-plane cleavage** (adj.)

azimuth *Azimuth* is 'the horizontal angle, measured clockwise, from due north', and is recorded numerically as three digits with a degree symbol (i.e. the point of the compass): *145°*; *the fault trends 015°* (*not* the fault trends N15°E); *with a 328° trend* (*not* N32°W, S32°E trend). *See also* DIRECTION; STRIKE AND DIP.

backshore, backslope, backwash, backwater

badlands

ball-and-pillow (adj.) As in *ball-and-pillow structures.*

bankfull discharge

basal Never use *basal* as part of an informal name that has other modifiers. For example, *the basal silty member* means 'the basal part of the silty member', even if the writer meant to name the unit informally as the *basal silty member.* The same arguments apply to the use of *lower, middle,* and *upper* in this context. *See also* EARLY, LATE; EARLY, LOWER; LOWER, UPPER; MIDDLE.

base camp, base level, base line, base map, base metal as nouns, but as adjectives **base-camp activities, base-level studies, base-metal deposit,** etc.

based on, on the basis of *Based on* is a past-tense participal phrase, so it is adjectival; *on the basis of* is an adverbial phrase:

> Based on this tiny fossil collection, Smith proposed a new phylum. (Incorrect. Here 'based on' dangles; it modifies Smith putting him in double jeopardy.)
>
> On the basis of this tiny fossil collection, Smith proposed a new phylum. (Correct. 'On the basis of' correctly modifies the verb 'proposed'.)
>
> The decision was made, based on sound reasoning. (Correct (?) Here 'based on' correctly modifies 'decision', but the sentence seems a little awkward.)
>
> The decision was made on the basis of sound reasoning. (Better. 'On the basis of' correctly modifies 'was made'.)
>
> The decision was based on sound reasoning. (Better (?) 'Based on' is a predicate adjective [an adjective that is complement to a linking verb] correctly attached to 'decision' by 'was', part of the linking verb 'to be'.)
>
> We made the decision on the basis of sound reasoning. (Best, because the party responsible is identified, and because of the first-person, active-voice construction.)

basin Capitalized as in *Michigan Basin.*

basin-and-range (adj.) As in *basin-and-range province.*

basis (pl. **bases**)

b axis, b direction, b horizon

bay head, bay ice (n.) but **bay-mouth bar, bay-ice studies** (adj.)

bed, bedding

bedding plane (n.) but **bedding-plane fault** (adj.).

because of *See* DUE TO.

bed load (n.), **bed-load** (adj.) *bed-load material*

bedrock

begin, commence *Begin* is preferable to *commence*, except in legal usage.

behaviour (*not* behavior)

believe, consider, feel These verbs attract criticism when used incorrectly. *Believe* means 'having faith or trust in', and is commonly applied to the acceptance of a theology or deity. *Consider* means 'to regard as, or think of a being as', and is also used in the sense of *believe*, *conclude, decide*, and *judge*, which are all synonyms. *Feel* connotates 'sensation or emotion'.

bell-like

bell-shaped distribution

below, under *Below* is concerned with 'relative position', whereas *under* implies 'superposition or subjection'.

bench mark

benefit, benefited, benefiting

Bernoulli effect

Berriasian

beside, besides Both of these words are used as prepositions. *Beside* means 'at the side of'; *besides* means 'in addition to'.

best preserved specimen

better drained soil

between *See* AMONG.

bevelled

biannual, biennial *Biannual* means 'every half year, twice a year, semiannual'. *Biennial* means 'lasting two years or happening every second year'. It is applied to a plant that springs from seed one year, and flowers and dies the next (cf. annuals, biennials, and perennials). *Biweekly* and *bimonthly* can mean either 'once in two weeks/months' or 'twice a week/month'.

Use *twice-weekly, fortnightly, every two months, half-yearly, every two years*, etc. to be clear. *Bicentennial*, however, means 'every two hundred years'.

bilateral

billion In North American usage, this word signifies a thousand million (10^9); in most other countries it signifies a million million (10^{12}). Because of this ambiguity do not use the terms *billion*, *trillion*, or *quadrillion*. Use of phrases such as *thousand million* or expressing the term in figures such as 10^{12} avoids all ambiguity. *See also* QUADRILLION; TRILLION.

bio- Most words with this prefix are unhyphenated (e.g. *bioclast*, *bioclastic*, *biocoenosis*, *biodegradable*, *bioerosion*, and *biofacies*).

biological (*not* biologic)

bioturbation mottling, bioturbated mottling *Bioturbation mottling* means 'mottling resulting from bioturbation'. Do not use *bioturbated mottling* in this sense, as it refers to an existing mottling that has been modified by bioturbation.

bird's-eye

Blackriveran (*not* Blackriverian)

block Capitalized as in *Peace River Block.*

block fault

blowout

borderland

boreal (adj.) *Boreal* means 'pertaining to, or located in, northern regions; northern': *boreal region.* But, in paleontological usage: *Boreal Realm, Boreal Bathonian, Boreal Upper Bathonian*, etc. *Compare* ARCTIC.

borehole

botanic

both Follow *both* by 'and', (*not* as well as).

bottomset

boudin, boudinage

Bouguer anomaly

box fold

BP This means 'before present' (specifically 1950) and is used for radiocarbon ages. BP should always be placed after the numerals: *an age of 13 660 ± 370 BP (WAT-951); dated 22 260 ± 1000 BP; (WAT-95, Smith and Jones, 1989).* It is not necessary to add 'ago' or 'years' to the age.

braided river (n.), but **a sandy, braided-river system** (adj.)

braidplain

break of slope, break in slope

breakup (n.), but **break up** (vb.)

breakwater

broad, wide These words have similar meanings, as is shown by the fact that they have the same opposite: *narrow*. *Wide* refers to 'the distance that separates the limits', and *broad* to 'the extent or size of something in a direction measured across'. Backs, shoulders, and expanses can be *broad*, but mouths and rivers are *wide*.

B-tectonite

buildup (n.), but **build up** (vb.) For example: *Carbonate buildups build up gradually.*

built-up area

burned over

but *But* can be used as the first word in a sentence such as: *But for the weather, the field crew might have made it on time.*

bypass, byproduct

CAI *See* COLOUR ALTERATION INDEX.

calc Most words with the prefix *calc*, meaning 'lime-' or 'calcareous', are hyphenated: *calc-alkali, calc-alkalic, calc-arenite, calc-dolomite, calc-flinta, calc-schist, calc-silicate,* and *calc-tufa.*

calcilutite

calcium carbonate powder

caldera

Cambrian System, but **Cambrian time**

camera-ready copy

cannot

caprock

Caradoc (Series/Epoch; *not* Caradocian)

carbonated *See* CARBONIZED.

carbonates Do not use *carbonates* when you mean 'carbonate rocks'. *See also* INTRUSIVES.

carbonatized *See* CARBONIZED.

carbonized, carbonated, carbonatized It has become customary in our reports to distinguish between these terms. *Carbonized* means 'changed to carbon'; *carbonated,* 'charged with carbonic acid'; and *carbonatized*, 'replaced by carbonate mineral(s)'.

cardinal numerals, ordinal numerals The numbers 'one, two, three', etc., as opposed to the *ordinal numerals*, 'first, second, third', etc.

Caribbean

case The word *case* is all too commonly used as a trouble-saver or 'filler', and results in flabby writing. The word has its use, but, before using *case* or its elegant variation, *instance*, consider rewriting the sentence.

cataclastic

catalyze

catastrophic

cauldron

cave in (vb.), but **cave-in** (n.)

cede

Celsius

centi The prefix *centi* (symbol c) indicates the multiple 10^{-2}.

centimetre (*not* centimeter) *See* METRE.

centre, centre point, central, centring (*not* center)

centred on (*not* centred around)

cf., see, see also Abbreviation of the Latin *confer*, meaning 'compare' or 'to be compared to'. Authors should keep in mind the distinction between *see* or *see also* and *cf.*

See makes reference to something else for the information, for example, '**aeolian** *See* EOLIAN.' is termed a 'blind entry' as it is composed only of a heading and a *see* reference. The explanation is found under the entry '**eolian**', the accepted spelling.

See also makes reference to additional information under another heading, for example, '**I, we**' states that 'first person pronouns are acceptable' and ends with '*See also* VOICE.' indicating that there is more information under the entry '**voice**'.

The abbreviation *cf.* is set in vertical (roman) type.

changeable

channel, channelling, channelled (*not* channeling, channeled)

channel flow, but **channel-fill, channel-mouth bar**

characteristic, distinctive, typical The *characteristic* quality of something is 'the quality that distinguishes and identifies that thing'. *Distinctive* denotes 'an individuality that sets something apart from its type or group'. *Typical*, which is the opposite of *individual*, denotes 'that the thing or person in question has the characteristics peculiar to the type, class, species, or group to which it belongs'. *Characteristic* is to be preferred to character when describing the traits of fossils.

characterize

chemical symbols When the text deals with analytical work or reports analytical measurements, the chemical elements are indicated by symbols:

> The Cu, Pb, and Zn values were statistically analyzed.
>
> Current estimated reserves are 1 000 000 t grading 9% Zn.

The element names are written out when they occur in other contexts in the text:

> The fault was active after gold emplacement.

Symbols should also be used in figures, tables, and equations. Rewrite sentences so that they do not begin with a chemical symbol:

> Gold, silver, and mercury *not* Au, Ag, and Hg

Isotopes are indicated by writing the mass number as a left superscript to the symbol:

^{40}Ar ^{14}C ^{18}O ^{238}U $^{207}Pb/^{206}Pb$ $^{40}Ar/^{39}Ar$

but

K-Ar age U-Pb ratio

Chemical symbols are used for chemical compounds:

$LiBO_2$	*not*	lithium metaborate
H_2SO_4	*not*	sulphuric acid

> Four analyses indicate 5 to 10% MnO and 10 to 28% FeO.

Valences are written as follows:

Fe^{+3} *not* Fe^{+++}

chemistry, geochemistry *Chemistry* and *geochemistry* are disciplines. Authors often entitle a section of their manuscript 'Whole-rock chemistry' when they mean 'Whole-rock chemical compositions' or 'Whole-rock major (trace) - element relations (variations)'. As a discipline, geochemistry encompasses isotopic as well as chemical relationships. Commonly manuscripts have one section called 'Geochemistry', devoted entirely to whole-rock chemical variations, and another entitled 'Isotopic relations'.

china clay

chronological (*not* chronologic)

chronostratigraphic units Position within *chronostratigraphic units* (system, series, stage, etc.) is best indicated by *basal, lower, lowest, middle, upper*, and *uppermost*.

Cincinnatian

circumlocution Avoid *circumlocution* — 'roundabout language; the use of several or many words instead of one or a few words'. *See also* 'Jargon and contrived or redundant words' in 'Grammar'.

circum-Pacific

circumstances *Under the circumstances* and *in the circumstances* are both acceptable.

cirque

city The *city of Ottawa*, but *Ottawa City*.

claim *Claim* as a noun in not capitalized: *claims A 61239 to A 61244*; *Nancy claim*. Other similar terms are *deposit, property, prospect, mine*, and *showing*.

clastics Do not use *clastics* when 'clastic rocks' are meant. *See also* INTRUSIVES; VOLCANICS, METAMORPHICS, CLASTICS.

clay belt, clay boil (n.), but **clay-rich, clay-sized** (adj.) **particles**

clean, cleanness

cliff forming, but **cliff-forming limestone**

cliffline

cloudburst

co- Many compound words with the prefix *co-* are written as one word. A hyphen is used when two similar vowels occur together, or when the appearance of the word is confusing without the hyphen: *coaxial, coexist, coproduct, co-author, co-operate, co-ordinate*, and *co-worker*.

coal

anthracite	high volatile bituminous coal (abbr. = hvb)
semianthracite	medium volatile bituminous coal (mvb)
semibituminous	low volatile bituminous coal (lvb)
subbituminous	
	high volatile A bituminous coal (hvAb)
	high volatile B bituminous coal (hvBb)
	high volatile C bituminous coal (hvCb)
	subbituminous A coal (subA)
	subbituminous B coal (subB)
	subbituminous C coal (subC)
	lignite A (ligA)
	lignite B (ligB)

coal bearing (n.), but **coal-bearing strata** (adj.)

coalfield, but the **Peace River Coalfield**

coal measures

coalspar

coarse grained Hyphens are used with compound adjectives before a noun, but not after it:

A coarse-grained granite	The granite is coarse grained

Do not use hyphens with adverbs ending in *ly*:

finely banded gneiss (*prefer* fine-banded gneiss)

The hyphen is used in suspended compounds (i.e. when a component common to successive compound adjectives is omitted):

medium- to coarse-grained adamellite
thin- to thick-bedded limestone

coarsening-upward sequences (*not* upward-coarsening sequences)

coarse sands

coast *The Pacific coast*, but *the Coast* (cf. *the Prairies*).

coastal plain

coastline

Coast Mountains, but **eastern Coast Mountains**

coeval

coldspring, hotspring

collaborate

collinear (*not* co-linear or colinear)

colour, coloured (*not* color), but **coloration, colorimeter**

Colour Alteration Index (CAI) There are *Colour Alteration* and *Thermal Alteration indices*, but do not use 'Colour Alteration Indices' when referring to a series of values or measurements. The latter should be written as *Colour Alteration Index values*, or *CAI values*.

colour filter, but **red colour-filter**

colours Hyphenate combination colour terms that are placed before or after the noun:

a blue-green mineral	the mineral is blue-green
orange-red shear zones	the shear zones are orange-red

Compounds with the suffix *-ish* are hyphenated only when they precede the noun:

bluish-green amphibole	*but*	the amphibole is bluish green

Adjectives indicating a specific shade, such as *light, pale, bright, dark* are not hyphenated whether they are placed before or after the noun:

light grey gneiss	the gneiss is light grey	sky blue kyanite
pale yellow zone	the zone is pale yellow	olive green shale

commence *See* BEGIN.

commit, commitment, committal, committed

common, to be common, commonly These words are much abused. Where appropriate, select synonyms such as *prevalent, usual*, and *general*. Do not use adverbs of time such as *often* or *frequently* for 'prevalence' or 'abundance': *Limestones are commonly fossiliferous* (*not* often fossiliferous). *See also* TIME TERMS.

comparatively, relatively Do not use these words unless the degree of comparison or relativity is clearly stated. These words are commonly used as substitutes for *fairly* and *somewhat*. Use *relatively* only when a comparison is made. *Extremely* should be used in the sense of 'to the uttermost degree.'

compare to, compare with These two expressions are distinct and different but are commonly misused. If one rock specimen is *compared to* another, the object is to indicate their similarity; but, if one is *compared with* another, both their differences and similarities are considered. Any poet could be *compared with* Shakespeare, but few could be *compared to* him.

compass points *See* DIRECTION.

competition, competitive

complement, compliment *Complement* as noun, verb, and adjective (*complementary*) relates to 'the quantity or amount that completes'. *Compliment* as noun, verb, and adjective (*complimentary*) relates to 'praise, flattery, and something obtained free'.

complete, completeness

compose *Compose* means 'make up, constitute, or form' and is most frequently used in the passive: *be composed of*. *See also* COMPRISE.

comprise The word *comprise* means 'consists of'. A formation is *not* 'comprised of' sandstone and shale; it *comprises*, or *consists of*, or *is composed of* sandstone and shale. A whole *comprises* two halves, but two halves *constitute* (*not* comprise) a whole.

Comprise implies 'inclusion of all parts of a whole' as opposed to *include*, which implies that 'there may be other parts not mentioned': *The sandstone comprises quartz, feldspar, chert, and calcite*, but *The sandstone includes quartz and feldspar in its mineral composition.*

Never use *is comprised of*: use *is composed of*.

computerize

concede

concrete *See* ABSTRACT.

cone-in-cone

confer, conference

conform to (*not* conform with)

conodont Colour Alteration Index (CAI) *See* COLOUR ALTERATION INDEX.

consensus *Consensus* means 'shared opinion', or 'unanimity of opinion'. 'Consensus of opinion' contains a redundant element. *The consensus is that the strata are Devonian* is correct.

consider *See* BELIEVE.

consistent, consistency

consists of, consists in *Consists of* denotes 'the substance of which the material is made', and is a synonym for *is composed of*. *Consists in* defines the subject: *The work consists in writing reports*, and is a synonym for *has its being in*.

Use *consists of* for materials, and *consists in* for a definition or statement of identity.

conspecific (*not* cospecific)

contact As a verb, *to contact* is now acceptable in the sense of 'get in touch with, look up, find, or meet'. The noun *contact* is also used in the modern sense of 'an acquaintance who might be of use': *I made several useful contacts at the Current Activities Forum*.

contact-metamorphosed sedimentary rocks, but **the sedimentary rocks are contact metamorphosed**

continual, continuous Whereas *continual* means 'repeated' or 'going on at regular intervals', *continuous* means 'unbroken' or 'going on without pause'.

contractions of verbs An apostrophe is used to represent the missing letter(s): *she's, shouldn't, couldn't, can't,* etc. Although contractions are used in speech or informal writing, such as personal letters, they should not be used in scientific reports or papers.

contrast with, contrast to When *contrast* is used as a verb, it is followed by *with*. Either *to* or *with* may be used when *contrast* is used as a noun.

corehole

Coriolis effect

corollary

corrasion, corrosion. *Corrasion* refers to 'mechanical erosion of rocks and soil by the sediment load in air, water, or ice'. *Corrosion* refers to 'erosion by chemical processes'.

correlate The word *correlate* is used to demonstrate the equivalence of two or more geological phenomena in different areas, although they may be different in lithology. A limestone formation in the Yukon Territory may, for example, be *correlated* with a sandstone formation in Alberta. The term should not be applied to separate bodies of the same formation or group, nor to what are mapped tentatively as parts of the same lithological units. *Correlations* may be based on lithological, paleontological, chronological, or other physical evidence. *Correlate with* is the correct expression; 'correlate to' is incorrect.

correspondence

corroborate

counsel, counselled

county Capitalized as in *Pictou County*.

crag-and-tail (n. and adj.)

craton Capitalized as in *Slave Craton,* but *North American craton.*

creek Capitalized as in *Lost Creek.*

crevasse splay

crisis (pl. **crises**)

criterion (pl. **criteria**)

cross- Compound words starting with *cross-* may be one word: *crossbed, crossbedded, crossbedding, crosscut, crosscutting, crosshatched, crosshatching, crosslaminae, crosslaminated, cross-lamination*; hyphenated: *cross-section, cross-stratification;* or two words: *cross fault, cross fold.*

crystallize, crystallization

crystallographic

cryptocrystalline

cryptozoon

cumulate, cumulus In petrological jargon, *cumulate* is a noun defined as a name for igneous rocks of a particular kind, and its uses are essentially parallel to those of *rock*. Thus, we can have *cumulate layers* or *rock layers*, but 'cumulate rock' is redundant. *Cumulus* is defined as the corresponding adjective, so we have *cumulus minerals* and *postcumulus processes*, but 'cumulate mineral' and 'postcumulate processes' are inappropriate.

cusp-ripple

cut-and-fill (n. and adj.)

cutbank

cutoff (n.), but **cut off** (vb.)

cutting samples (*not* cuttings samples)

damsite

dangling participle Avoid the common error of opening a sentence with a *participle*, thus misrelating phrases, so that the participle becomes unattached from its correct noun or implies a wrong noun, as in the following examples:

> Shattered into fragments, the student picked up the calcite crystal.
> Traversing across the fold belt, the rocks become increasingly gneissic.
> Going westward, the craton becomes part of a mobile belt.

Such sentences with *dangling participles* range from amusing to ridiculous — where they should be easy to spot. Students may be fragile, but rocks and cratons are remarkably stable.

Make sure that phrases are related to a proper subject in the main clause. This can be done by examining the participles (*present participles* end in *-ing*; *past participles* end in *-d* or *-ed*) and asking: *Who or what is -ing or -ed?* If the answer is not logical, then rewrite the entire sentence.

Care should be taken to avoid the *hanging participle*, gerundial, or infinitive phrase, that is, one for which the subject is missing. Amusing illustrations have been quoted, such as: *Having eaten our lunch, the boat sailed for Quebec*; or, *When three years old (or, At the age of three), my grandmother died.* However, these are no more absurd than the following: *Approaching the contact, the phenocrysts decrease in size; On crossing the ridge, the quartz veins appeared at closer intervals*; or *Reviewing the preceding paragraphs, the Cache Creek Group...*

See also PARTICIPLES.

dark coloured, dark weathering Avoid using these meaningless descriptive terms by describing the actual colour of the rock, weathering, etc.

database, but **data set**

datable (*not* dateable)

date line

dates Instead of such expressions as *last year* or *next year*, the exact year should be specified. Delay in publication may make the general reference erroneous.

datum (pl. **data**) The word *data* is a Latin plural: *data are* (*not* data is), and *these data* (*not* this data). The singular, *datum*, is seldom used and the sentence can usually be rewritten to avoid it. The word *information* can serve much the same purpose.

debate, debatable

debris flow, debris flow deposits

deca The prefix *deca* (symbol da) indicates the multiple 10^1.

deci The prefix *deci* (symbol d) indicates the multiple 10^{-1}.

decimate *Decimate* means 'to reduce *by* one tenth, not *to* one tenth (originally, to take out one tenth)'; hence, 'to decimate by twenty per cent' is incorrect. Decimate also now means 'to destroy a large proportion of'.

décollement

deep-sea sediments

deep water (n.), but **deep-water sediments** (adj.)

defective, deficient *Defective* (from defect) is appropriate if something is 'lacking in quality'. *Deficient* (from deficit) refers to 'inadequate quantities'.

definite, definitely Do not use these words unless you are sure that you cannot express your meaning properly without them. They mean 'exact(ly), precise(ly), distinct(ly), certain(ly)'.

definite article *See* THE.

definitive This word goes a step further than *definite* and introduces a concept of finality. *A definite offer* may state precise terms, but *a definitive offer* presents final terms. A *definitive report* is the 'last word' on a subject.

degree symbol (°) 32°C (no space, *not* 32 °C, *or* 32° C). Other examples:

30 ± 2°C	minus 10°C	*or*	−10°C
−10 to −30°C (*not* −10–30°C)			
10° (of arc)	40° (40 proof)		an angle of 45°
latitude 49°21′18″N, longitude 72°13′14″W			

de-icing (*not* deicing)

delta fan, delta front, delta plain (n.), but **delta-front deposits, delta-plain deposits** (adj.)

dependable

dependant (n.), **dependent** (adj.) Do not omit the word *on* or *upon* after *depend* and *dependent.*

depleted *See* ENRICHED.

depocentre

deposit (or detritus) **feeder structure** (ichnology) (*not* deposit feeding structure — deposits do not feed)

deprecate, depreciate *Deprecate* means 'to express disapproval of'. *Depreciate* means 'to lower the value of'.

desiccate, desiccation, desiccator

desirable

develop *Develop* should be used in the sense of 'a gradual process' and is not a synonym for *arise, come, happen, occur, take place*, etc. It is correctly applied in *developing a mine*, but a prospect is *explored*. Other words or expressions, such as *uncover, unfold, bring to light, disclose, increase, produce, expand, evolve, make, contrive, construct, build, establish, compose, achieve, enlarge*, and *extend*, can be substituted for greater clarity and less monotony.

devise

diamond-drill hole, but **drillhole**

differ When used in the sense of 'being different', *differ* is followed by *from*. When used in the sense of 'having a difference of opinion', it may be followed by *with* or *from*.

different Use *different from* (*never* different than *or* different to).

dilemma This word is not a synonym for *difficulty*. *Dilemma* means 'a situation or predicament involving a choice between two equally balanced, and usually equally unattractive, solutions or courses of action'.

dip, dipping *See* DIRECTION; STRIKE AND DIP.

dip slip, dip slope, but **dip-slip fault**

direction Compass points consisting of two directions are written as one word: *northwest, southeast*. Hyphenate after the first point, where there are three points: *north-northwest, south-southwest*. Note also: *north-trending, north-northwest-trending, west-central.*

North (or *south, east, west, northeast, north-northeast*, etc.) is to be preferred where a definite directional designation is intended, as in *north bank, north side, west corner, east boundary, south flowing*, or *north dip*.

Northward or *northerly* are more appropriate where the direction is less precise, as in *northward trending, northerly dipping*. *Northward* (*westward*, etc.) is preferred to 'northerly', as the latter can mean both 'from the north' and 'to the north'.

Bearings should be given by azimuth. Write *the fault strikes 135°* (*not* the fault strikes north 45° west, or N55°W). Similarly, write that *glacial striae trend 140°* (*not* south 40° east, or S40°E). Avoid bearings such as 'north-south', 'northwest-southeast', or 'east-west' in such statements as 'the folds trend north-south'; it is sufficient to note that the folds trend north (*not* N).

In texts on structural geology, compass directions can be abbreviated; for example, *N, NE, NNE*, and *strike 328°, dip 25° NE* (or *328°/25°NE*). Do not abbreviate 'north' ('south', etc.) in expressions such as *the north side of the lake,* or in expressions such as *north-trending fault, southwest-plunging strata.*

Unless stated to be magnetic, all bearings are assumed to be true.

Use *northern*, etc. where the 'general northern end of the zone' is intended: *southern Alberta, western Virginia,* but *West Virginia* and *Western Canada* (formal names).

See also AZIMUTH; STRIKE AND DIP.

directly As an adverb *directly* means 'instantly' or 'immediately', not a conjunction equivalent to 'as soon as'.

disc, disk *Slipped disc* and *disc brakes*, but *disk, diskette* for computers, e.g. *floppy disk,* but *CD* or *compact disc*.

discrete, discreet *Discrete* means 'individually distinct, a separate entity'. *Discreet* means 'prudent or tactful'.

dissect

disséminate

dissociate (*not* disassociate)

distinctive *See* CHARACTERISTIC.

divisible, division

dolomite, dolostone *Dolomite* is the mineral. Authors may use either *dolostone* or *dolomite* for the rock.

domain Uppercase where formal as in *Britt Domain, Parry Sound Domain.*

dome Capitalized as in *Ozark Dome.*

donate This word is not the equivalent of 'give'; it means 'present with'.

down Most compound words starting with *down* are one word: *downdip, downdropped, downfaulted, downsection, downslope, downstream, downthrown, downwarped, downwelling*, but *down-ice* (adj.)

downward (*not* downwards)

draft (*not* draught)

drag fold

drift-covered area, but 'the area is **drift covered**'.

driftwood

drill bit, drill core

drillhole, but **diamond-drill hole**

drumlin-like

due to, owing to, because of Current usage indicates that *due to* has become a compound preposition, essentially synonymous with *owing to*: *Due to (Owing to) the high chert content, the limestone is of limited use.* Some writers, however, observe the earlier distinction between these complex prepositions, and feel that *due to* is an adjectival construction and must be preceded by a noun/pronoun, and any form of the verb *to be*, whereas *owing to* is an adverbial construction, and relates to transitive and intransitive verbs. These writers would rewrite the sentence as: *Owing to the high chert content, the limestone is of limited use*, or *The limited usefulness of this limestone is due to the high chert content.* Another example of this differentiated usage is: *He missed the evidence of a fault, owing to the presence of a thick vegetation cover*, or *His failure to observe the fault was due to the presence of a thick vegetation cover.*

Both of these complex prepositions mean 'because of', or 'caused by', but some distinction can be made by considering that *due to* = 'a result of', while *owing to* = 'as a result of'. Avoid adding 'the fact that' to either phrase.

dwelling structure (ichnology)

dyke (*not* dike)

earlier, later *Earlier* and *later* (also *older* and *younger*) are commonly misused in geological reports and maps. Earlier and later are time terms: *Late Cretaceous or earlier.* Older and younger refer to rocks and rock formations: *Blackstone River Group or older strata.*

early, late These are time terms applied to geochronological units (period, epoch, age, etc.) and should be used for age or intervals of time only; the terms *lower* and *upper* being used for stratigraphic intervals.

The current rule is to use *early* and *late* for informal, loosely defined divisions: *early Paleozoic, late Paleozoic, early Cenomanian, late Tertiary, early in the Devonian, late Cretaceous deformation.*

Early and *Late* are used for formal, clearly defined divisions: *Early Cambrian, Late Devonian, Early Jurassic, Late Cretaceous.*

See also BASAL; EARLY, LOWER; LATE, UPPER; LOWER, UPPER; MIDDLE.

early, lower A stratigraphic unit may be referred to in either physical (rock) or temporal (time) terms, depending on the context, and regardless of whether or not the word *age* is used. *Early* and *Lower*, for example (also *Late* and *Upper*), are not interchangeable as they have different meanings:

> *Lower* refers to relative physical position in a stratigraphic section.
> *Early* refers to relative temporal attribution in a continuum of age.

See also BASAL; EARLY, LATE; LATE, UPPER; LOWER, UPPER; MIDDLE.

Early Precambrian (=Archean), but **early Precambrian** (indefinite)

Earth (planet); **earth** (material)

earthflow

earthquake *See* AFTERSHOCK, FORESHOCK; FORECAST, PREDICTION; INTENSITY, MAGNITUDE.

east-central

Eastern Canada, Eastern Townships

east-northeast

ebb tide

echogram, echo sounder

effect *See* AFFECT.

e.g. Abbreviation of the Latin *exempli gratia*, meaning 'for example'. This abbreviation introduces an example or examples of what precedes: *sedimentary rock types, e.g. siltstone, sandstone, and limestone.*

Note that a comma (sometimes a dash, semicolon, or bracket) is written directly before *e.g.* but that as a rule there is no need for a comma immediately afterwards. If you use *e.g.* at the beginning of a list, do not use *etc.* at the end of it. Avoid using *e.g.* at the beginning of a sentence. Do not use *e.g.* in place of *i.e.* (*i.e.* restates and specifies, whereas *e.g.* just exemplifies). Where *for example* is written out, it is usually followed by a comma, and may be preceded by a comma, a dash, a period, or a bracket. The abbreviation *e.g.* is preferably confined to parenthetical references, and is set in vertical (roman) type.

See also I.E.; VIZ.

eighteenth century (*not* Eighteenth Century)

eldest *See* OLDEST.

electron microprobe (*not* electron probe or probe)

elevation *See* ALTITUDE.

elongated-clast fabric measurement

elude *See* ALLUDE.

embedded (*not* imbedded)

emphasis Many writers overlook the *emphasis* that can be gained by rearranging the order of words in a sentence. For example, in the following sentence the emphasis is on *discovery*: *The discovery of gold in the Klondike was made in 1896.* If it is desired to emphasize *gold*, the sentence should read: *Gold was discovered in the Klondike in 1896.* To emphasize the *Klondike*, the sentence should read: *The Klondike gold discoveries were made in 1896*, and, to stress the *date*: *In 1896, gold was discovered in the Klondike.*

enclose

encounter This verb is commonly misused for 'observe'. One *encounters* a grizzly bear, but *observes* a deformation pattern.

encrustation (*not* incrustation)

endorse This word should not be used in the sense of 'corroborate', 'subscribe to', or 'be in agreement with'. It means 'confirm' or 'ratify'.

en échelon

enriched, depleted Avoid misusing these words when *richer* or *poorer*, or *higher* or *lower* will suffice. Remember that *enrichment* and *depletion* are 'processes', and so if you are tempted to use *enriched* or *depleted*, ask yourself what process is implied and whether the word is appropriate and justified in that context. If you use the words, be sure to say 'what' is *enriched* or *depleted*, that it is something that can be *enriched* or *depleted*, and that you identify the standard of comparison.

en route (*not* enroute)

entail *Entail* means 'to impose upon, to involve', or 'to require as a necessary condition'. (For example, in terms of labour or expense.) This verb is frequently used where no verb is necessary, or where the words *need, cause, impose, necessitate*, or *involve* should be substituted. *See also* INVOLVE.

entropy ratio, but **fixed entropy-ratio**

environments (multiple) Although an 'en dash' is commonly used to link multiple environment entries, an 'oblique' (slash) provides a much clearer, less ambiguous linkage. For example, *a lagoon-coastal swamp environment* could be a single, special, swamp environment rather than the intended dual or composite environment, because the dash links lagoon and coastal, not lagoon and coastal swamp. The entry *lagoon/coastal swamp environment* avoids ambiguity and clearly separates two distinct entities. *Never* use a hyphen for this construction. *See also* 'Oblique' in 'Punctuation'.

eolian (*not* aeolian)

epeirogeny

epicentre

equally as *As* should be omitted. Not *equally as good*, but *equally good.*

erosional, erosive Do not confuse *erosional* with *erosive* — the two words are not interchangeable. *Erosional* describes 'the state or origin of something as the result of erosion'. *Erosive* means 'having the function or property of eroding'. Surfaces and contacts can be *erosional* but cannot be *erosive*. Currents and streams are *erosive*. It is impossible to have an *erosive surface* or an *erosive contact.*

erratum (pl. **errata**)

error ranges *See* PLUS, PLUS/MINUS

essentially *Essentially* means 'necessarily or indispensably'. In scientific writing, it should not be used as a substitute for 'principally, chiefly, mainly, virtually, in effect, most of', and 'almost': *The formation comprises mainly limestone*, or *Most of the formation is limestone*, are preferable to 'The formation is essentially limestone'.

et al. Abbreviation of the Latin *et alii* (or *et aliae*, the feminine form) meaning 'and others' or 'and other people'. The abbreviation *et al.* is set in vertical (roman) type. When the list is of non-human items, the appropriate term is *etc.* If *et al.* follows a list of two or more items, then it is preceded by a comma. Do not use *et al.* at the end of a list that begins with *e.g.*, *such as*, or *for example*. Never write 'and et al.' *See also* ETC.

etc. Abbreviation of the Latin *et cetera*, meaning 'and the remaining things'. The abbreviation *etc.* is preceded by a comma if it follows a list of two or more items: *A typical metasedimentary sequence of quartzite, marble, pelite, etc.* If there is only one item, however, the comma is usually omitted. Since *etc.* means 'and the rest', it is redundant to write *and etc.* Do not use *etc.* at the end of a list if the list begins with *e.g.*, *for example*, or *such as*. The abbreviation *etc.* is preferably confined to parenthetical references, and is set in vertical (roman) type. *See also* ET AL.

euphemism, euphuism *Euphemism* is 'a figure of speech in which a mild or gentle expression or word is used instead of a strong or unpleasant one': *passed away*, instead of *died*. *Euphuism* denotes 'a high-flown and affected style of writing or speaking, using excessive elegance'.

eustasy

even, evenness

everyone, every one *See* ANYONE.

evidence of (something), **evidence for** (a theory)

evident *See* APPARENT.

exaggerate, exaggeration

exceed

except that As a conjunction introducing a clause, *except that* is better replaced by *unless*, or *if not*.

excerpt

existence, existent

extend Consider the merits of *give, accord*, or *offer* as alternatives when expressing thanks to your associates.

extraglacial

facilitate, felicitate 'The field officer was *facilitated* in his work by the manager of the Hudson's Bay Company store' is the wrong use of *facilitate*: the work may have been *facilitated*, but not the officer. Do not confuse *facilitate* with *felicitate*, meaning 'to congratulate'.

fact Avoid using such meaningless phrases as: *as a matter of fact, in fact, the fact is*, and *actually*.

factor A *factor* is 'something that contributes to an effect', but too commonly it is used instead of: *circumstance, component, consideration, constituent, element, event*, and *fact*.

fall line

fallout (n.), **fall out** (vb.)

far-reaching, far-reaching events

farther, further Use *farther* when implying distance, as in *farther from the base*; but use *further* when implying something additional, as with *this requires further research*.

fast ice

fault Capitalized as in *San Andreas Fault*

fault-block mountain

favour

feasible

fecal (*not* faecal)

feeding structure (ichnology), but **deposit feeder structure** (*not* deposit feeding structure — deposits do not feed and a structure feeding a deposit would be a delta).

feel *See* BELIEVE.

feet Written as *5 ft.* or *five feet*. The SI equivalent should be stated in parentheses.

feldspar, feldspar porphyry, but **feldspar-phyric**

felicitate *See* FACILITATE.

felsenmeer

felsic, mafic When describing rocks, the terms *felsic* and *mafic* are used. *Salic* and *femic* are used for discussing 'norms'. *See also* SALIC, FEMIC.

femic *See* SALIC; *see also* FELSIC, MAFIC.

ferromagnesian

fetid

few, a few *Few* emphasizes the fact that 'the number is small'. *A few* emphasizes the fact that 'there is more than one'.

fewer, less, lesser The word *less* should not be misused for *fewer*. *Less* takes a singular noun: *there is less choice*; *fewer* takes a plural noun: *there are fewer choices*.

Fewer is used when referring to number (i.e. countable items): *There were fewer phenocrysts in the porphyry on the southern edge of the exposure*. Do not add *number* to *fewer* by writing 'fewer number' or 'fewer in number'.

Less or *lesser* are used when referring to 'relative quantity, amount, mass, bulk, or size': *The porphyry has a lesser content of phenocrysts near its southern margin*.

fibre (*not* fiber)

field geology, field map, field season, field trip, but **fieldwork**

Figure The word 'Figure', referring to text or pocket illustrations, is capitalized when written out in the text (in singular and plural) and when abbreviated in parentheses:

Figure 1	Figures 1 and 2	Figures 5 to 20	Figure 1a and b
(Fig. 1)	(Fig. 1, 2)	(Fig. 5–20)	(Fig. 1a, b)
Fig. 17a, b, 18			

Note that a semicolon is used to separate references to different items in parentheses:

(Fig. 1; Smith, 1994)	—	indicates two references: one to Figure 1 (of this report), and one to Smith, 1994.
(Fig. 1 *in* Smith, 1994)	—	indicates one reference: to Figure 1 found in Smith, 1994.

Full page groups of black and white photographs or photomicrographs, in other than paleontological reports, are called 'Figures'. Individual illustrations in these 'Figures' are identified by letters.

See also PLATE.

fine grained *See* COARSE GRAINED.

fining-upward cycles, fining-upward sequences (*not* upward-fining sequences, *or* fining-up sequences)

fiords, not fjords

first, firstly When several facts or items are being listed one by one, do you use *first, second, third* or *firstly, secondly, thirdly*? Although both are correct, *first, second, third* is preferred. The main thing is to be consistent in your use.

first-order (adj.)

first two This is correct (*not* two first)

fit, fitted, but **fitful**

fix *Fix* means 'to make firm or to place definitely'. Avoid using *fix* to mean 'arrange, prepare, or repair'.

flatland, but **flat-lying**

flight line

floodplain, floodwater

flowslide, flowtill

fluorescent, fluorescence The light is *fluorescent*; the property of the mineral or substance is *fluorescence*.

fluorite

fluviodeltaic, fluvioglacial, fluviolacustrine

focus (pl. **focuses**)

focused (*not* focussed)

-fold Numerical compounds with *fold* are written as one word: *twofold, sixtyfold,* a *thousandfold,* but *24-fold.*

fold belt (*not* foldbelt)

follow-up (n., adj.), **follow up** (vb.)

following *Following* should not be used as a preposition substituting for 'after' or 'as a result of', but only as a participle, when it agrees with a noun or pronoun: *Such success, following the careful preparations, was to be expected.*

foothills Capitalize as in *the Alberta Foothills, the Rocky Mountain Foothills,* and *the Foothills* (when referring to the previous two). Note also *the Foothills Belt.*

footnote

footwall, (n. and adj.), but **hanging wall** (n.) and **hanging-wall** (adj.)

for, of John Smith is manager *of* a mine *for* a company.

foraminifers, Foraminifera The word *Foraminifera* is a 'taxonomic term', and should not be used in a sentence where the writer means 'fossils belonging to the order Foraminifera'. Thus write: *rocks contain foraminifers* (or *brachiopods, conodonts,* etc.), not 'rocks contain Foraminifera (or Brachiopoda, Conodonta, etc.)'. It is also correct to use *foraminiferal limestone, foraminiferal ooze,* and *foraminiferal test.*

forecast, prediction Although in most dictionaries, *forecast* and *predict* are regarded as synonymous, there is a distinction between the terms when applied to geophysical phenomena. *Forecast* is 'a description of the ambient conditions over some period of time in the future over some region'. *Prediction* is 'the indication of a particular event at a particular time and place'. Whereas

weather conditions and magnetic storms are *forecast*, earthquakes are *predicted*. The past tense and past participle are *forecast*, not *forecasted*. *See also* AFTERSHOCK, FORESHOCK; INTENSITY, MAGNITUDE.

foredeep, foreland, foreset, foreslope

foregoing, forgoing *Foregoing* refers to 'something that has gone before (preceding)'. *Forgoing* means 'abstaining from something'.

foreign

fore reef

foreshock *See* AFTERSHOCK.

foreword, forward Whereas a *foreword* is similar to a *preface*, *forward* means 'ahead'.

format, formatting

formation *Warspite Formation; Nullataktok Formation;* but *Warspite and Nullataktok formations.*

former, latter These are useful words where used to avoid awkward or lengthy repetition of two nouns or names. The words refer to something that has been mentioned, usually in the preceding sentence, as the first (*former*) or second (*latter*) of two. *Latter* should not be used for the final item or person in a list. Where three or more items are under consideration, do not use 'the former' or 'the latter'. The words *the first* and *the last* are then appropriate. Try to avoid overusing *former* and *latter*, for in many cases it is clearer to simply repeat the actual nouns. *See* "'Former' and 'latter'" in 'Grammar'.

formula (pl. **formulas**)

Forty-ninth Parallel, 49th Parallel Capitalized if an International Boundary, not otherwise: *fifty-first parallel, 51st parallel.*

fossilize

fourfold, fourscore

fractions Hyphenate *fractions* used as modifiers and written in full, unless the numerator or denominator already contains a hyphen: *a one-third share, twenty-fiftieths calcium, twenty-nine fiftieths calcium* (29/50 is preferable). Do not hyphenate fractions used as nouns: *four fifths of the sample was sand.*

freeze-and-thaw

freeze-dried food

freeze-up (n.), **freeze up** (vb.)

frequently *See* TIME TERMS.

fresh water (n.); **freshwater** (adj.). For example: *A freshwater lake consists of fresh water.*

frontispiece

frost heave, frost table

fulfil, fulfilment

fulgurite The burrow-like trace of a lightning strike.

further *See* FARTHER

Ga (10^9 years) *See* Ma.

gamma ray (n.), **gamma-ray** (adj.). For example: *A gamma-ray log is based on gamma rays.*

gangue

gas (pl. **gases**)

Gaspésie This is the correct term. Do not use 'Gaspé', or 'Gaspé Peninsula', or 'Gaspésie Peninsula'.

gastropods

gauge, gaugeable

generally speaking Avoid this expression in such sentences as: 'Generally speaking, the rocks are well exposed.' No one is speaking — certainly not the rocks.

geochemistry *See* CHEMISTRY.

geochronological units Position within *geochronological units* (period, epoch, age, etc.) is best indicated by *early, middle, medial, late*, and *latest.*

geographic (*not* geographical).

geological (*not* geologic) Compare usage with *a logical idea, a logical person,* etc. Never 'a logic idea' or 'a logic person'.

geometry This word is frequently misused, particularly in structural geology, but also in paleontology. Fossils, folds, and faults, etc. do not have 'a geometry'. The words *form, style, profile, shape*, and *configuration* can be substituted in many instances.

geomorphological (*not* geomorphologic)

giga The prefix *giga* (symbol G) indicates the multiple 10^9.

glacial lake, but **glacial Lake Iroquois**

glacially eroded landscape

glaciofluvial, glaciogenic, glaciolacustrine, but **glacio-isostasy**

globular, globule-like (*not* globularlike)

gneiss *See* ROCK NAMES.

gold-bearing deposit

got Avoid the use of 'have got' or 'have obtained' where *have* alone will express your meaning.

Never use 'gotten'.

graben (pl. **grabens**)

grain size

gram

Great Divide, Great Plains, the Plains (as a physiographic province)

greater than (>), less than (<) The signs stand for '*is*, or *are*, greater than, less than'. In the text, the expression is written out, whereas the signs are used in parentheses: *dip less than 10°*; *steep dips (>70°)*. The signs are used in equations and tables; there is no space between the sign and the number.

grey (*not* gray)

greywacke

groundmass, groundwater, groundwork, but **ground ice**

group *Windsor Group; Canso Group;* but *Windsor and Canso groups.*

guidebook

gully (pl. **gullies**), **gullying**

half life, half width, one half (*not* a half)

halfway

halo (pl. **haloes**)

hanging participle *See* DANGLING PARTICIPLE.

hanging wall (n.), **hanging-wall** (adj.), but **footwall** (n. and adj.)

harbour

hardground, hardpan, hardwood

hard hit, hard won, hard earned (*not* hardly hit, etc.) *Hardly* is the adverb of the adjective *hard*. *Hardly* is used only in the sense of 'scarcely'.

hard rock A colloquial term meaning 'igneous or metamorphic rock'; hard-rock geology (adj.).

Hawaiian-type eruption

headland

hecto The prefix *hecto* (symbol h) indicates the multiple 10^2.

height

hemispheric

herringbone crossbedding

hiatus (pl. **hiatuses**)

high angle, but **high-angle fault**

high energy, but **high-energy environment**

high grade (n.), **high-grade** (adj.) *High-grade metamorphism*, but *the metamorphism is high grade*

highlight(s) Reserve this word to refer to 'a moment or detail of vivid interest'.

highly shattered rock

high sea-level beach

highstand, highwall

high volatile coal *See* COAL.

high water, but **high-water mark**

highway, but *Alaska Highway, Trans-Canada Highway, Mackenzie Highway, Toronto-Hamilton Highway, Highway 417.*

hillside, hilltop

hinge line

histogram

historic, historical *Historic* is used in the broad sense of 'notable' or 'important or well known in history': *a historic earthquake* (an earthquake notable for its magnitude, or the damage it caused). The word *historical* is used to describe events or things from the past: *historical records* (records from the past); *historical earthquakes* (earthquakes that occurred in the past).

homeoblastic

homogeneous, homogeneity

honour

hoodoo

horizon A *horizon* is, theoretically, 'a plane', and the word should not be used in reference to features that have implied or measured thicknesses. Alternative words are *zone, band, belt, bed, seam, parting, layer, unit*, etc. Thus we have *platy units, fossil zones, mineral belts, ironstone bands, concretionary bands, sandstone beds, seams of coal*, and *partings of shale, bentonite*, etc. An exception is a *soil horizon*, which is a layer.

hotspring, coldspring

however Avoid starting a sentence with *however* when the meaning is 'nevertheless'.

Hudson Bay, but **Hudson's Bay Company**

humus

hydroelectric

hydrogen sulphide solution

hydrological (*not* hydrologic)

hypabyssal

hypothesis (pl. **hypotheses**)

I, we First person pronouns are acceptable. *See also* 'Active and passive voice' in 'Grammar'; PERSON.

ibid. Abbreviation of the Latin *ibidem*, meaning 'in the same place', and should not be confused with *op. cit.* (abbr. of Latin *opere citato*) meaning 'in the work quoted'. Use *op. cit.* to indicate a repeat of the previous reference, and *ibid.* to identify a repeat of a specific reference to a page or figure. Both *ibid.* and *op. cit.* are set in vertical (roman) type.

The normal style of GSC referencing is more convenient for the reader than overuse of *ibid.* or *op. cit. See* 'Notes for format of publication' in 'Paleontology'.

-ic, -ical Use the terminations (suffixes) *-ic* and *-ical* in a phonetic sense, except where custom may have dictated otherwise. For example, do not use 'geologic': use *geological*. Generally, words ending in *-spheric* do not take *-al*; for example, *atmospheric* and *hemispheric*. The word *spherical* is an exception. Words ending in *-graphic* do not take *-al* (e.g. *geographic, petrographic, topographic*). Words ending in *-logic* do take *-al* (e.g. *biological, geological, petrological, lithological, paleontological*). A 'rule of thumb' for other words is the closeness of the relationship with the noun (e.g. an *electric light* is *electric*, but an *electrical contractor* is not).

iceberg, icefall

ice break-up season

ice cap, ice dam, ice field, ice flow, ice front, ice sheet

ice-contact deposit, ice-flow direction, ice-marginal channel

ichnocoenosis (an assemblage of trace fossils), **ichnofossil, ichnology**

ichthyosaur, ***Ichthyosaurus***

ideal This word cannot be used in the comparative. 'More ideal' is impossible.

identical Correct constructions are: *one is identical with (or to) the other; two (or more) people, things are identical.*

identified as (*not* identified to be, as this implies that the identification is the cause)

i.e. Abbreviation of the Latin *id est*, meaning 'that is'. The abbreviation gives a full explanation of what precedes:

Examination of the MORB, i.e. the mid-ocean-ridge basalt...

Note that a comma (sometimes a dash, semicolon, or bracket) is written directly before *i.e.* but that as a rule there is no need for a comma immediately afterwards. If you use *i.e.* at the beginning of a list, do not use *etc.* at the end of it. Avoid using *i.e.* at the beginning of a sentence. Do not use *i.e.* in the place of *e.g.* (*i.e.* restates and specifies, whereas *e.g.* just exemplifies). Where *that is* is written out, it is usually followed by a comma, and may be preceded by a comma, a dash, a period, or a bracket.

The abbreviation *i.e.* is preferably confined to parenthetical references, and is set in vertical (roman) type.

See also E.G.; VIZ.

if, when One of these words is usually sufficient.

illusion *See* ALLUSION.

immanent, imminent Whereas *immanent* means 'inherent', *imminent* means 'about to occur'.

immiscible

impact (n.) Use this word as a noun only: *Climatic change has had an impact on the geomorphology of the prairies.* Use the verbs *affect* or *influence* instead of *impact*: *climate change affected the environment,* not *climate change impacted the environment.*

impassable (*not* impassible)

Imperial system Unit abbreviations in the *imperial system* of measures take periods. Do not add an *s* to form the plural. Area and volume are expressed by *sq.* and *cu.* Examples are:

8 in.	100 sq. ft.
11.6 sq. in.	20 cu. yd.

NOTE: When the Imperial system is used, the SI (metric) equivalent should be stated in brackets.

imply, infer Do not confuse these words. They are not interchangeable. *Imply* means 'to hint at or suggest', while *infer* means 'to deduce or to draw a conclusion from': *The evidence implies the existence of a fault* is correct, as the evidence does not 'infer' the existence of a fault: *What do you imply by that remark? What am I to infer from that remark?*

important Do not use words such as *important* and *significant* without explaining why the subject is important or significant. For example, *a significant find* may mean one thing to the author, but something quite different to the reader. *An important outcrop* is similarly vague. Many other words, such as *long*, *extensive*, and *widespread* convey more information than the word *important*, but also require explanation and a more scientific definition. The same applies to such words as *interesting* and *reasonable*.

inasmuch as

incertae sedis Latin, meaning 'of uncertain place'. A term applied to a fossil or modern specimen whose classification is considered uncertain.

inch (pl. **inches**) Written as 5 in. or 5 inches, the SI equivalent should be stated in brackets.

incise The word *incise* means 'to cut into', so *incised into* is redundant.

include *See* COMPRISE.

inculcate We *inculcate* ideas into people, not people with ideas.

indefinite article *See* "The indefinite articles 'a' and 'an'" in 'Grammar'.

independent (*not* independant)

index (pl. **indexes**) Use *indexes* with books, but *indices* for specialized usage e.g. *Miller indices, Colour Alteration indices*)

individual *Individual* is not equivalent to *person*. It refers to the single members of a group as opposed to the whole group.

infer *See* IMPLY.

infinitive phrase *See* DANGLING PARTICIPLE.

inform *Tell* is preferable. *Inform* cannot be used with a verb in the infinitive.

information, informative

infrared

-ing endings *See* PARTICIPLES.

in-house program

inside of This is correct only when used adverbially to mean 'in less than' (e.g. *inside of a week*).

in situ This Latin phrase, meaning 'in position', is set in vertical (roman) type.

insofar as (*not* in so far as)

install, installed, installation, instalment

intense, intensive *Intense* means 'existing in a high degree'. *Intensive* means 'directed to a single point, or area, or subject'.

intensity, magnitude The *intensity* of an earthquake at a particular place depends not only on the earthquake magnitude, but on the distance from the earthquake epicentre, and also on the local geology. The *intensity* is measured on arbitrary scales ranging from I (not felt by people) to XII (almost total destruction of buildings etc.).

Earthquake *magnitude*, on the other hand, is a measure of the strength of an earthquake determined by seismographic observations recorded on the Richter, logarithmic scale.

See also AFTERSHOCK, FORESHOCK; FORECAST, PREDICTION.

inter-, intra- The prefix *inter-* means 'between' or 'among': *interbed, interchannel, interdepartmental, interglacial, intermontane, interregional, interrelationship, intertidal.* The prefix *intra-* means 'within' or 'on the inside': *intradepartmental, intraformational, intraglacial.*

inter alia Latin, meaning 'among other things'.

interburden A layer of sedimentary rock that separates two mineable coal beds.

intercede

intermittent, sporadic Whereas *intermittent* relates to 'time', *sporadic* relates to 'distribution'.

internal sediment Material that has been chemically precipitated or mechanically deposited as a sediment in vugs and other cavities or interstices.

International Boundary, the Boundary

interpreted as (*not* interpreted to be) For example, the presence of *Crassispora* is *interpreted as* evidence of an arid paleoclimate.

interstice (n.), **interstitial** (adj.)

in the order of (*not* on *or* of the order of)

intra- *See* INTER.

intrusion-hosted deposits

intrusives The words *intrusives, metamorphics, pyroclastics, volcanics, carbonates, clastics*, and *accessories* are not nouns and, when used in that sense, are geological jargon. Preferably, these words should be used only adjectivally: *intrusions* or *intrusive* rocks, *accessory* minerals,

carbonate rocks, *clastic* rocks, *siliciclastic* rocks, etc. *See also* CARBONATES; CLASTICS; MINERALS, MINERAL CRYSTALS, MINERAL GRAINS; ROCK NAMES USED IN THE PLURAL FORM; ROCKS, ROCK BODIES.

Inuk (pl. **Inuit**, *not* Innuit)

involve *Involve* originally meant 'wrap up, envelop, or enfold'; recent usage (often superfluously) is in the sense of 'include, contain, or imply'. It is therefore correct to say that *rocks are involved in folding*. Use a more specific word in most instances. See also ENTAIL.

iridescent, iridescence

iron-formation *See* ROCK NAMES USED IN THE PLURAL FORM.

irreconcilable

irrelevant

-ise, -ize Most verbs ending with the sound *iz* derive from the original Latin ending *-izare*, based on the Ancient Greek verb suffix, *-izein*. For these verbs, the current North American usage, *-ize*, is more correct than the common British usage, *-ise*, which owes something to the French, *-iser*.

The GSC uses *-ize* as the standard form for most words: *analyze, catalyze, carbonatize, characterize, civilize, computerize, crystallize, fossilize, mineralize, organize, paralyze, recognize*, and *specialize*.

Some verbs, however, should be spelled with *-ise*: *advertise, advise, apprise, arise, comprise, compromise, despise, devise, disguise, exercise, improvise, incise, revise, surmise, surprise*, and *televise*.

isostasy

isotope *See* CHEMICAL SYMBOLS.

isotopic composition, but **lead-isotope composition** (*not* lead isotopic composition)

it When using *it*, or any other pronoun, make sure that the reader knows exactly what is being referred to, i.e. avoid overusing *it*.

italics *Italics*, or *italic type*, should be used sparingly, as this type tends to overemphasize the words. *See* 'Italics' section in 'Grammar'.

it is, it was Avoid overusing *it is* and *it was* at the beginning of a clause, followed by *that, which*, or *who* and the rest of the sentence. For example, 'It was determined from fieldwork that diatremes are rare in west-central Baffin Island' can be rephrased as *Fieldwork proved that diatremes are rare in west-central Baffin Island.*

its, it's Without the apostrophe, *its* is the possessive form of the pronoun 'it'. Use of the apostrophe indicates that *it's* is a contraction of 'it is' or 'it has'.

I-wave

-ize *See* -ISE.

jargon *Jargon* refers to the specialized vocabularies used by members of various professional or social groups, such as geologists, physicians, lawyers, and computer experts. The technical terminology used is incomprehensible to lay people, but facilitates communication within specialized groups.

Avoid needless *jargon*. The point of writing an article or report well, is to communicate clearly, so before using *jargon* ask yourself three questions. Does it convey your meaning? Can it be replaced by a simpler word or expression? Are you using it to communicate, and if not, why not?

joint plane

judgment

juxtaposition Means 'the placing of things side by side' or 'in a close spatial relationship', or 'the condition of being in this relationship'.

ka (10^3 years) This symbol denotes an absolute age and also an interval of time: *about 6.6 ka; gave an age of 17 ka; dated from >24 to 11.4 ka.* It is not necessary to add 'ago' to the age, as in '25 ka ago'.

kame-and-kettle (topography)

kbar *See* KILOBAR.

kerogen Type III

kettle hole

K-feldspar (*not* K-spar)

kieselguhr Synonym for 'diatomite'.

kilo The prefix *kilo* (symbol k) indicates the multiple 10^3.

kilobar Although this unit of pressure is not part of the SI, the GSC continues to use it; *bar* is not abbreviated (1 bar = 100 kPa) and the symbol for *kilobar* is kbar (1 kbar = 10^5 kPa).

kilometre (*not* kilometer) *See* METRE.

Kimmeridgian

knowledgeable

K-wave

label, labelling

labour, but **laborious**

lake Capitalized as in *Great Slave Lake, Lake Erie*, but *lakes Huron and Ontario.*

lakebed, lakefront, lakeshore, lakeside, but **lake basin**

lamina (pl. **laminae**) *Lamina* is the layer, *lamination* is the structure. Do not use *lamination(s)* for *layer(s)*, use *lamina(e)*.

landform, landmark, landmass, landslide, but **land ice**

landlocked

Landsat images

lapilli tuff

larger sized grains

large scale (n.), **large-scale** (adj.)

last, latest *Last* means 'final: the end of a sequence'. *Latest* means 'the most recent'.

late *See* EARLY.

late, upper A stratigraphic unit may be referred to in either physical (rock) or temporal (time) terms, depending on the context, and regardless of whether or not the word *age* is used. *Late* and *Upper*, for example (also *Early* and *Lower*), are not interchangeable as they have different meanings:

Upper refers to relative physical position in a stratigraphic section
Late refers to the relative temporal attribution in a continuum of age

See also EARLY, LATE; EARLY, LOWER; LOWER, UPPER; MIDDLE.

Late Precambrian (= Proterozoic), but **late Precambrian** (indefinite)

later, *See* EARLIER.

latitude Write as: *latitude 64°28′30″N* and *(lat. 64°28′30″N)*, or *(lat. 64°28′30″N; long. 115°21′42″W)*. Do not omit the words *latitude (lat.), longitude (long.)*, or the compass direction.

latter *See* FORMER.

lead-zinc vein

least *Least* is the superlative of *little; less* is the comparative form. It is incorrect to use *least* when referring to only two persons or things: *He is the less efficient of the two supervisors* but *Of all the people in the company, he works the least* (or *he is the least efficient*).

lebensspur (pl. **lebensspuren**)

leda clay

left-lateral fault

lens (pl. **lenses**)

less, lesser *See* FEWER.

less than (<) *See* GREATER THAN.

leuco-quartz diorite, but **leucodiorite**

levée

levelled, levelling (*not* leveled, leveling)

liable *See* APT.

liaison

licence (n.), **license** (vb.)

lie, lay It is easy to confuse the verbs *to lie* and *to lay* although they are quite distinct. Their forms are:

Infinitive	Present tense	Past tense	Present participle	Past participle
to lie	I lie	I lay	lying	lain
to lay	I lay	I laid	laying	laid

To lie means 'to recline, to be positioned on a flat surface, or to be moved into such a position', and is an intransitive verb taking no direct object:

> The boulder of Precambrian charnockite *lies* on the Ordovician limestone. The erratic *lay* undisturbed for thousands of years. It is not *lying* there now, as it has been moved to a university campus. It had *lain* on the outcrop since the Ice Age.

To lay means 'to place in a recumbent position, to deposit, or to put', and is a transitive verb having a direct object:

> The farmer *lays* each stone in its most appropriate place in the dry stone dyke. He *laid* the entire dyke in two weeks. By *laying* each stone with care, the wall could last for generations. His ancestors *laid* a limestone dyke that is still perfect.

Confusion arises because the past tense of *to lie* is *lay*.

Liesegang rings

light coloured, light weathering Avoid using these meaningless descriptive terms by describing the colour of the rock, weathering, etc.

lignite A, lignite B *See* COAL.

like, as Use *like* as a preposition, not as a conjunction with subordinate clauses. *As* may be used as a preposition and as a subordinating conjunction:

> At the fault contact, water acted *like* (or *as*) a lubricant.
> In the field he behaves *as* (*not* like) he does in the office.
> No interpretation can convince the geologist as much *as* the evidence of the rocks themselves.

likely, likelihood *Likely* means 'probable'. *Likely* does not imply any suggestion of habit or that the probability arises from the character of the subject. *See also* APT.

lime mudstone (*not* lime-mudstone)

lime packstone Note, however, *lime-packstone lithofacies, mixed-skeletal lime packstone*, and *mixed-skeletal lime-packstone lithofacies*

limestone *See* ROCK NAMES USED IN THE PLURAL FORM.

limited Do not use *limited* as a substitute for *few, small, meagre, inadequate*, or *scant.*

limy Containing calcite, lime, or limestone.

line 'Along these lines', meaning 'in this way', or 'a course of procedure', is an overworked phrase and should be avoided.

lineament, lineation

liquefaction, liquefy

literally *Literally* means 'truly, accurately, actually, adhering to the facts'; the opposite of 'figuratively'. Do not confuse it with 'figuratively, virtually, or metaphorically'.

lithological (*not* lithologic)

lithology In its original sense, *lithology* was essentially synonymous with *petrography*, but it is now used for the description of rocks in outcrop and hand specimen. Different rock types or units should be called *lithological units*, not 'lithologies'. A rock such as limestone has a certain *lithology*, but limestone, shale, and sandstone are not 'lithologies'. 'Lithologies' are not present in a section or a map area, but *rocks*, *rock types*, *strata*, or *lithological units* are.

lithostratigraphic units Position within *lithostratigraphic units* (group, formation, member, etc.) is indicated by *basal, lower, middle, upper, uppermost.*

lithotectonic

lit-par-lit

litre Note that 'L' is the correct SI symbol for *litre*.

little *See* LEAST.

littoral Means 'benthic oceanic, between high water and low water'.

Llandeilo (Series/Epoch; *not* Llandeilan *or* Llandeilian)

Llandovery (Series/Epoch; *not* Llandoverian)

Llanvirn (Series/Epoch; *not* Llanvirnian)

loan Use *loan* only as a noun; the verb is *lend.*

loaned The better form is *lent*, past participle of *lend.*

locate This word is commonly misused, as in the expressions: *the company located the mill*; *he was located in Toronto*; or *he located the ore shoot.* Use other words, such as *find, place, reside, situate.* A millsite may be *located* (i.e. its position established), but the mill is *built* at a certain place. You may *locate* a claim, but you *find* the ore on it. In many instances, the word may be omitted, as in the sentence: *The millsite is on* (*not* located on) *Spring Creek.*

lodgment till

loess

longitude Write as: *longitude 115°21′42″W* and (*long. 115°21′2″W*), or (*lat. 64°28′30″N; long. 115°21′42″W*). Do not omit the words *latitude (lat.), longitude (long.)*, or the compass direction.

longshore

low energy, low water, but **low-energy environment, low-water mark**

lower, upper These terms are applied to chronostratigraphic units (system, series, stage, etc.) to indicate stratigraphic position within the geological column; the terms *early* and *late* are used for age. They correspond to *early* and *late* as applied to the equivalent geochronological unit, for example: *rocks of the Lower Cambrian System formed during the Early Cambrian Period.*

The current rule is to use *lower* and *upper* for informal, loosely defined divisions: *lower Paleozoic, upper Paleozoic, lowermost Cambrian, lower Albian, upper Tertiary.*

Lower and *Upper* are used for formal, clearly defined divisions: *Lower Cambrian, Upper Devonian, Lower Jurassic, Upper Cretaceous.*

See also BASAL; EARLY, LATE; EARLY, LOWER; LATE, UPPER; MIDDLE.

lowland (Capitalized as in *St. Lawrence Lowland*), **lowstand**

low-lying

low-pressure conditions, low-velocity zone

low volatile coal *See* COAL.

L-tectonite

Ludlow (Series/Epoch; *not* Ludlovian)

lustre (*not* luster)

L-wave

Ma (10^6 years) *Ma* refers to the absolute age of rocks and also denotes a geological interval of time: *The age of the basal Devonian rocks is approximately 409 Ma, and the Devonian Period lasted for about 46 Ma. The laboratory reported a whole-rock Rb-Sr isochron age of 325 ± 20 Ma.* It is not necessary to add 'ago' to the age, as in '510 Ma ago'. The GSC does not use the abbreviation 'm.y.' (or 'my') for millions of years.

Maastrichtian

Mackenzie District of Mackenzie

macroclimate, macrofossil

mafic *See* FELSIC; *see also* SALIC, FEMIC.

magnitude *See* INTENSITY.

mainland

major, majority These words should be restricted to a usage that involves numbers, and should not be substituted carelessly for the greater part of a whole that is not numerical.

many, much The word much should not be misused for many. *Much* takes a singular noun: *much quartz*; *many* takes a plural noun: *many sills*. *Many* is used when referring to number (i.e. countable items): *There were many zircons in the sample*. *Much* is used when referring to 'relative quantity, amount, mass, bulk, or size': *Much of the kyanite in the sample is twinned. See also* FEWER, LESS, LESSER

map area (*not* map-area), **map sheet** Do not confuse a *map area* with a *map* or *sheet*: a *map*, *map sheet*, or *sheet* is a piece of paper.

map legend Lithological descriptions in *map legends* and *cross-sections* can be given in sentences or in inverted sentences. Unit modifiers should be hyphenated when they follow the noun in inverted sentences:

> Quartzite, white, thin-bedded, ripple-marked, fine-grained
>
> Charnockite, feldspar megacrystic, locally garnet-rich

See also ROCK NAMES.

map scale *See* SCALE.

map unit (map unit CAb)

Maritime Provinces, the Maritimes

massif

massive Used to describe a rock or very thick bed of homogeneous material with no apparent stratification.

matrix (pl. **matrices**)

matrix-supported deposits

meagre (*not* meager)

medium (pl. **media**) *Media* is used in the sense of 'communications'. *Medium* is used when 'only one agency or means of communication' is meant.

medium grained *See* COARSE GRAINED.

medium volatile coal *See* COAL.

mega The prefix *mega* (symbol M) indicates the multiple 10^6.

megafauna, megathrust

mélange

melt-out till

meltwaters

member A (*not* Member A) Capitalized if formal, as in *Franklin Member*, but *Franklin and Benjamin members*.

memorandum (pl. **memoranda**)

meridian Capitalized if an international boundary, such as *141st Meridian*; not otherwise: *142nd meridian*.

Mesoarchean, Mesoproterozoic

meta-andesite, meta-anthracite, meta-igneous

metabasalt, metavolcanic

metamorphics *See* CLASTICS; INTRUSIVES; VOLCANICS, METAMORPHICS, CLASTICS

meter (instrument; do not use for the SI unit of measurement)

meticulous *Meticulous* means 'over-careful about small details', and should not be used as a synonym for *scrupulous* or any other word implying commendation.

metre (*not* meter) Only the spelling *metre* is used for the SI unit in Canada. Write: *Five metres...* or *5 m*, not '5 metres' or 'five m'. The accepted symbol is 'm', written with one space between it and the numerical value, and without a period:

5 to 9 m
3–8 m (in parentheses, tables and appendixes only, not in text)
25 m section 25 m thick section
100 m cliff 100 m high cliff

Always write *30 m are*, not '30 m is', even when referring to the upper or lower 30 m of a section: *The top 20 m of the Cardium Formation are* (or *consist of*) *sandstone*, not 'The top 20 m is (or consists of) sandstone'.

Other SI units, such as the *millimetre* (mm), *centimetre* (cm), and *kilometre* (km), are similar to the metre:

20 km traverse

micaceous

micro The prefix *micro* (symbol μ) indicates the multiple 10^{-6}.

microclimate, microfauna, microprocessor

microlithotype Means 'associations of macerals determined microscopically'.

micrometre (μm), *not* micron (μ) 1 μm = 1 μ. The micron is *not* part of the SI.

micron Not used by the GSC. *See* MICROMETRE.

micro-organism, micro-ornament

mid- Most words with the prefix *mid-* are hyphenated: *mid-anterior, Mid-Atlantic Ridge, mid-continental, mid-Cretaceous, mid-length, mid-ocean-ridge basalt, mid-Paleozoic* (*not* mid Paleozoic or Mid-Paleozoic), *mid-valve, mid-nineteen-eighties*; but *midpoint, midline, midway.*

middle This is a time term, between *early* and *late*, when applied to geochronological units, but is also a stratigraphic position term, between *lower* and *upper*, when applied to chronostratigraphic units.

The initial letter of the term is in lowercase (*middle*) to indicate informal, loosely defined divisions (*middle Tertiary*), and is capitalized (*Middle*) to indicate formal, clearly defined divisions (*Middle Devonian*).

See also BASAL; EARLY, LATE; EARLY, LOWER; LATE, UPPER; LOWER, UPPER.

Midwest The north-central states of the U.S.A.

mile, mileage Mile is capitalized as in *Mile 105, Alaska Highway.*

milepost, milestone

militate *Militate* means 'to act, operate, or work in favour of, or against, something', and should not be confused with *mitigate*, which means 'to appease, moderate, or reduce the severity of something'.

millennium

milli The prefix *milli* (symbol m) indicates the multiple 10^{-3}.

millimetre (*not* millimeter) *See* METRE.

millsite

mine (not capitalized even as part of a name: McWatters mine)

mineable

mineralize

mineral matter, but **dispersed mineral-matter**

mineralogical (*not* mineralogic)

mineralogy *Mineralogy* is the study of minerals and should not be used for 'mineral composition'.

minerals, mineral crystals, mineral grains Authors say 'olivines rimmed by pyroxene', when they mean *olivine grains* (or *crystals*) *rimmed by pyroxene*, and 'opaques' when they mean *opaque minerals*.

The plural forms of mineral names should probably be reserved for their variants or species, e.g. 'pyroxenes' might mean augite and hypersthene in one case, or orthopyroxene and pigeonite in another.

See also INTRUSIVES; ROCKS, ROCK BODIES.

minimize

mining division *Kamloops mining division.*

minuscule *minuscule* means 'very small'.

miogeocline, miogeosyncline A *miogeocline* is 'a prograding wedge of shallow-water sediment along a passive continental margin'. A *miogeosyncline* is 'the basin or geosyncline, of the type in which sedimentation is not associated with volcanism'.

miscible

Mississagi

Mississippian

misspell

mitigate *See* MILITATE.

model, modeller, modelling

modicum (pl. **modicums**) *Modicum* means 'a small quantity'.

mollusc (*not* mollusk)

more or less This expression is overworked. Do not write that 'the beds are *more or less* vertical', or 'the situation is *more or less* unique'. These are poor sentences. Nothing can be more than vertical or more than unique. *Almost, approximately*, or *virtually*, are more appropriate.

more than *See* OVER

mould (*not* mold)

mount Capitalized as in *Mount Robson.*

mountainside

mud Most compound words starting with *mud* are one word: *mudball, mudbank, mudchip, mudclast, mudcrack, mudflow, mudlump, mudrock, mudslide, mudstone*, but *mud boil, mud drape, mud flat, mud mound,* and *sulphurous-mud flow.*

multi Most words with the prefix *multi* are one word: *multicoloured, multicyclic, multipurpose, multistage, multistoried,* but note *multi-author, multi-element.*

Muschelkalk

mutual Means 'reciprocal (used of two individuals acting on each other)'. David and George may have a *mutual* respect for one another, but they do not have *mutual* likes and dislikes. *Common* is the appropriate word in the latter case.

m.y. Not used by GSC. *See* MA.

myrmekite

nannoplankton

nano The prefix *nano* (symbol n) indicates the multiple 10^{-9}.

naphtha

National Topographic System (NTS) NTS map areas are written in this form:

14 L 14 M/3 14 N/1, 2, 3

A hyphen is used between the number and letter if the letter is *O* or *I*:

31-I/12 104-O/3

neap tide

near (*not* near to)

near, nearly *Near* in the sense of 'almost' is now usually expressed by *nearly*: use *nearly vertical*, not 'near-vertical'.

nearby, near by *Nearby* is an adjective; *near by* is an adverb: *he walked to the nearby cliff, the cliff was near by*, or better still, *the cliff was near.*

nearshore *Nearshore* is an adjective; *near shore* is an adverb: *The nearshore sediments, The drilling platform was near shore.*

negligible

neighbour, neighbouring

neither

Neoarchean, Neoproterozoic

next two This is correct: avoid using 'two next'.

nickel

nineteenth century (*not* Nineteenth Century)

Nipissing

no. The abbreviation for number(s). Do not use the symbol '#' for number(s) in text, figures, or tables. *See also* NUMBER; NUMERICAL EXPRESSIONS.

non This is a useful negative prefix, but do not use it in preference to more colourful antonyms (i.e. 'words of opposite meaning'). *Unessential* is usually a better word than *nonessential* and *dissent* is preferable to *nonconcurrence*. Note the tendency to drop the hyphen after *non* in most combinations: *nonactive, nonaligned, nonbedded, noncalcareous, nondeposition, nonglacial, nonideal, nonpenetrative, nonplicate, nonplunging, nonrestrictive, nonribbed, nonmarine.*

nonfossiliferous The adjective *nonfossiliferous* means 'not containing fossils'. The word *unfossiliferous* means the same thing. Both are correct, just be consistent in their usage.

non sequitur Latin, meaning 'it does not follow'. In *non sequiturs* there is no causal connection between the pieces of information in a sentence:

> Born in Montreal on 20 April 1798, William Logan was knighted by Queen Victoria at Windsor Castle on 29 January 1856.

The information should be given in separate sentences, or in clauses linked by *and.*

no one *See* ANYONE

northeast, northwest, but **north-northeast, north-central, north-northwest-trending striae**

North Pole

north trending, but **north-trending fault**

notice, noticeable

not to exceed Except in specifications and similar work, *not more than* should be used.

number *Number* takes a singular verb when preceded by *the*: *The number of geologists has increased.* When preceded by *a* or *any, number* takes a plural verb: *A number of geophysicists have applied. See also* AMOUNT; NO.

number of A *number of* is inexact. Where possible, give the exact number.

numerals Hyphenate compound numbers from twenty-one (twenty-first) to ninety-nine (ninety-ninth): *Twenty-two trenches were cut through the overburden.*

numerical expressions *See* 'Numerical expressions' section under 'Grammar'. *See also* NO.; NUMBER.

Nunavut

oblique-slip fault

observed *Encountered* should not be substituted for *observed.* One *encounters* a grizzly bear, but *observes* a deformation pattern.

obtain *See* SECURE.

obvious *See* APPARENT.

occasion, occasionally *See* TIME TERMS.

occur *Occur* is overused by many writers. A more precise meaning can be obtained by substituting words such as: *are present, are found, exist, live, stand, take place, lie.*

occurred, occurrence

odd Compounds of a numeral with *odd* are hyphenated:

sixty-odd 140-odd

odd-looking feature

odour, odoriferous

of *See* FOR.

off Do not use 'off of', which is colloquial: use *off* alone. In many cases, including the following example, *from* should be used instead of *off* or *off of*: 'I borrowed the hammer off (of) my assistant'.

offlap, offset, offshore (adj.), but **off shore** (adv.)

Offshore drilling takes place off shore

often *See* TIME TERMS.

oilfield, but **conventional oil field**

oil sand(s), but the **Athabasca Oil Sands**

oilwell

older *See* EARLIER, LATER.

oldest, eldest These are both superlatives of *old*; *oldest* being the more recent form. *Eldest* is now reserved for reference to the first-born in a family. So, also, are the comparatives *older* and *elder*.

omit, omitted

on, upon Most authorities agree that these words are interchangeable and that the choice of one or the other depends upon convention, emphasis, or rhythm.

one Do not use *one* as a first person pronoun. *One* should be used only as an impersonal pronoun: *I* (*not* One) *must complete the program although I know that it is late in the season.* Also, do not use the impersonal pronoun (*one*) and the personal pronoun (*I*) in the same sentence.

one half, one third, but **one-half** (of something)

one of the most This construction is overworked; avoid it. But, if you do use this expression, do not make the mistake of using a singular verb in the relative clause that follows it. *One of the most difficult climbs that face the explorer*, illustrates the correct usage.

one of those who Use a plural verb after *who*.

ongoing

onshore (adj.), **on shore** (adv.)

on the basis of *See* BASED ON.

Onshore wind moves the beach sand farther on shore

op. cit. Abbreviation of the Latin *opere citato*, meaning 'in the work quoted', and should not be confused with *ibid.* (*ibidem*) meaning 'in the same place'. Use *op. cit.* to indicate a repeat of the previous reference, and *ibid.* to identify a repeat of a specific reference to a page or figure. Both *op. cit.* and *ibid.* are set in vertical (roman) type.

The normal style of GSC referencing is more convenient for the reader than overuse of *ibid.* or *op. cit.* *See* 'Notes for format of publication' in 'Paleontology'.

open pit (n.), **open-pit** (adj.)

open water

optimistic This word is derived from the Latin *optimus* ıning 'best' and should not be used as a synonym for *hopeful* or *cheerful*. Reserve its use to :ess the habit of hoping for the best at all times.

oral, verbal *Oral* means 'spoken, by word of mouth'. *l* means, 'in words', whether written or spoken.

ordinal numerals *See* CARDINAL NUMERALS.

ordinarily

orebody

organize, organization

orient, orientate Both forms of this verb are acceptable and both give rise to the same noun, *orientation*. Things may be *oriented* or *orientated*.

orogen Capitalized as in the *Cordillera Orogen* and *Appalachian Orogen*.

orogeny Capitalized as in the *Acadian Orogeny, Hercynian Orogeny, Laramide Orogeny,* and *Taconic Orogeny*.

ostracode (*not* ostracod)

outcrop (n. and vb.) (*not* crop out). The limestone *outcrops* at the top of the ridge. The *outcrop* on the arête is rhyolite.

outflow, outgoing, outwash

over, more than *Over* can be used in the sense of 'more than' or 'greater than'.

overall *Overall* is overused. Select one of many synonyms that are more exact: *absolute, aggregate, average, complete, comprehensive, entire, general, inclusive, net, overriding, supreme, total,* and *whole*.

overlain, underlain (*not* overlaid *or* overlayed, underlaid *or* underlayed) *The coal seam is underlain by fireclay and overlain by sandstone.*

overlay (n.) Means 'a transparent sheet bearing graphic or other data to be superimposed on another sheet'.

overlie (vb.) Means 'to lie above or on' (*not* overly).

override, overrun

overthrust, overturn

owing to *See* DUE TO.

oxbow

oxidized (*not* oxidised)

Pacific coast

pack ice

packstone (*not* packestone)

paleo Words with the prefix *paleo* (*not* palae) are rarely followed by a hyphen: *paleoatmosphere, paleoceanography* (*not* paleo-oceanography), *paleoclimate, paleoenvironment, paleontology, paleovalley, Paleoarchean, Paleoproterozoic, Paleozoic*, and *Paleocene* (NB *lower Paleozoic*, but *Lower Paleocene*). Note *Paleozoic Era*, but fossils of *Paleozoic age.*

paleontological (*not* paleontologic)

palimpsest

palsa (pl. **palsen**)

Pangaea (*not* Pangea)

parabituminous

paraffin

paragneiss, but **para-andesite**

parallel, paralleled

parallel lamination

parallel structures, parallel constructions Parallel structures commonly yield economy of words, clearer meaning, and pleasing effects. *See* 'Parallel structures' in 'Grammar'.

paralyze

parenthesis (pl. **parentheses**)

partially, partly *Partially* is commonly misused for *partly*, as in the sentences: 'The area is partially drift covered'; 'The orebin is partially filled'; or, 'The granodiorite is partially altered'. *Partially* implies 'partiality', and should never be used without first considering the claims of *partly*. *Partially* can mean 'incompletely', but for *in part*, always use *partly*.

participles The two *participles* of the verb in English are the *present participle* (which always ends in *-ing*; e.g. *standing*) and the *past participle* (ending in *-d, -ed, -n, -en*, and *-t*; e.g. *shattered*). *See also* DANGLING PARTICIPLE.

particular Do not misuse this strong adjective. Use it for emphasis. The noun to which it is attached should be one that you need to single out and emphasize.

passive voice *See* 'Active and passive voice' in 'Grammar'.

past, passed The word *past* can be used as a noun: *Fossils are relics of the past*, as an adjective: *Fossils are used to interpret past events*, or as a preposition: *The avalanche roared past my tent in a matter of seconds.*

Passed is the verb form: *I passed the hammer to my assistant.*

patch reef

pay zone

pebble conglomerate, but **chert-pebble conglomerate**

pelite

pellet

penecontemporaneous The prefix *pene* means 'almost, nearly', or 'all but'.

peneplain (n.), **peneplaned** (vb.)

peneplanation

Pennsylvanian

per This is a Latin preposition and should be confined to its own language (e.g. *per cent*). Say *eight cents a mile* (*not* eight cents per mile). Some expressions do, however, demand *per*, such as *miles per gallon* and *kilometres per hour*.

perbituminous

per cent (from *per centum*) (*not* percent) The *per cent sign (%)* can be used in the text where numbers are common, but otherwise use the term *per cent*. There is no space between the numeral and the per cent sign: *10% plagioclase*, but there is a space between a word or abbreviation and the sign: *weight %*; *wt %*.

percentage Instead of 'a large percentage of', use *many*; instead of 'a small percentage of', use *few*.

perceptible

Permo-Carboniferous (when both periods are considered as a unit).

persistent

person In grammar, pronouns belong to three *persons*, and occur in the singular and plural. First person: *I* (singular), *we* (plural). Second person: *you* (singular and plural). Third person: *he, she, it* (singular), *they* (plural).

In modern writing, scientists are encouraged to use the first person *I* and *we*. When there are two or more authors, use *We found* instead of 'It was found' (passive voice) or 'The authors found' (active voice, but verbose). Use *I* for a singular author, not the 'editorial' *we*. Be consistent in your use of *person*.

See also 'Active and passive voice' in 'Grammar'.

personal, personnel Whereas *personal* means 'individual, private', *personnel* means 'staff'.

persuasive, pervasive *Persuasive* means 'able to persuade'. *Pervasive* means 'spreading through, saturating'.

Petro-Canada

petrographic (*not* petrographical)

petrological (*not* petrologic)

PGE *See* PLATINUM GROUP

phase A *phase* means 'a stage of transition or development' (*not* an aspect). A mineral is a *phase*, so that 'mineral phase' is redundant. An exception applies for broad discussions or comparisons, as in *mineral, melt, and gas phases*.

At one time *phase* was widely used in petrology in reference to the compositional *units, variants*, or *facies* of igneous intrusions, presumably with the implication that these units represent different *stages* of differentiation. Nowadays, though, the word is deeply entrenched in the sense of *phase equilibria*, where a phase is a solid, liquid, or gas. It seems advisable, therefore, to avoid the older usage.

phenoclast, phenocryst

phenomenon (pl. **phenomena**)

phosphorus (n.), **phosphorous** (adj.)

photomicrograph (*not* microphotograph)

phylum (pl. **phyla**)

-phyric As a suffix *-phyric* is usually preceded by a hyphen: *feldspar-phyric, hornblende-feldspar-phyric, olivine-phyric, plagioclase-phyric, pyroxene-phyric, quartz-phyric.*

pico The prefix *pico* (symbol p) indicates the multiple 10^{-12}.

pilotaxitic

pinch-out (n. and adj.), **pinch out** (vb.)

pipeline

planar crossbedding

planetable

plate Refers to coloured photographs, or to full page groups of photographs or photomicrographs in paleontological reports only. Subordinate or individual illustrations within a plate are called 'figures':

Plate 1, figures 1 to 3 (Pl. 1, fig. 1–3)

All other illustrations of paleontological (less than page size) or other material are called 'Figures' with a captial 'F' to distinguish them from the 'figures' with a lower case 'f' in the plates.

See also FIGURE.

plateau (pl. **plateaus**)

platy (*not* platey)

platinum group, but ***platinum-group element*** (PGE), ***platinum-group elements*** (PGEs)

pleochroic

Pliensbachian A stage of the Global Stratigraphic Chart.

plus, plus/minus (±) In mineral assemblages and metal-deposit descriptions, there are no spaces on either side of the + or ±.

> Sedimentary rocks adjacent to the pluton contain the assemblage cordierite+biotite+chlorite±muscovite whereas mafic volcanic rocks contain hornblende+biotite±chlorite.
>
> The Broad River Group hosts both the Teahan and Lumsden Cu-Zn-Pb±Au±Ag deposits, and other less well known sulphide occurrences.

In stating error ranges in age determinations, a space is used on either side of the ±.

> The Broad River Group has been intruded by dioritic to granitic plutons with ages of ca. 615 +1/-2 Ma, 625 ± 5 Ma, 616 ± 3 Ma, and 623 ± 2 Ma (Watters, 1993; Barr et al., 1994).

plutonics Do not use *plutonics* when 'plutonic rocks' is meant. *See also* CLASTICS; INTRUSIVES; VOLCANICS, METAMORPHICS, CLASTICS.

poikilitic

poikiloblast

point bar, but **point-bar deposit**

polarize

Pole, the Pole, North Pole

polychaete

porphyroblast

porphyry, porphyritic

portion *Portion* is commonly misused for *part*, as in, 'the northern portion of the area'. *Portion* refers to a *share*, as in, *your portion of the profits*.

post Most words with the prefix *post*, meaning 'after' or 'later', are not hyphenated: *postdate, postdepositional, postglacial, postmagmatic, postorogenic, postoperative,* but *post-Mississippian, post-tectonic, post-Tertiary,* and *post-Paleozoic*. *See also* PRE; SYN.

post office *The Red Lake post office*.

potassium feldspar (*not* potash feldspar). *See also* K-FELDSPAR.

pothole

pneumatolysis

pneumotectic

practicable, practical *Practicable* means 'that which can be done, feasible'. *Practical* means 'relating to or applicable in practice', the opposite of *theoretical*. Other opposites are *impracticable* and *unpractical* or *impractical*.

practically Do not use *practically* as a substitute for *almost, nearly*, or *virtually*. The section may be '*almost* complete', but it is not '*practically* complete'. It is incorrect to write that a geologist 'practically proved the hypothesis', when in fact most of the hypothesis' terms remained unexplained.

practice (n.), **practise** (vb.)

pre Most words with the prefix *pre*, meaning 'before' or 'previous in time', are not hyphenated: *Precambrian, precede, predate, predetermined, preglacial, premetamorphic,* but *pre-Devonian brachiopods, pre-empt, pre-existing, pre-Fraser Valley Glaciation, pre-Jurassic,* and *pre-Wisconsinan*. *See also* POST; SYN.

precede (*not* preceed)

precision *See* ACCURACY.

prediction *See* FORECAST.

prefer, preference

preferable *Preferable* should not be used in the comparative ('more preferable' is incorrect).

preoccupy

prerequisite

presently *Presently* once meant 'immediately'. It currently has two meanings: 'after a short time, in a little while, before long, shortly, soon', and 'now, at present, currently'. Writers should therefore ensure that when they use *presently*, their meaning is not ambiguous.

presume *See* ASSUME.

preventive (*not* preventative)

Prídolí (Series/Epoch; *not* Pridolian)

principal, principle *Principal*, as a noun or as an adjective, always means 'chief'. *Principle* is used only as a noun and means 'a rule, law, or moral value'.

prior to (prep.) *Before* is preferred. *Prior* as an adjective is correct.

proceed

prodelta, proglacial, prograde

program (*not* programme), **programmer, programming** *Program*, the preferred spelling, was the common form, even in Britain, until the nineteenth century.

prohibit from doing, but **forbid to** do.

proportion Use this word only to refer to statistics. Instead of 'a proportion of', use *some*; instead of 'a large proportion of', use *many*.

proposition *Proposition* means 'something put forward for discussion, or as the basis of argument'; it should not be used as a synonym for *plan* or *project*.

proto-Atlantic Ocean

proven Accepted usage is only in the legal sense. As the participle of *prove*, the form *proved* should be employed. *Proven* may be correctly used as an adjective.

provenance

provided that Introduces a stipulation (on the condition that) and is preferable to 'providing'.

province Capitalized as in *Province of Quebec, Churchill Province.*

psammite

pseudo As a prefix *pseudo* is rarely followed by a hyphen: *pseudobreccia, pseudotachylyte.*

pseudomorph *Pseudomorphs of cassiterite after orthoclase.* Avoid using *pseudomorph* as a verb.

P-wave

pyroclastics *See* INTRUSIVES.

quadrillion This word signifies 10^{15} in North America, but 10^{24} in most other countries. Because of this ambiguity, the term *quadrillion* should not be used. *See also* BILLION; TRILLION.

quantity Avoid such expressions as *the majority of, a good deal of, a lot of,* and *a number of* where the words *most* or *much* will serve for the first three expressions, and one or other of *a few, several, many*, or *numerous* will convey a more definite meaning for the last.

quartz arenite, quartz diorite, quartz porphyry

quartzofeldspathic

quartz-rich granite, but *the rock is quartz rich.*

questionable When using the question mark to imply that something is questionable or uncertain, the symbol should always be placed in parentheses (?) to distinguish this usage from its normal use as a punctuation mark. The position of the symbol is also very important, and the following conventions should be observed:

(?) Lower Devonian	questions the entire statement.
(?)Lower Devonian	questions only Lower.
(?) Silurian–Devonian	questions both ages.
(?)Silurian–Devonian	questions only the Silurian age.
Silurian–(?)Devonian	questions only the Devonian age.
(?)[Upper Bathonian]–Callovian	questions only Upper Bathonian

questionnaire

quicksand

quite *Quite* is now accepted as having two opposite meanings: 'fairly, somewhat', and 'completely, totally'. In the statement: *The pebbles are quite round*, *'quite round'* can mean 'nearly round' or 'absolutely spherical'. To make the intended meaning clear, replace *quite* by *fairly* or *absolutely*.

radio As a prefix, *radio* is rarely followed by a hyphen: *radioactive, radiocarbon, radioecology, radioisotope*.

rainfall, rainwater, but **rain gauge**

range The word *range* implies a minimum as well as a maximum limit. It is imprecise to say that 'the beds range up to 3 m thick', although a minimum thickness close to zero would be understood, perhaps wrongly. It is more accurate to state that *the beds range from 50 cm to 3 m in thickness*. Do not say that 'the beds are between 50 cm and 3 m in thickness', as this could mean that all the beds are of one thickness and the reader must guess exactly how thick, within the minimum and maximum values given.

Also, do not say that 'the beds range between 50 cm and 3 m in thickness'; the word *between* constitutes a repetition of *range* and should be omitted. *Bedding thickness ranges from 50 cm to 3 m*, is the correct entry.

rare earth, but **rare-earth element** (REE), **rare-earth elements** (REEs).

rarefy

rationale, rationalize

re Many compound words with the prefix *re* are written as one word. A hyphen is used when two similar vowels occur together, when the appearance of the word is confusing without the hyphen, or when the word written without a hyphen has another meaning. Several words occur both with and without a hyphen, and have different meanings and pronunciations. Examples are listed below in alphabetical order.

reaction This word implies an automatic rather than an intellectual response. Reserve its use for chemical, biological, and mechanical processes, and do not use it in place of *opinion* or *impression*.

readvance, reappraise, reassess, reassign

recede

recognize

recollect, re-collect *Recollect* means 'to remember'; *re-collect* means 'to collect again'.

reconcilable

recount, re-count *Recount* means 'to narrate'; *re-count* means 'to count again'.

recover, re-cover *Recover* means 'to get (a thing) back'; *re-cover* means 'to cover again'.

recreation, re-creation *Recreation* is 'a pleasant pastime'; *re-creation* means 'creation anew'.

recurrence

redbeds

reducible

redundant words *See* 'Jargon and contrived or redundant words' section in 'Grammar'

REE *See* RARE EARTH.

re-educate

reef core, reef edge, reef front, reef rock, reef wall

re-entrant

re-establish

refer, referable, reference, but **referred**

reform, re-form To *reform* is 'to improve, to correct'; *re-form* is 'to form anew'.

re-fused rocks

regardless, not **irregardless**

reinterpret

relatively *See* COMPARATIVELY.

relay, re-lay *Relay* means 'to relieve, to replace'; *re-lay* means 'to lay again'.

relic, relict *Relic* and *relict* have come to be used differently from everyday English, where both tend to be used as nouns, and where *relict* is obsolete except in legal sense. Premetamorphic minerals or textural features are said to be *relics* (noun) or *relict* (adjective) textures.

In paleontology, *relict* serves as both adjective and noun.

replace *See* SUBSTITUTE.

reproduction, reproducible

requisition (vb.) One *requisitions* a thing, or *makes a requisition for* it, but does not 'requisition for it'.

reserve, resource In simple terms *reserves* (of coal, oil, gas, etc.) are proven quantities, whereas *resources* are estimated quantities.

resign, re-sign *Resign* means 'to relinquish'; *re-sign* means 'to sign again'.

resistance, resistant

resort, resource *Resort* means 'that to which one has recourse for aid': *as a last resort. Resource* is 'a reserve upon which one can draw when necessary'.

resource *See* RESERVE; RESORT.

respective, respectively

responsible Do not confuse *responsible* with *cause. People are responsible for events*, but *things cause them.*

résumé

retrothrust *Retrothrust* means 'a fault on which reverse or thrust movement has been followed by normal displacement'.

reversible

revise

rhythm, rhythmite

right angle (n.), **right-angled** (adj.)

right-hand rule *See* STRIKE AND DIP.

right-lateral fault

rigour, rigorous

ripple bedding, ripple crosslamination

ripple mark Use this for the structure in sediments or rocks ('ripple' is unacceptable: use *ripple mark*).

rip-up clasts

river Capitalized as in *Fraser River*, but *Fraser River valley*.

river bed, river bottom, river valley, but **riverbank**

roadbed, roadcut, roadside, roadway

roches moutonnées

Rock-Eval

rockburst

rock names When applying 'unit modifiers' to the names of rocks, remember that like names (i.e. names of *rocks, minerals, textures*, and *clastic aggregates*) are connected by hyphens, whereas unlike names are not:

quartz diorite
biotite granite
porphyritic quartz monzonite
quartz diorite dyke
porphyroblastic kyanite-staurolite-garnet schist
feldspar megacrystic biotite-garnet gneiss

quartz porphyry
sanidine trachyte
ash-flow tuff
quartz monzonite
hornblende-biotite granite

See also MAP LEGEND.

rock names used in the plural form To write: *The gneisses, schists and iron-formations of the area* is geological jargon comparable to *mineralization, clastics, accessories*, etc. and should be avoided. *Gneiss, schist, iron-formation, shale, sandstone*, and *limestone* are collective nouns that need not be pluralized. 'The iron-formations of the area' can be rewritten: *The iron-formation units. See also* INTRUSIVES.

rocks, magmas, melts, liquids In igneous petrology, the names of rocks (particularly of the volcanic types) are commonly also applied to the magmas from which they solidified, and confusion commonly results. For example, authors write about basalt *the rock* in one sentence, and basalt *the magma* in the next, without specifically identifying them or explaining that they have switched. Try, therefore, always to make the distinction by identifying the magma, as in *andesitic magma* or *kimberlite magma.*

Other ever-recurring problems concern the distinctions between *magma, melt*, and *liquid.* By its traditional definition, *magma* is molten rock material, but it can also embody crystals, rock fragments, and gas bubbles. Thus, if the liquid is the part of interest, it should be specifically identified. It is properly called *melt* if the topic concerns the formation of the magma by *melting* processes, but if the topic pertains to crystallization, assimilation, or related processes occurring under cooling conditions, then *magmatic liquid* (or just *liquid*) is more appropriate.

rocks, rock bodies Geologists frequently speak (for example) of *kimberlites* when they mean 'kimberlite dykes, pipes, or diapirs'; of *basalts* when they mean 'basaltic lavas or flows'; and of *peridotites* when they mean 'peridotite lenses or bodies'.

The plural form of a rock name should probably be reserved for reference to its variants, e.g. *basalts* might refer to an association of alkaline and subalkaline basalts in one situation, or to an affiliation of tholeiitic and high-alumina basalts in another.

See also INTRUSIVES; MINERALS, MINERAL CRYSTALS, MINERAL GRAINS.

rock type, rock unit, but **rockslide**

Rocky Mountains Capitalized as in *the Canadian Rockies*, *the Rockies* (colloquial), *Rocky Mountain Foothills, Rocky Mountain Trench.*

roman numerals (*not* Roman numerals)

runoff

R-wave

sabkha

saccharoidal

salic, femic When discussing norms, the terms *salic* and *femic* are used. *Felsic* and *mafic* are used for describing rocks. *See also* FELSIC, MAFIC.

salt-and-pepper sandstone

saltpetre

salt water, but **saltwater lagoon**

same This word should never be used as a pronoun, as in: 'rocks full of fossils, and students ready to collect *same*'.

sandbag, sandbank, sandbar, sandshale, sandspit, but **sand flat**

sandstone *See* ROCK NAMES USED IN THE PLURAL FORM.

saussurite, saussuritization

savannah

saw-cut

scale This is the ratio between the linear distance on a map, figure, airphoto, etc. and the corresponding distance on the surface being mapped. The scale 1:50 000 indicates that one unit on the map represents 50 000 identical units on the ground. The scale is always given in this order:

1 inch to 4 miles (*not* 4 miles to 1 inch).

Note the difference between a *small-scale map* and a *large-scale map*. In a *small-scale map*, a large area is shown in a generalized form, say at 1:250 000 scale or smaller (e.g. 1:1 000 000). A *large-scale map* shows a small area in fine detail, say at 1:25 000 scale or larger (e.g. 1:5000).

schist *See* ROCK NAMES USED IN THE PLURAL FORM.

Schlumberger

Schmidt net

scoriaceous

seabed, seabottom, seafloor, seamount, seashore, seawater, but **sea fan, sea ice.** Note that most *sea* words are written as one word: *seafloor spreading*, but *inland-sea shore.*

sea level (n.), but **sea-level** (adj.). For example: *The sea-level curve indicates major changes in sea level.*

secede

second-order (adj.)

section 21 (*not* Section 21)

secure, obtain *Secure* means 'to get possession of (something desirable) as the result of effort'; originally, 'to make safe'. *Obtain* means 'to acquire, get'.

sediment(s), sedimentary rock(s) By default, these two terms have become synonymous to some extent. In good scientific writing, however, the terms should be differentiated as follows: The word *sediment(s)* should be reserved for 'unconsolidated material', such as sand, gravel, or clay, and may be used in reference to recent deposits or to paleoenvironments: *Mississippian deltas consisted of a variety of sediments. Sedimentary rocks* are 'consolidated sediment'.

sediment-flow deposit

sedimentological

see, see also *See* CF.

self- *Self-assured, self-control, self-possessed,* but *selfish, selfless, selfsame*

seismic wave

seize

selvage

semi Most words with the prefix *semi* are one word: *semiannual, semianthracite, semiarid, semi-bituminous, semicircular, semiconsolidated, semiopal, semipelite, semiquantitative*, but *semi-invalid.*

sensu lato, sensu stricto These Latin phrases are set in italic type.

separate

septum (pl. **septa**)

severely

S-fold

shale *See* ROCK NAMES USED IN THE PLURAL FORM.

shallow-marine environment

shaly (*not* shaley); **more shaly** (*not* shalier)

sharp *Sharp* (*not* sharply) is the correct adverb to use in matters of time and direction: *Turn sharp right at the conglomerate outcrop* and *Meet me at eight o'clock sharp.*

shear-zone-hosted deposits

sheetlike

shoreline, but **shore ice**

short-term project

shortwave

shothole

sic This is a Latin word meaning 'thus, so'. It is used to inform the reader that an unlikely quotation is in fact correctly worded, and also to indicate that an error in a quotation is not to be attributed to the author(s). Write *sic* in square brackets thus: [*sic*] immediately after the error, as in the following item in a References list:

Prest, V.K.
1990: Laurentide ice-flow patterns: a historial [sic] review, and implications of the dispersal of Belcher Island erratics; Géographie physique et Quaternaire, v. 44, no. 2, p. 113-136.

side-by-side (adj.), **side by side** (adv.)

sideroad

side-scan sonar

sidewall sampling

siliceous

siliciclastic, siliciclastics *See* INTRUSIVES.

sill-like

silver-gold anomaly

similar to (*not* similar as, *or* similar with)

slack water

slipface

slip-off slope

small scale (n.), **small-scale** (adj.)

snowbank, snowdrift, snowfall, snowfield, snowline, snowpack

so far as *See* AS FAR AS.

soft rock A colloquial term meaning 'sedimentary rock'; and 'soft-rock geologist' (adj.).

some one, someone *See* ANYONE.

somewhat If a mineral is 'somewhat altered', it is altered, and *somewhat* is unnecessary; if some attempt is being made to indicate the degree of alteration, use more specific terms, such as: *completely, largely, partly*, or *slightly*. The use of percentages is even more scientific.

In the same class as *somewhat* are several other words, including: *about, considerable, perhaps, probably, very*, and *rather*: *The rock is hard* (*not* rather hard); *Walls are straight* (*not* very straight); *The lode is 4 m wide*, or, *ranges from 3 to 4 m wide* (*not* is probably about 4 m wide); *The value of the gold produced was more than two million dollars* (*not* was considerable).

southeast, southwest, but **south-southeast, south-central, south-southwest-trending striae**

south trending, but **south-trending fault**

space terms *See* TIME TERMS.

SP-curve (spontaneous potential curve)

spatial

specialize

spectrum (pl. **spectra**)

spherical

sporadic, intermittent Whereas *sporadic* relates to 'distribution', *intermittent* relates to 'time'.

stage Capitalized as in *Cenominian Stage.*

stationary, stationery *Stationary* means 'not moving'; *stationery* means 'writing materials, paper'.

S-tectonite

stillstand, stillwater

stockwork

stony (*not* stoney)

strandline, but **strand plain**

stratabound

stratigraphic (from graphic; *not* stratigraphical)

stratovolcano

stratum (pl. strata)

streamflow

street Capitalized as in *Sparks Street*, but *Sparks and Rideau streets*.

stria (pl. **striae**)

strike and dip *Strike and dip* should be recorded numerically, with degree symbols, and with the dip direction given:

020°/15°E

If you are using the 'right-hand rule' for strike and dip, then state this at the beginning of your report and record the strike as three digits: *Dip directions are always to the right of the azimuth recorded, e.g. 090°/10° indicates a dip of 10° due south.*

Azimuths indicating the orientation of geological features should also be recorded numerically with a degree symbol:

The dyke swarm strikes 085° (*not* N85°E)

See also AZIMUTH; DIRECTION.

strike fault, strike-slip fault A *strike fault* is parallel to the strike of the strata involved: on a *strike-slip fault*, movement is parallel to the strike of the fault.

stromatactoid

stromatoporoid

sub Most words formed with the prefix *sub* are one word: *subaerial, subalpine, subaqueous, subangular, subarctic, subbasement, subbasin, subbituminous, subbottom, subclass, subcommittee, subcrop, subdelta, subfacies, subgenus, subglacial, subgroup, sublittoral, suborder, subparallel, subrounded, subsurface, subtropical, subunit.*

subbituminous coal *See* COAL.

sub-ice

substitute, replace *Substitute* means 'to put a person or thing in place of another'. *Replace* means 'to take the place of another'. 'Substituted by' is incorrect; the correct form is: *replaced by*.

substrate *Substrate* is 'the medium on which organisms grow or to which they are attached'. Do not use *substrate* as a substitute for *substratum*.

substratum (pl. **substrata**) The layer or bed underlying the stratum or interval under discussion, and the layer underlying the 'true' soil.

subsurface Do not use *subsurface* in conjunction with *well*, as in 'subsurface well section'. The section is either a *subsurface section* or a *well section*.

subterranean

succeed

succession

such a large, such a small, etc. *So large a, so small a* is preferable.

sudden, suddenness

sufficient Use the word *enough.*

sulphur, sulphide, sulphate, sulphuric (*not* sulfur, sulfide, sulfate, sulfuric)

suncrack

supercool, superfamily, superglacial, supersede, supervise

suprafan, supraglacial

surmise

surplus (pl. **surpluses**)

susceptible

suspended compounds Hyphenate when a component common to successive compound adjectives is omitted:

first- and second-class fares
thin- to thick-bedded limestone
but the limestone is thick bedded *and* a thin-bedded limestone

See also COARSE GRAINED.

swaley crossbedding The original misspelling of 'swaly' is now firmly entrenched in the literature.

S-wave

symbols Never hyphenate before a symbol that is not a letter:

a 100°C thermometer 27‰ salinity

symmetrical, symmetry

syn Most words with the prefix *syn*, meaning 'together' or 'at the same time', are not hyphenated. Examples are: *syndepositional, synmetamorphic, synorogenic, synsedimentary*, and *syntectonic*.

A hyphen is used, however, to represent the omitted part of a solid compound — that is a compound intended as one word rather than hyphenated:

pre- to synsedimentary

See also POST; PRE.

syneresis (*not* synaeresis)

tableland

tachylyte

TAI *See* THERMAL ALTERATION INDEX.

technique

tectonostratigraphic

tendency

tends to *Tends to* is incorrectly used in such expressions as: 'the vein *tends to* split' or 'the fault *tends to* swing to the north'. Either the vein splits or it does not, and, similarly, either the fault swings or it maintains its course. The expression is used correctly in the sentence: *dispositions tend to change with age*.

tense *See* 'Verb' in 'Grammar'

terrain, terrane *Terrain* refers specifically to a 'topographic surface'. *Terrane* refers to 'the general area or body of a type or grouping of rock, by age, formations, or lithology, especially metamorphic or structural groupings': *a gneissic terrane, a Precambrian terrane, Bancroft terrane, Elzevir terrane.*

terrigenous

testhole

tetrahedron (pl. **tetrahedra**)

thalweg

that, which These relative pronouns are commonly misused for each other. *See* 'Pronouns' section in 'Grammar'.

the The definite article *the* is generally unnecessary in association with the names of streams, valleys, or other physiographic or topographic features, such as: (the) *Mackenzie River*, (the) *Fraser River valley*, (the) *Porcupine Creek*, (the) *Sverdrup Basin*, though the ruling is not absolute and, in some instances, custom prefers the retention of the definite article, as in: *the Rocky Mountains, the Coast Range, the Great Lakes, the Great Plains, the Prairie Provinces*. Use *the* in such expressions as: *the Mackenzie, the Liard River bridge*, and *the Bearpaw Formation.*

there is, there are (**there was, there were**, etc.) *See* 'Jargon and contrived or redundant words' in 'Grammar'.

Thermal Alteration Index (TAI) There are *Thermal Alteration* and *Colour Alteration indices*, but do not use 'Thermal Alteration Indices' when referring to a series of values or measurements. The latter should be written *Thermal Alteration Index values*, or, *TAI values*.

these kind, these sort, those kind, those sort The correct expressions are: *this (that) kind, this (that) sort; these (those) kinds, these (those) sorts.*

thick, thickness The expression, *the beds are 2 to 3 m thick* is preferable to 'the beds are 2 to 3 m *in thickness*', but no choice is allowed in the expression: *the beds vary in thickness from 2 to 3 m.*

thick bedded, thin bedded Use hyphens when the compound functions as an adjective before a noun, but not elsewhere: *A thick-bedded sandstone*, as opposed to *a 100 m thick, bedded sandstone. The unit is thin bedded, chiefly composed of beds less than 10 cm thick.*

thickening-upward cycles, thickening-upward sequences (not **upward-thickening sequences,** or **thickening-up sequences**)

thinly bedded limestone (*prefer* **thin-bedded limestone**)

thin section

third order (n.), **third-order** (adj.)

this, that Should never be used adverbially (as in 'this much').

tholeiite, tholeiitic

though, although Both forms are correct, though the shorter is commonly preferred.

three-dimensional, third dimension

thrust fault, but **McConnell Thrust**, or **McConnell Fault**, and **McConnell thrust fault**

tidewater

till *See* UNTIL.

timberline

time comparisons *See* EARLIER, LATER.

time domain, but **time-domain electromagnetic method**

time-stratigraphic

time terms *Time words*, chiefly adverbs, should not be used to denote abundance or distribution (space or place terms). The *time terms* listed here should be replaced by the corresponding space terms that are italicized in brackets: always (*everywhere*), frequently (*commonly*), never (*nowhere*), occasionally (*locally, here and there*), often (*commonly, in many places*), seldom (*rarely*), since (*as, because*), sometimes (*in places*), usually (*commonly, most of*), when (*where*), and while (*although, whereas*).

Some examples are shown in such sentences as: 'While (*Although*) others may disagree, I am prepared to defend this usage'; 'When (*Where*) the fault swings to the west'; or 'Since (*As*) the shaft is caved, no examination can be made'. They are correctly used in: *While I am away you ...; When*

the first assays were run ...; or, *Since the first World War, prices* .... You may visit outcrops *frequently* (*not* commonly). Sandstones are *commonly* feldspathic (*not* often feldspathic). Beach deposits may show evidence of *occasional* (or *frequent*) storm influence, but the same deposits rarely (or *commonly*) contain storm-generated sediments.

Note that *throughout* can be used for time and space.

Timiskaming A geographical area in Ontario, but 'Témiscamingue' a geographical area in Quebec. *Timiskaming Group*, and *Lake Timiskaming (Ontario), lac Témiscamingue (Quebec). See* 'Names of pan-Canadian significance' in 'Preparing maps and reports for publication'.

titles *Titles* such as *Dr., Mr.*, etc., are better omitted. Authors must be careful that names, initials, and titles of persons, companies, or organizations are cited correctly.

tonne (1 tonne = 1.1 short tons). Use the SI symbol 't'.

too, very These words do not qualify participles directly. The word *much* should be inserted; as in *too much engrossed*, or *very much pleased. See also* VERY.

topographic (*not* topographical)

topsoil

toward, towards *Toward* is the form now generally used as an adjective or preposition; *towards* as an adverb.

township Capitalized as in *Fitzroy Township,* and *the Eastern Townships*, but *Tiny and Tay townships*

traceable

transatlantic, transcontinental, but **trans-Arctic**

transfer, transferable, transferred, transferring

transpire In its nontechnical sense, *transpire* means 'become known' (*not* happen).

travel, travelled

treeline

Tremadoc (Series/Epoch; *not* Tremadocian)

Trempealeauan

trickle-down theory

tricolpate, tricolporate The adjective *tricolpate* refers to 'pollen with three colpae without pores'. The adjective *tricolporate* refers to 'pollen with three colpae, each of which has a central pore'.

trillion This word signifies 10^{12} in North America, but 10^{18} in most other countries. Because of this ambiguity, the term *trillion* should not be used. *See also* BILLION; QUADRILLION.

trimline

triservice

tsunami

tuff breccia

T-wave

twentieth century (*not* Twentieth Century)

twenty-first century (*not* Twenty-First Century)

two-person tent

Type III kerogen

typical *See* CHARACTERISTIC.

ultrabasic, ultramafic *Ultrabasic igneous (metamorphic) rocks* have a low (<45%) silica content. *Ultramafic igneous (metamorphic) rocks* are composed chiefly of mafic minerals, e.g. monomineralic rocks of olivine or pyroxene.

Not all *ultrabasic* rocks are *ultramafic*. Anorthosite, composed of anorthite, admittedly a rare terrestrial rock, is *ultrabasic* (SiO_2 <45%) but not *ultramafic*. Pyroxenites are *ultramafic*, but are not *ultrabasic* because of their high SiO_2 content.

ultraviolet

under *See* BELOW.

undercut, underestimate, underwater

underlain, underlie, underlying *See* OVERLAIN.

undulose extinction Undulatory extinction; *undulose* is used in this context.

undulous *Undulous* means 'of an undulating nature'.

unfossiliferous *See* NONFOSSILIFEROUS

unidirectional

unique There are no degrees of uniqueness. It is incorrect to say 'rather unique, somewhat unique, very unique, fairly unique', etc. Many other adjectives are also absolute, and should not be modified by a comparative adverb — although *almost* and *nearly* are sometimes applicable.

These words include: *absolute, basic, empty, entire, essential, fatal, final, fundamental, necessary, perfect, primary, pure, right, round, square, supreme, ubiquitous, unanimous, universal*, and *wrong*.

unit A (*not* Unit A)

Universal Transverse Mercator (UTM) UTM co-ordinates are written in this form:

UTM 11U, 428800E, 5583400N

If the map sheet is given, e.g. 82 L/8, then it is not necessary to give the zone (11U).

unparalleled

until, till These are variations of the same preposition or conjunction. Use 'until'.

up Most compound words starting with *up* are one word: *updip, upsection, upslope, upstream, upvalley*, but *up-ice*.

upon *See* ON.

upper *See* LATE, UPPER; LOWER, UPPER.

upward *Upward* (*not* upwards) is the preferred spelling when 'to or toward a higher position or plane' is the intended meaning, as in: *The conglomerate grades upward into sandstone and siltstone*; or *The chert content decreases upward.*

usable

use, utilize There is little difference in meaning between these words. In most contexts the shorter word is preferred. *Utilize* tends to convey the meaning that 'good use was made of something not originally designed for the purpose', as in *and for a bathtub they utilized an old 45 gallon drum.*

U-shaped

valence *See* CHEMICAL SYMBOLS.

valley Capitalized as in *Midge Valley, Okanagan Valley*, but *Midge Creek valley, Fraser River valley.*

valley bottom, valley fill, valley floor

valleyside

vapour

variable, varied, varying, various Do not misuse these words. 'A sandstone does not contain *variable* (or *varying*) amounts of chert' — this usage implies that the sandstone has say 10% chert one day and 20% chert the next. The correct word to use in this context is *varied* or *various*.

variegated

vein-dyke

verbal *See* ORAL.

very Nine times out of ten the word *very* can be omitted without loss, and, often, its use defeats its purpose, as in: 'This machine achieves a *very* perfect separation of the ore minerals from the gangue'. Nothing could be better than a perfect separation, and in this example the word *very* implies 'nearly perfect'. As another example, the statement: 'This is a *very* good report', is indefinite because, depending on the emphasis placed on words, the report may be exceptionally good, or of normal quality. Other examples in which *very* should be omitted are: 'The coal-bearing beds are not *very* widespread' (meaning 'they are of limited extent'); 'The shale is *very* impervious'; and the expressions 'very approximately' (meaning 'roughly'), 'very flat', and 'very horizontal'.

via Means 'by way of'.

vigour, vigorous

village Capitalized as in *Village of Rockcliffe Park.*

viz. Abbreviation of the Latin *videlicet*, meaning 'it is permitted to see' or 'namely'. The abbreviation 'viz.' is used when listing items just mentioned or hinted at: *The three directors — viz. Brown, Cunningham, and Smith — are now in the board room.*

The abbreviation 'viz.' is similar to 'i.e.', but 'i.e.' tends to explain rather than simply to list: *The three candidates for the position — i.e. the Director General vacancy — are all on the short list.*

See also E.G.; I.E.

voice (**active** and **passive**) *See* 'Active and passive voice' in 'Grammar'. *See also* PERSON.

volcaniclastic

volcanics, metamorphics, clastics These and similar words are not acceptable in geological writing. Use *volcanic rocks*, *metamorphic rocks*, *clastic rocks*, *clastic material*, etc. *See also* CLASTICS; INTRUSIVES.

volcano, volcanoes, volcanism

volcano-sedimentary, volcano-sulphide, volcano-tectonic

V-shaped

wackestone

wall rock (n.), **wall-rock** (adj.) as in *wall rock alteration.*

-ward, -wards In words with this ending, the adverb retains the *s* in most cases; the adjective (and, following it, the noun) drops it: *facing northwards, a northward trend.*

washout (n.), **wash out** (vb.)

watercourse, waterfall, waterline, waterlogged, watershed, waterway

water gap, water level, water table, water well

wave base, wave form, but **wavelength**

wave ripple mark

wavy (*not* wavey)

we *See* I; *see also* 'Active and passive voice' in 'Grammar'.

weather conditions The word 'conditions' is unnecessary.

well bedded, well defined, well developed, well known, well rounded, well sorted (adj.). Hyphens are not essential in these compound adjectives and should be omitted:

well defined hypothesis
well known author
well developed feature

Wenlock (Series/Epoch; *not* Wenlockian)

west-central, west-southwest

Western Canada, but **western Ontario**

when *See* IF.

which *See* 'Pronouns' in 'Grammar'.

whichever

while, whilst Although both forms are correct, *while* is commonly preferred.

Whiterock (Series/Epoch), **Whiterockian** (Stage/Age) — different durations.

who, whom *Who* is the subject of a verb; *whom* is the object of a verb: *Who will be sent to the field camp? Whom will she choose as a field assistant? Tell me who was responsible. Tell me whom she selected.*

whole, wholesome, wholly

whole-rock analysis

whose In modern usage, *whose* can refer to inanimate objects as well as to persons: *The cratons, whose megalineaments can be correlated, form the cores of the supercontinents.*

wide *Canada-wide, industry-wide, province-wide,* but *basinwide, nationwide, worldwide.*

See also BROAD.

widespread

windblown, windfall, but **wind gap**

with *With* is frequently misused, especially for *and. See also* 'Prepositions' in 'Grammar'.

x axis

xenoblast, xenocryst, xenolith

X-ray

y axis

younger *See* EARLIER, LATER.

Yukon Territory *not* Yukon or the Yukon)

z axis

zero-edge

Z-fold

zinnwaldite