AN INDEX OF MINERAL SPECIES & VARIETIES

ARRANGED CHEMICALLY

With an Alphabetical Index
of accepted Mineral Names and Synonyms

BY

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PREFACE TO THE SECOND EDITION

DURING the five years since the issue of the first edition, progress in mineral chemistry has been so marked, and the number of new minerals described so large, that either an appendix or a new edition appeared desirable. The limited impression of the first edition being exhausted, and the use of an appendix to a work of this nature being necessarily inconvenient, a new edition seemed best.

In this edition, which has been revised throughout to incorporate all material coming to the notice of the author up to March 1955, the whole of the references in the Chemical Index have been checked back, a laborious task which Miss M. F. Kiddle and Miss R. M. Kafka have carried through most cheerfully and efficiently. The cross-references have also been checked throughout by Dr. A. A. Moss, to whom the author is most grateful for this assistance.

In response to a number of requests, an attempt has been made to offer some guidance in the pronunciation of the accepted mineral names; in this last respect, the author would crave the indulgence of those mineralogists who find their cherished pronunciation of some name omitted or rejected, and would be most grateful for further suggestions, and for information regarding the correct pronunciation of those place-names and personal names from which mineral names have been derived.

MAX H. HEY

28 *February* 1955

PREFACE TO THE FIRST EDITION

THE index of mineral species here presented was commenced as a card index in 1942 to meet a practical need in the Department of Mineralogy.

There are many books of determinative tables for identifying minerals mainly by their physical properties, supplemented by such information on their chemical composition as can readily be ascertained from blowpipe tests, but there is no complete index of minerals arranged according to their chemical composition. In the course of our work we are presented frequently with the question whether a mineral or other inorganic substance known to contain certain chemical elements can be identified with any known mineral, and if so what the mineral is and where all the known facts about the mineral are recorded.

In order to provide an answer to such questions, Dr. Max H. Hey undertook the compilation of a card index of all minerals chemically arranged. The card index, completed in 1945, proved so useful that it was decided to re-cast the whole in a form suitable for printing and to add an alphabetical index. The latter has been extended to include all mineral names (except very early systematic names which are well dealt with in T. Egleston's *Catalogue of Minerals and Synonyms*).

Dr. Hey brought to the task a wide knowledge of the chemistry of minerals and has completed the work in a very few years by great diligence.

The compilation has involved much study of mineralogical literature and careful criticism of chemical analyses and formulae in the light of recent X-ray studies. Many decisions on details of nomenclature have had to be taken, and on such points Dr. Hey has had frequent discussions with other members of the staff of the Department, and in particular with Dr. F. A. Bannister, who has taken great interest in the work. The completed index has already proved its usefulness in the Department and it is offered for publication in the hope that it will prove equally useful to other research institutions.

Our thanks are due to the printers, who have been most helpful in setting up some unusually troublesome material.

W. CAMPBELL SMITH,
Keeper of Minerals

31 *March* 1948

INTRODUCTION

THE present chemically classified list is intended to provide a ready answer to anyone inquiring what minerals of a given qualitative chemical composition are known, to assist in eliminating superfluous mineral names, and to serve as a collective index to recent work bearing on the individuality and chemical composition of minerals.

The alphabetical index, which follows the chemical classification, is intended to provide, in conjunction with T. Egleston's *Catalogue of Minerals and Synonyms* (3rd edn, 1892), as complete an index of mineral names, both old and recent, as possible. Systematic names such as *Brachytypous lead baryte* have been omitted, nor has any attempt been made at completeness in respect of descriptive names such as *Green iron ore*, or purely chemical names such as *Selenkupfer*; they are very well dealt with by Egleston. Only the English names are given for the native elements and a number of other common minerals, since their names in other languages are available from the dictionaries. Thus the index consists mainly of what may be regarded as mineral names proper, and in respect of these it has been made as complete as seemed possible without undue expenditure of time; besides these, there are a few miscellaneous names (pseudomorphs, mixtures, group names, etc.), a selection of descriptive names (in the above sense), a few chemical names, and a variety of spelling variants, also misspellings and other errors. The chemical names include a number of German names that, being single words, simulate ordinary mineral names, together with a number of chemical names that are not strictly correct (such as Phosphate of Lead for Pyromorphite). It is hoped that this selection will enable a research worker to find the significance of almost any mineral name, and to find whether any proposed new mineral name, or anything unduly like it, has been used before. Rock names, of which there are many, are not included in the alphabetical index,[1] but should naturally be avoided in naming a new mineral; lists of rock names will be found in such sources as: A. Holmes, *The Nomenclature of Petrology*, 2nd edn, London, 1928; A. Johannsen, *A Descriptive Petrology of the Igneous Rocks*, 2nd edn, Chicago, 1939; W. E. Tröger, *Spezielle Petrographie der Eruptivgesteine*, Berlin, 1935.

The Chemical Classification

The chemical classification is based on the commonly accepted subdivision by anions into oxides, sulphides, silicates, phosphates, etc.; this is the more convenient since few minerals contain more

[1] A few names of rocks originally regarded as minerals and published as mineral names are included, together with some rock names which are close to, and might be confused with, mineral names; also a few names which have been applied to kinds of meteorites.

than one anion, and very few more than two. Cross-references are given wherever they seemed likely to be of value, but by providing a few additional sections such as silicates with other anions, sulphates with halide, and the like, the number of individual cross-references needed is greatly reduced; an attempt has been made, however, to provide cross-references wherever one of the anions is only present in very small amount or is easily overlooked for other reasons.

The second stage of the subdivision is, in most sections, by metals; however many metals a mineral may contain, only one main entry is made for each species or chemically distinguishable variety, but cross-references are given under all the other metals normally or occasionally present; the metal selected is not necessarily that present in largest amount, but is usually the noblest or rarest—this arrangement ensures that all entries of minerals of the same qualitative composition shall come together, so that a knowledge of the quantitative composition of the mineral is not necessary for the effective use of the index. The subsections are arranged in the order of the periodic classification of the elements; where minerals containing a given metal are not numerous, all those containing metals of the same periodic group are collected into one subsection.

In general, division by anions into sections and by metals into subsections gives subsections containing a reasonable number of entries—some 10 to 30 entries per subsection can be comfortably followed without confusion. But the silicates, which include roughly one-third of all the entries, need special treatment; here a first division is made into four sections: silicates containing other anions, simple silicates not containing aluminium, simple silicates containing aluminium and no other metal, and simple silicates containing aluminium and other metals.[1] Further, the silicates or aluminosilicates of one metal may constitute more than one subsection.

This second-stage subdivision by metals applies to most sections, but in some a second subdivision according to anions is more suitable, and in a few, such as the tantalates and columbates, other forms of subdivision have seemed preferable; these are explained in the introductions to the respective sections.

To facilitate cross-reference, the sections, subsections, and individual entries are numbered; thus Pyroaurite has the reference number 11.13.8—that is, section 11 (carbonates without other anions), subsection 13 (carbonates of Fe), entry 8. Any such system of numbering suffers from a lack of elasticity in that there is no vacant place for new entries, but this is not serious where the numbers are only used for convenience in cross-indexing and in the alphabetical index. The original basis of this classified list is a

[1] The recent development of reliable and rapid microchemical tests for aluminium, especially the Morin test, makes this subdivision practicable; it would not have been satisfactory with the classical scheme of qualitative analysis, in which small percentages of aluminium are too readily overlooked.

card index, which will be kept up to date; there is no recasting of reference numbers when an entry is deleted or a new entry added, and new entries receive "lettered" reference numbers—for example, should a new carbonate of Mg and Fe be found that would naturally follow Pyroaurite (11.13.8) in the classification, it would be numbered 11.13.8a.

In the matter of *varietal names*, the chemical prefixes of W. T. Schaller (for example, Plumbian aragonite for Tarnowitzite) have not been adopted; certainly a great multiplication of varietal names based on small differences in chemical composition is to be deprecated, but it seems quite unnecessary to discard such well-known names as Freibergite, Pisanite, or Ceylonite; moreover, it is not really possible to draw a definite line between species and varieties.

Where a complete isomorphous series is known, or is possible, the currently accepted nomenclature proceeds differently in different cases: only two species may be recognized, with perhaps one or more intermediate varieties, and the dividing line between the species may or may not be at 50% either molecularly or by weight (for example, Gahnite-Spinel, with the variety Gahnospinel); or three species may be recognized, with perhaps some intermediate varieties, the series being arbitrarily divided (for example, Magnesite–Mesitite–Chalybite); or the series may be divided into several steps all of species rank (for example, the Plagioclases); or at the other extreme a single species name may be used, and the pure end-members may be distinguished as varieties (for example, Humite), or they may not be recognized in the nomenclature (for example, Topaz).

Which method is used in any particular case is partly a historical accident: where the end-members were known before any intermediate compositions, the two-species nomenclature is commonest; where the series is important in petrography, or the full range was discovered early, multiplication of species names is common; and where an intermediate composition was known before the end-members, the single-species nomenclature will tend to develop, provided the variation is in a relatively inconspicuous constituent such as (F, OH) in the Phlogopites or (Mg, Fe, Cu) in the Copiapites; but where the isomorphous replacement involves the principal metal or anion, three-species nomenclature will tend to develop, as in the Forsterite–Olivine–Fayalite series. Any simple system of varietal nomenclature such as Schaller's must fail to meet these diverse natural tendencies. Moreover, Schaller's separate, adjectival prefixes show little sign of gaining international acceptance. It is unfortunate that the well-known, internationally accepted chemical prefixes Natro-, Kalio-, Ferro-, etc., have in recent years been increasingly used to indicate complete rather than partial replacement of a major constituent,[1] a distinct species, rather than a variety (Ferroantigorite; Cobaltocalcite (of Frondel)).

[1] The use of a chemical prefix to indicate complete replacement of a minor constituent, as in Cuprocopiapite, is a different matter.

Nevertheless, the introduction of new varietal names for minerals showing very minor isomorphous replacements is definitely undesirable, especially when the varietal name is not compounded from the name of the parent species. It seems probable that in course of time many superfluous varietal names will fall out of use, but until then it is desirable to include all names of chemically distinct varieties in an index such as this, for reference and definition; the inclusion of any varietal name should not be taken to imply that its use is recommended. Varietal names have therefore been retained, and receive separate entries in so far as they refer to chemically distinct varieties; but since many are relatively unfamiliar, they have been distinguished by italics and a reference to the parent species added. But it must be emphasized that the distinction between varieties of a species and species of a family is one of degree rather than of kind. Varieties that are distinguished by colour, crystal habit, or any property other than chemical composition do not receive separate entries, except in the alphabetical index, but are simply listed along with any chemically distinct varieties at the end of the entry for the parent species. An attempt has been made to include unnamed chemically distinct varieties as far as possible, but since such varieties are not separately indexed in the literature, this cannot be made even approximately complete without expenditure of an inordinate amount of time.

The treatment of *doubtful species* or varieties (that is, species or varieties of doubtful homogeneity or doubtful individuality) has been deliberately conservative. Often there is some evidence to suggest that a supposed species is a mixture, or identical with some other species, but the evidence is not fully conclusive, or there may be conflicting evidence; wherever there is any reasonable doubt of a suggested identity, the discredited species has not been rejected, but accounted "doubtful"; and wherever a supposed species has been shown to be a mixture, but one of the principal constituents has remained unidentified, the name has been retained, since it may reasonably be transferred in the future to the at present unidentified component. Doubtful species have been given separate entries, but in ordinary type instead of **Clarendon.** It is hoped that by giving the doubtful species special publicity in this way some may be conclusively eliminated and others established, and that the unnecessary multiplication of names by the redescription of imperfectly known species under new names may be avoided.

The *form of entry* adopted for the chemically classified list begins with the reference number and name of the species or variety, with a cross-reference to the parent species in the case of varieties; where the name has been used for more than one species, a distinction is made by appending the name of the author who introduced the name in the sense under consideration. Then comes the chemical formula (or the chemical description where no formula can be given), with abbreviated references to the literature to establish the formula and the individuality of the species or variety (no attempt

has been made at a complete bibliography), and any notes or discussion; then a selection of synonyms, and lastly a list of varieties. In many cases the formula is enclosed in square brackets [ ]; this indicates that the crystal repeat has been established by X-ray methods, and is either the formula in the brackets or a multiple indicated by a figure outside the brackets. This use of submultiples of the unit cell with a figure outside the brackets should not be taken as indicating that the submultiple has any special structural significance; it is merely a device for avoiding chemical formulae involving large numbers, which are often difficult to follow; the device also has an advantage if it should be found that the true cell is a multiple of that at first proposed. And it should be emphasized that the square brackets in themselves indicate little more than that the size of the unit-cell or of a prominent pseudo-cell is known; but if the chemical analysis and density are reliable, it follows that the chemistry can be discussed on a structural basis in a way that it is impossible when the size of the structural unit is unknown (compare *Min. Mag.*, 1939, **25**–402; 1954, **30**–481).

No attempt has been made to include all synonyms, and in particular, obvious translations have been avoided (thus "Mountain green" is not given in addition to the earlier "Berggrün"), and a number of common spelling variants have been generally omitted; but spelling variants which wholly alter the appearance of the name are often given, especially where the accepted name in English-speaking countries is a spelling variant of the original (for example, Hydromelanothallite, originally Idromelanotallo).

Reference has been made wherever possible to Dana's *System of Mineralogy*, 7th edn (1944), or 6th edn (1892), supplemented where necessary with references to *Mineralogical Abstracts*; species and variety names which are not included in Dana are referred where possible to Chester's *Dictionary of the Names of Minerals*, or to the lists of new mineral names by L. J. Spencer included in each volume of the *Mineralogical Magazine* since vol. 10. Failing these, reference is made to O. M. Shubnikova's lists of new mineral names, to standard text-books (including, for many German spelling variants, Hintze's *Handbuch der Mineralogie*), or to the original literature. This course appeared preferable to a reference to the original description since, while enabling reference to be made to the original, it often provides in addition a reference to most of the literature on the species. In a few instances, the only publication traced is in a list of names without details of author, date of publication, etc.; such references have been avoided where possible. A few names, found in the *Student's Index to the Collection of Minerals* (published by this Museum), have been included though they occur only on dealers' labels and have not been traced elsewhere. When the original spelling of a name has been established, no special effort has been made to trace the origin of spelling variants.

Accepted Nomenclature

The name and spelling to be adopted for a species or variety often raises difficulties. The development of mineralogical nomenclature has been rather haphazard, and many species and varieties have received several totally different names, while the same name has often been given to more than one species. Further, many variations in the spelling of some names are to be found: some prompted by attempts to preserve the original pronunciation when adopting names of foreign origin (for example, Kwarc, Polish variant of Quartz); others by attempts to accommodate names of foreign origin to local spelling conventions (for example, the incomplete and inconsistent replacement of *th* by *t* or of *c* by *k* or *z* in German, or the tendency to discard the *e* in *ae* and *oe* in America, to discard an initial *h* in Italian, and to prefix an *e* before initial *s* in Spanish); and others by an attempt to avoid the use of diacritical marks (for example, the replacement of German *ä*, *ö*, and *ü* by *æ*, *œ*, and *ue*, common in America). Also, the names of the common metals, which often differ in different languages, are sometimes used as varietal prefixes, and are commonly translated to adapt the name to other languages (for example, Eisen, Iron, железный).

All these tendencies are greatly to be deprecated. Mineral names should be as international as possible; since the written rather than the spoken word is the medium of publication, international uniformity of spelling is of prime importance, and pronunciation relatively immaterial. To quote L. J. Spencer: "The question of the alteration of the form of names with the idea of adapting them to different languages resolves itself into whether (i) the correct pronunciation, or (ii) the correct spelling of the printed word, is the more important. For international science the latter is surely to be considered first." "The correct pronunciation . . . need not be considered seriously. Even quite simple names like Pyrite, Quartz, Calcite, etc., are pronounced very differently in different countries. International usage depends mainly on the printed word (in Roman characters) and it is in this that standardization is needed. If a name with a derivation peculiar to one language is changed, with a mistaken idea of adapting it to some other language, then confusion will follow and the name may be lost in an alphabetical index." "Unless obviously in error, species names should be accepted in as nearly as possible the same form as that given by the first author." "This leads to the difficulty presented by the diacritical marks peculiar to various languages. Here there may be a difficulty not only in the form of the word, but also in its alphabetical arrangement, and for the majority of printers in the lack of the proper type. In the Swedish alphabet *å*, *ä*, and *ö* find a place after *z*. . . . Diacritical marks have such varied meanings in different languages . . . that for international use they are better ignored so far as alphabetical arrangement is concerned. Unless they can be printed

correctly, they are better omitted; while any attempt to acquire the correct pronunciation of the original language is only pedantic." (*Min. Mag.*, 1925, **20**–355–6.)

Strict priority, on the lines adopted by zoologists or botanists, is not a practical solution of the difficulties of deciding which of several alternative names or spellings should be accepted; it would involve the abandonment of many well-known and generally accepted names, and the adoption of many quite unfamiliar spelling variants. In the absence of any approach to international agreement, we have endeavoured to retain the names most generally accepted in English-speaking countries. As has been mentioned above, the inclusion of varietal names should not be taken to imply that their use is recommended; indeed apart from a few well-known names like Bronzite, Sahlite, and Rubellite, the only varietal names that can be recommended for general use are those that are compounded with chemical prefixes, and those only where the substitution is substantial in amount. The introduction of a new name for every find of material differing slightly in chemical composition or optical properties from a known species is quite indefensible. Nor is there any justification for replacing a well-established name merely because it implies physical or other properties not necessarily typical of the species (which would call for the rejection, for example, of Pyroxene), and accordingly a number of changes proposed in the 7th edition of Dana's *System of Mineralogy* have not been accepted.[1]

Reference has been made above to the difficulty raised by the use of the names of common metals, which differ in different languages, as varietal prefixes. Wherever the international forms Ferro-, Ferri-, Calcio-, Kalio-, Natro-, Cupro- have already been used in alternative names, we have adopted them (thus Calciocancrinite is preferred to the earlier Kalk-cancrinit, Ferrogedrite to the earlier Iron-gedrite), but we have not felt justified in introducing new names to replace such names as Iron-albite where an international form is not already in existence; the Russian железистый гюбнерит is, however, translated as Ferrohübnerite.

The spelling of the adopted names also has to be a matter of some compromise: while it is clearly desirable to accept them "in as nearly as possible the same form as that given by the first author", it is obviously undesirable that names commencing with some well-known prefix for which there is no internationally agreed spelling such as Clino- (German Klino-) or Hydro (Italian Idro-) should be variously spelt according to the nationality of the originator (Clinohumite, Des Cloizeaux; Klinophaeit, Sandberger), and the accepted English spellings have been retained for all such prefixes, even where we have not been able to trace a previous use of the anglicized

[1] In particular, Cobaltocalcite in place of Sphaerocobaltite is unsatisfactory for two reasons: prior usage for a cobaltiferous variety of calcite; and the use of a chemical prefix to indicate complete replacement of a major constituent. And Chalcocyanite (=copper-blue) is no improvement on the long-established Hydrocyanite (=water-blue) for a *white* copper mineral that is turned blue by water.

form. Similar considerations apply to the second half of names modified by prefixes (thus Pseudo-eucryptite and Pseudomeionite are preferred to the original Pseudo-Eukryptit and Pseudomejonit). Spellings which are definitely in error, or attempts to render a foreign name in accordance with local spelling conventions, have been rejected even when original (for example, Göthite, Roentgenite, Buetschliite, Dennisonite, Craïtonite). And the German terminations *-it* and *-in* have naturally been changed to *-ite* and *-ine*.

"The termination *-ite* . . . is used in so many senses that a word with this ending does not necessarily suggest a mineral name" (L. J. Spencer, *loc. cit.*, p. 357); accordingly, it is only adopted in place of any earlier termination when this has become the normal practice and a return to the original form would appear pedantic.

Diacritical marks have been uniformly retained, except for the accents on certain names of French origin, where their omission is not likely to lead to doubts concerning the pronunciation. In general, we have sought to reproduce the original form of the names as far as possible, while agreeing that the diacritical marks should either be correctly printed or simply omitted. Though we feel that pronunciation is relatively immaterial, any guide to the correct pronunciation that does not disturb the alphabetical order must be useful. Accordingly, in the numerous names ending in *-eite*, an acute accent or a diaeresis in the original is retained; and in other names with this ending where the *e* should be separately pronounced, we have added a diaeresis over the *i* (for example, Zippeïte). With the German modified vowels, *ä*, *ö*, *ü*, often written out *ae*, *oe*, *ue*, we have retained the original form as far as it could be traced without inordinate expenditure of time, unless it tends to obscure the derivation, in which case it has been regarded as an error (thus although the original spelling appears to be Göthit, the derivation clearly requires Goethite; and Röntgenite is similarly preferred to the original Roentgenite).

With regard to the ligatures *æ* and *œ*, these have been printed where there is precedent for their use; but for normal use, it is certainly preferable to write *ae* and *oe* rather than use the ligatures or replace them with *e* to the detriment of the alphabetical order (but Hematite and a number of related names are adopted in accordance with the proposals of the Anglo-American committee on nomenclature).

The principle underlying these conventions has been that of ensuring that the position of the names in an alphabetical index shall be as internationally uniform as possible. They differ from the American conventions (Dana, *Syst. Min.*, 7th edn, 1–46) in some respects in which the latter tend to disturb the normal alphabetical arrangement; the American conventions include:

(*a*) Replacement of Swedish *å* by *a*, but of Norwegian *å* by *aa*; this seems especially undesirable in that the language of origin is made to decide whether a given symbol shall be

represented by *a* or by *aa*; the problem which form to use for a mineral named by a Swedish author after a Norwegian personal or geographical name involving *å* will be interesting.

(*b*) Unspecified changes "when letters in a name are brought together in a manner not customary in English"; this convention, fortunately not adhered to in the case of Vrbaite (Dana 7th edn, 1–484), is decidedly retrograde; it would involve that "alteration of the form of names with the idea of adapting them to different languages" (Spencer, *loc. cit.*) which is a potent source of confusion, and of failure to discover the literature on a species.

(*c*) Uniform replacement of German *ä*, *ö*, and *ü* by *ae*, *oe*, and *ue*; here again the form of the name is made to depend on the language of origin, since these symbols are not exclusively German, and in Swedish, Danish, Hungarian, Spanish, or French such a replacement would be quite incorrect.

(*d*) Simplification of "the diphthongs *ae* and *oe*" to *e*; presumably it is intended to make the simplification where *ae* and *oe* represent the ligatures *æ* and *œ*. But the use of the ligatures has been so irregular and often incorrect that this course is difficult; Tänit (of Reichenbach) has very commonly been written Tænite, but in Dana, *Syst. Min.*, 7th edn, 1–117 it appears as Taenite, not as Tenite; Chester, Dana (6th edn), and others have used the ligatures to represent German modified vowels; and in Norwegian, Danish, and Icelandic, the ligature *æ* is accounted a separate letter, and is equivalent to German *ä*, not to *e*. In fact, *ae* and *oe* may represent not only the ligatures (in names of classical or Scandinavian derivation) and the German modified vowels, but may be *ae* and *oe* in their own right, as in the place names Caen and Caerphilly. A careful study of the derivation of every mineral name containing these combinations is necessary to achieve the proposed "simplification", and without it we may expect eventually to meet Gethite, Ellacherite, Erstedite, and other curiosities.

The large selection of new names proposed by G. Gagarin and J. R. Cuomo (see *Min. Mag.*, 29–974) have not been accepted, and are listed as synonyms, even where the mineral had not been previously named. It has long been an accepted convention among mineralogists that the privilege of naming a new mineral rests with the discoverer or with the author who first publishes an adequate description of the species, and it is felt that a name should not be put forward for a mineral which its discoverer did not see fit to name unless either substantial new data is offered or the approval of the original author has been obtained. It is also desirable to have the approval of the person after whom a mineral is named where this is possible.

Arrangement of the Alphabetical Index

The names incorporated in the alphabetical index fall into two classes: adopted names of species and chemically distinct varieties, as used in the chemical classification, on the one hand, and, on the other, synonyms, names of colour- and other "trivial" varieties, names assigned to mixtures or pseudomorphs, group names, etc.

The first class are printed in **Clarendon** type, and each is followed by a literature reference and by the reference number to the entry in the chemical classification; no distinction is made in the alphabetical list between accepted and doubtful species, or between species and chemically distinct varieties.

The second class are printed in ordinary type, and each entry is followed by a literature reference; for the accepted names of "trivial" varieties, the name of the parent species is given, introduced by "Var. of"; for synonyms, the accepted name of the species, variety, or trivial variety is introduced by "Syn. of", with a literature reference to the proof of synonymy if necessary; names of pseudomorphs, group names, etc., are treated similarly.

While the literature references in the chemical index are to the latest (7th) edition of Dana's *System of Mineralogy* wherever possible, it has seemed preferable in the alphabetical index to retain the references to the 6th edition and to Dr. Spencer's lists of new mineral names in the *Mineralogical Magazine*; in the 7th edition, many names that appear solely in the synonymy are not true synonyms, but were given to minor varieties which are not felt to deserve a separate name, or even to mixtures or pseudomorphs; the references to Dr. Spencer's lists usually make the precise connotation of the name quite clear.

Russian Names

"International usage depends mainly on the printed word (in Roman characters) . . ." "The correct pronunciation . . . need not be considered seriously" (L. J. Spencer, *loc. cit.*). Thus English, French, Italian, and other mineralogists have no difficulty over the significance of the name Rézbányite, though none of them may have any idea of its correct pronunciation. But when a language using another alphabet enters the field, new difficulties arise, because the phonetic values of the Roman letters differ greatly in different languages, so that it is impossible to devise a single system of transliteration, applicable to all mineral names and to all languages using the Roman alphabet.

Of languages using alphabets other than the Roman, it will be sufficient to consider Russian; the same general principles will apply to others. For names of Russian origin (that is, names originally published in the Russian literature in the Cyrillic alphabet, such as Elatolite, and names derived from Russian personal or place names, such as Chevkinite) the standard is the original

Cyrillic spelling, and this has been appended to the accepted names of Russian origin in the alphabetical index (but not to synonyms, etc.). For these, the name to be adopted in English-speaking countries should preferably be a transliteration according to some uniform system giving a reasonable approach to the phonetic value, except that common prefixes such as Clino- and accepted mineral names incorporated into compounds should retain their normal English spelling (for example, Alumohydrocalcite is preferred to the exact transliteration Alyumohydrokaltsit); in this index the Royal Geographical Society's system (*Alphabets of Foreign Languages*, 2nd edn, London, 1933, with corrections, 1938 and 1948) is adopted, except that the initial *E* (Еремеевит, Ермакит) is transliterated *E*, and not *Ye*. This system only differs from that adopted by the American Chemical Society and the Library of Congress in that the latter transliterates Cyrillic *e* by *e* throughout, whereas we use *ye* where the Cyrillic *e* follows another vowel. But French, German, and other mineralogists cannot be expected to adopt an English system of transliteration, so that names of Russian origin often acquire a totally different spelling in French or German from the accepted English spelling; this is unfortunate, but unavoidable.

The converse problem, that of the proper Russian spelling of names originally spelt in the Roman alphabet, is even more difficult. As far as the non-Russian mineralogist is concerned, the problem is usually to know under what spelling he may expect to find a given name in the Russian literature; he can do little more than try one or two attempts to reproduce phonetically the pronunciation of the name in English, French, or German; fortunately, many Russian authors and journals append an index of the Roman equivalents of the mineral names. Ideally, the solution would be to find the proper pronunciation of each accepted name according to the country of origin, and then transcribe phonetically (though even then such sounds as English *g*, *wh*, and *th* would raise difficulties), and it is to be hoped that the Academy of Sciences of the U.S.S.R. will compile an official index of transliterations on some such lines.

A Note on New Mineral Names

The problem of finding a satisfactory name for a new mineral is often one of some difficulty. Names derived from some characteristic property of the mineral (for example, Margarosanite, Chlorozíphite) are usually eminently satisfactory, though it has happened that the property to which the name calls attention is not truly characteristic of the mineral (for example, Pyroxene, Phlogopite). Geographical names, based on the place of find, are generally unexceptionable, but the supply may easily run short in such prolific localities as Långban or Franklin (New Jersey). Names given in honour of some person have long been popular; but it is noticeable that some famous mineralogists have been curiously unfortunate in the minerals named after them, which have often been very rare

or quite unimportant varieties, or have turned out to be already known under another name[1] (for example, Delislite, for Romé de l'Isle; Boodtite, for Boethius de Boodt; of nine names given in honour of Berzelius, only one is in general use, and that for the rare species Berzelianite). Names based on chemical composition such as Hydrocalumite, Nahcolite, and Bismoclite are usually very satisfactory, provided the chemistry was not in error as it was with Chromowulfenite (which is not coloured by chromium as was supposed).

In allotting a new name, two points are often overlooked, besides the question whether a new name is really necessary: not only should the name be one not previously used for a mineral or rock, but it is most undesirable to put forward a name very near in spelling to an older name, lest errors creep in—compare Celadonite and Caledonite; Vaalite and Valaite; Zoésite and Zoisite; Voglite, Vogtite, and Voigtite; Braggite, Bragite, and Broggite; Mallardite and Malladrite; Halite and Hallite. In one instance, a name has been given that differs from a well-established older name by nothing save a diacritical mark (Jarošite). And a name for international use—as mineral names should be—ought not to present special problems in pronunciation like Bhreckite, Vrbaite, Przibramite, or Whewellite.

Pronunciation of Mineral Names

In this edition, an attempt has been made to offer a guide to the pronunciation of mineral names. As has been emphasized above, an agreed spelling, as international as possible, is of much greater importance in mineral nomenclature than any attempt to standardize pronunciation, but some approach to uniformity of pronunciation in English-speaking countries is clearly desirable, and it is hoped that the suggestions here made will at least afford a basis for discussion.

Apart from a number of old and well-known names that have become completely anglicized, the pronunciation here suggested is based on the etymology of the name. For minerals named after places or persons, it is hardly practicable to attempt a strict rendering according to the country of origin, and a partially anglicized version is suggested, in which the consonants approximate to those proper to the derivation of the name, while the vowels are often somewhat modified (the nasal vowels of French and Portuguese always) and the accentuation generally follows an English pattern. For names derived from Greek or Latin words, the old or English pronunciation has generally been followed; but *KH*, sounded as in *Loch*, is preferred for the Greek χ, though this is very commonly pronounced as *K*. In a few instances, mainly names of English or American origin, pronunciations have been recorded as definitely incorrect.

[1] In this connexion, it is interesting to note that the omission of the accent obscures the derivation of Roméite (after Romé de l'Isle, not after the city of Rome).

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Abbreviations used in the Literature References

B.M. Index—The Student's Index to the Collection of Minerals, British Museum (Natural History), 11th edn, 1884, to 27th edn, 1936. Earlier editions bore the title Catalogue of Minerals (1863, 1st edn) or Index to the Collection of Minerals (6th to 10th edns, 1872–1882).

Min. Mag.—Mineralogical Magazine.

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Shubnikova, 1937—Idem, ibid., 1937, no. 10, pp. 169–226 [M.A. 7–58].
Shubnikova, 1938—Idem, ibid., 1938, no. 11, pp. 1–36 [M.A. 8–2].
Shubnikova, 1940—Idem, ibid., 1940, no. 31, pp. 1–6 and 31–62 [M.A. 9–125].
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