

THE TYPE MINERALOGY OF AFRICA : ZAIRE

by

V.D.C. DALTRY¹

(8 tables)

ABSTRACT.- The type-mineralogy of Zaire is reviewed. One hundred and ninety five type-minerals and mineral names are presented, comprising ninety one valid and one hundred and four non-valid type-phases. Zaire is the most productive African country for type-minerals. The ninety one approved species are described from twenty five type-localities. Thirty one of these minerals still remain unique to the respective type-occurrence. The Shinkolobwe deposit is the most prolific producer of new type-minerals in Zaire, ranking second in Africa as a whole. The Kobokobo pegmatite is the second most prolific producer of new minerals in Zaire; many of the recorded type-minerals from Kobokobo are unique to the deposit. Fifty three type-uranyl species are recorded from Zaire. The world's largest single assemblages of type-uranyl oxide hydrates and type-uranyl phosphates occur at Shinkolobwe and Kobokobo, respectively. Zaire is thus far the only documented source for REE-uranyl carbonate, uranyl selenite and thiocyanide phases.

KEYWORDS.- Africa; Zaire; Type-Mineralogy.

1. INTRODUCTION

1.1.- Foreword

An overview on the type-mineralogy of Zaire is presented. This publication is one of a series, by the author, on the type-mineralogy of Africa.

The listing of type-minerals from Zaire is as complete as possible, though the author apologises for any omissions which might have arisen during the compilation of this work. Amendments and additions to this effect would be most gratefully received.

1.2.- Type-Mineral Definitions and Terminologies

The term type-mineral may be defined as any mineral species that is described naturally for the first time and upon which the formal definition of the mineral is made. The locality from which such a mineral is initially described is known as the type-locality. No attempt is made in this publication to sub-define any of the listed type-species into holotypes, cotypes or neotypes, as defined by Dunn and Mandarino (1988). This aspect covering Zairean type-minerals has however, been reviewed by Deliens (1977a).

The naming of new phases is naturally the prerogative of the author or authors concerned. It is therefore imperative that the allocated mineral name is spelt correctly in any subsequent reference to it, as any misspelling(s) could be legitimately interpreted as a separate mineral name.

The validity (or non-validity) of all documented minerals, in this publication, is taken in strict accordance with the recommendations of the Commission on New Minerals and Mineral Names (C.N.M.M.N.) of the International Mineralogical Association (I.M.A.). Valid type-mineral are therefore those minerals that have been approved by the Commission.

Minerals or mineral names that either lack formal approval by the Commission or have been rejected by the Commission are referred to as non-valid. Such phases may be conveniently grouped into one of the following categories:

- a) inadequately described phases (status uncertain).

1.- *Geology Department, School of Mines, The University of Zambia - Box 32379 - Lusaka, Zambia.*

- b) phases that are identical to approved minerals (synonyms).
- c) compositional variants of approved minerals (chemical varieties).
- d) physical varieties of approved minerals.
- e) names applied to end-member phases which, as yet, have no natural counterparts (hypothetical compounds).
- f) Compositional mixtures (solid-solutions).
- g) mechanical mixtures of two or more approved minerals (mixtures).
- h) names that are used as group or generic terms (group names).
- i) misspelt mineral names (spelling variants) usually arising through typographical misprinting or erroneous back transliterations.
- j) unnamed phases.

The chemical variety sub-group includes those mineral names that carry non-adjectival modifiers (suffixes or prefixes) and which go to form derivative mineral names (an example is Thcrandallite for thorian crandallite).

Furthermore, because of the not-too-uncommon practice of misspelling minerals names it is sometimes difficult to ascertain whether or not that particular spelling version is original to the cited reference. This is especially so with the more common minerals and, in such cases, the mineral name is preceded by [?] in this publication.

Reference is also made to what the author has termed «the established literature». This term collectively refers to the following publications:

1. Lists of New Mineral Names, given in both Mineralogical Magazine and American Mineralogist.
2. The various editions of Dana's System of Mineralogy.
3. Chemical Index of Minerals by Max Hey (1955, 1962a).
4. A Manual of New Mineral Names 1892-1978, by P. Embrey and J. Fuller (1980).

1.3.- Zairean Overview

One hundred and ninety five valid type-minerals have been described from Zaire, for the period 1917-1990. Ninety one of these are valid mineral species, 33 of which come from the Shinkolobwe uranium deposit. The remainder are non-valid species comprising 38 spelling variants (including 6 queried [?] names); 36 synonyms; 18 chemical varieties; 5 inadequately characterised (status uncertain) phases; 3 mixtures, 2 physical varieties and 1 group name and 1 hypothetical compound. An additional 13 unnamed phases are also presented (section 4.2).

The first documented approved type-mineral from Zaire is cornetite (Buttgenbach 1917) from the L'Etoile du Congo mine, near Lubumbashi, Shaba province.

A summary of the recorded Zairean type-mineral names is presented in Table 1.

Table 1.- Recorded Type-Minerals and Mineral Names from Zaire

a) Valid Minerals :

Althupite	Juliñnite	Ranunculite
Andremeyerite	Kalipyrochlore	Renierite
Anthoinite	Kamitugaite	Richetite
Becquerelite	Kamotoite-(Y)	Roubaultite
Bijvoetite-(Y)	Kasolite	Saléeite
Billietite	Kipushite	Sayrite
Briartite	Kirschsteinite	Schoepite
Buttgenbachite	Kivuite	Schullingite-(Nd)
Cattierite	Kolwezite	Sengierite
Cesplumantite	Lepersonnite-(Gd)	Shabaite-(Nd)
Claringbullite	Likasite	Sharpite
Combeite	Ludjibaite	Skłodowskrite
Comblainite	Lueshite	Soddyite
Cornetite	Lusungite	Stilleite
Cuprosklodowskrite	Marthozite	Studtite
Curite	Masuyite	Swamboite
Delhayelite	Metaschoepite	Thoreaulite
Demessaekerite	Metastudtite	Threadgoldite
Derrikite	Metastudtite	Triangulite
Dewindtite	Metavandriesscheite	Triksalilite
Dumontite	Metavanmeersscheite	Upalite
Eylattersite	Mundite	Uranalcalcarite
Florencite-(La)	Oosterboschite	Vaesite
Fourmarierite	Oursinite	Vandenbrandite
Francoisite-(Nd)	Paraschoepite	Vandriesscheite
Gallite	Parsonsrite	Vanmeersscheite
Götzenite	Phuralumite	Varlamoffite
Guilleminite	Plumbicrollite	Wakefieldite-(Ce)
Gysinite-(Nd)	Protasite	Wyartite
Heterogenite-2H	Rankamaite	Zairite
Ianthinite (Schoep)		

b) Non-valid Minerals :

Compositional Varieties		
Borgniezite	Lead-becquerelite	Selenium molybdenite
Cobalt-vaesite	Li-biotite	Selenolinnæite
Cupro-asbolane	Nickel-cattierite	Th-crandallite
Cuproplatine	Selenio-molybdenite	Thorophosphuranylite
Kobokobite	Selenio-siegenite	Thororenardite
Kusultite	Selenio-vaesite	Uranothorogummitte

Synonym Status

Bialite	Keno-mitridatite	Schoepite III
Bijvoetite	Lead microlite	Schullingite
Chinkolobwite	Lepersonnite	Selenio-siegenite
Diderichite	Lubumbashite	Selenium-vaesite
Drögmansite	Meta-saléeite	Stainierite
Epilanthinite	Mindigite	Stasite
Gysinite	Mumbite	Topasolite
Heterogenite-H	Plancheite I	Trieuite
Hydrotenorite	Plancheite III	Uranolepidite
Ianthinite (Bignand)	Plancheite X	Vandriesscheite I
Katangite	Schoepite I	Vandriesscheite II
Keno-eylattersite	Schoepite II	Wyartite I

Mixtures	Hypothetical Molecule	Physical Varieties	Group Names
Boodtite	Zn-tourmaline	Plancheite II	Columbotantalite
Chalcocite-rose grey		Wyartite II	
Renardite			

Spelling Variants

Amenite	Ianthite
Brandallite	Ianthinit(e)
Caringbullite	Janthiniet
[?] Carolite	Kirchsteinite
[?] Chalcantite	Koluezite
Chalcotrycite	[?] Lithiophyllite
Chervettite	Lumbumbashite
Chinkolobwite	Meta-vanmeersscheite
Cobalt-calcite	Parmsite
[?] Colombite	Saleite
Comblainite	Shinkolobwite
Cupro-asbolite	Soddyite
Cuprosklodowskrite	Stainerite
Cuprosklovskite	Thoreaulith
Cuprosklodowskit	[?] Torbenite
Cuprosklowskrite	[?] Treadgoldite
Epilanthinit	[?] Triphyllite
Gerardite	Vandenbrandite
Guilleminite	Vanmeersscheite

Status Uncertain

Clino-sklodowskrite	Eylattersite I	Tantalpolycrase
Cousinite	Eylattersite II	

2.- LITERATURE REVIEW

2.1.- Authors to approved Zairean type-minerals

The most prolific describers of type-minerals from Zaire are the combined team of Michel Deliens and Paul Piret. Both are accredited with the descriptions of 25 five approved type-phases, for the period 1979-1989. Michel Deliens has additionally described the polytype heterogenite-2H (Deliens and Goethals 1977).

Alfred Schoep (1921-1955) has described 13 type-phases from the Shinkolobwe; Schoep is also accredited with an additional 3 approved species. Johannes Vaes has described 8 approved type-Zairean minerals for the period 1947-1949. L. van Wambeke, working mainly on the Lueshe carbonate and the Kobokobo pegmatite has described 6 new species for the period 1959-1975. Other prominent mineralogists in the same context include Th. Sahama (with Kai Hytonen) and Fabian Cesbron (and co-workers).

A summary of the more prominent authors to approved Zairean type-minerals, together with a list of the described phases, is presented in Table 2.

Table 2.- Listing of Principle Authors to Approved Zairean Type-Minerals

<i>Henri Buttgenbach (1917-1933)</i>			
Cornetite	Fourmarierite	Thoreaulite	
Cuprosklodowskite	Kipushite		
<i>Fabian Cesbron and co-workers (1966-1971)</i>			
Demesmaekerite	Marthozite		
Derriksrite	Roubaultite		
<i>Michel Deliens and Paul Piret (1979-1989)</i>			
Althupite	Ludjibaite	Shabaite-(Nd)	
Bijvoetite-(Y)	Metastudtite	Swamboite	
Comblainite	Metavanmeersscheite	Threadgoldite	
Francoisite-(Nd)	Moreauite	Triangulite	
Heterogenite-2H	Mundite	Upalite	
Kamitugaite	Oursinite	Uranalcarite	
Kamotoite-(Y)	Phuralumite	Vanmeersscheite	
Kolwezeite	Ranunculite	Wakefieldite-(Ce)	
Lepersonnite-(Gd)	Sayrite		
<i>Th. Sahama < including Kai Hytonen > (1957-1959)</i>			
Andremeyerite	Delhayelite	Kirschsteinite	
Combeite	Gotzenite	Trikalsilite	
<i>Alfred Schoep (1921-1955)</i>			
Bequerelite	Dumontite	Likasite	Sklodowskite
Buttgenbachite	Ianthinite	Paraschoepite	Soddyite
Curite	Julienite	Parsonsite	Vandenbrandeite
Dewindtite	Kasolite	Saléite	
<i>Johannes Vaes (1947-1949)</i>			
Billietite	Richetite	Studtite	
Masuyite	Schullingite-(Nd)	Vandendriesscheite	
Renierite	Sengierite		
<i>L. van Wambeke (1958-1975)</i>			
Eylattersite	Kivuite	Plumbomicrolite	
Kalipyrochlore	Lusungite	Zairite	

2.2.- Etymology of approved type-minerals

As stated in section 1.2. the naming of new minerals is at the discretion of the author(s) concerned. For the Zairean approved type-minerals, 56 are named for various scientific and non-scientific personages; 15 mineral names

allude to their composition; 13 are named for the respective type-locality and 7 names relate to their physical or structural properties.

A summary of nomenclature derivations of approved type-species from Zaire is given in Table 3.

Table 3.- Nomenclature Derivation of Approved Type-Minerals from Zaire

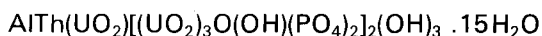
<i>After physical and crystal structure properties :</i>			
Heterogenite-2H	Oursinite	Ranunculite	Triangulite
Ianthinite	Paraschoepite	Trikalsilite	
<i>After the chemical composition :</i>			
Althupite	Kalipyrochlore	Phuralumite	
Cesplumtantite	Metaschoepite	Plumbomicrolite	
Cuprosklodowskite	Metastudtite	Upalite	
Florensite-(La)	Metavandendriesscheite	Uranalcarite	
Gallite	Meta-vanmeersscheite	Wakefieldite-(Ce)	
<i>After the type-locality :</i>			
Kamitugaite	Kivuite	Lueshite	Zairite
Kamotoite-(Y)	Kolwezeite	Lusungite	
Kasolite	Likasite	Shabaite-(Nd)	
Kipushite	Ludjibaite	Swamboite	
<i>For people :</i>			
Anthoine, R.	Fourmarier, P.	Salee, A.	
Bequerel, H.	François, A.	Sayre, D.	
Bijvoet, M.	Guillemain, C.	Schoep, A.	
Billiet, V.	Gysin, M.	Schulling, H.J.	
Briart, G.	Jullien, H.	Sengier, E.	
Buttgenbach, H.	Kirschstein, E.	Sharp, R.R.	
Cattier, F.	Lepersonne, E.	Skłodowska, M. (Mme)	
Claringbull, G.F.	Marthoz, J.	Soddy, F.	
Combe, A.D.	Masuy, G.	Stille, H.	
Comblain, G.	Meyer, A.	Studt, F.E.	
Cornet, J.	Moreau, J.	Thoreau, J.	
Curie, P.	Mund, M.	Threadgold, I.M.	
Delhaye, F.	Oosterbosch, R.	Vaes, J.F.	
Demesmaeker, M.G.	Parsons, L.	Van den Brande, P.	
Derriks, J.J.	Protas, J.	Vandendriessche, A.	
Dewindt, J.	Rankama, K.	Van Meerssche, M.	
Dumont, A.	Renier, W.	Varlamoff, N.	
Eylatters, E.	Richet, E.	Von Götzen, G.A.	
(Mme Van Wambeke)	Roubault, M.	Wyart, J.	

3.- TYPE MINERALOGY

3.1.- Type Mineralogy of the Named Phases

Recorded type-minerals and type-mineral names from Zaire are alphabetically presented below. Valid phases are highlighted in bold type and non valid phases are in *italics*. Only details concerning the type mode of occurrence are given, together with any updated crystal structure and chemical data. Up-to-date information on the status of non-valid minerals is also given.

Althupite



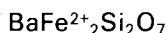
Initially described by Piret and Deliens (1987) in the uranium-rich portion of the Kobokobo pegmatite, Kivu province, where it occurs as thin, sub-millimetric, yellow transparent tablets, associated with beryl and a series of other aluminium uranyl phosphates. Althupite remains unique to Kobokobo.

Amenite

An erroneous spelling of amesite from Kalongwe, Shaba province, given by Derriks and

Oosterbosch (1958). The name amenite should not be confused with the armenite of Neumann (1939).

Andremeyerite



Andremeyerite is described as pale, emerald-green crystals in vesicles in melilite-leucite-nepheline lavas at Mount Nyiragongo, Kivu province (Sahama *et al.*, 1973). The phase remains unique to Mount Nyiragongo.

Anthoinite

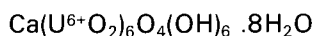
Anthoinite group



First described as chalky white material with ferberite in quartz veins and placer concentrates at Mount Misobo, in the Kalima-Maniema district, Kivu province (Varlamoff 1947). The composition has since been redefined by Matsubara *et al.* (1984)*. Anthoinite, originally indexed as monoclinic, is now redetermined as triclinic (Niggli and Jager 1957).

The name anthoinite should not be confused with anthonite, the copper hydroxyl chloride of Williams (1963).

Becquerelite



Initially described by Schoep (1922d) as centimetric-sized, yellow crystals and crystalline crusts on altered uraninite from the Shinkolobwe uranium deposit, Shaba province.

The type material is evidently a plumboan variety, containing 5.25% PbO, which Schoep (*op. cit.*) attributes to impurities. The original composition for becquerelite was given as $\text{UO}_3 \cdot 2\text{H}_2\text{O}$ (in Schoep 1924a). Further studies on becquerelite were continued by Schoep (1924b, 1924c) Billiet (1926) and Ungemach (1929).

Schoep and Stradiot (1948) later described a lead-free becquerelite from Shinkolobwe and assigned a formula closer to $2\text{UO}_3 \cdot 3\text{H}_2\text{O}$; they further suggested that lead substituted for uranium in the original lead-bearing phase. Vaes (1948b 1949) on the other hand, regarded their analyses as erroneous and suggested that the Pb was in fact Ba. Vaes concluded that the 'lead-rich' becquerelite was actually the more recently-described billietite (Vaes 1947). He further suggested that becquerelite should be retained for material containing neither Pb nor Ba.

Frondel and Cuttitta (1953) later proposed a composition of $7\text{UO}_3 \cdot 11\text{H}_2\text{O}$ thus analogous to billietite. These authors further suggested the more general formula

$$[\text{U}^{6+}_{1-x}(\text{Ba,Pb})_x^{2+}]\text{U}^{6+}_6\text{O}_{20-4x}(\text{OH})_{2+4x} \cdot (10-2x)\text{H}_2\text{O}$$

for the becquerelite-lead becquerelite-billietite series.

Protas (1957) however, reported the presence of major calcium in becquerelite, thus invalidating all earlier versions of the composition.

Refined crystal structure data for becquerelite are given by Potdevin and Brasseur (1958) and Toussaint and Brasseur (1959) though more recent data are presented by Piret-Meunier and Piret (1982)* and Pagoaga *et al.* (1987).

Bialite

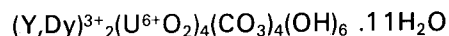
hydrous Al-Mg-Ca phosphate

Originally described by Buttgenbach (1928) as minute, white needles on compact brown phosphatic rock from Mushishimano, Shaba province. Originally thought to be a magnesian tavistockite, but now proven identical to wavellite (Embrey and Fejer 1969).

Bijvoetite

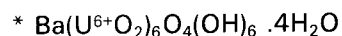
A name given by Deliens and Piret (1982a) to a rare earth uranyl carbonate. The mineral has been renamed bijvoetite-(Y) in accordance with the Levinson Rule for rare earth-bearing phases (Levinson 1966; Bayliss and Levinson 1988; Nickel and Mandarino 1988).

Bijvoetite-(Y)



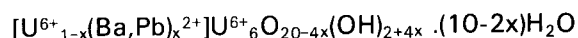
Bijvoetite-(Y) is the renamed bijvoetite, initially described as minute, sulphur-yellow tabular crystals occurring in the lower part of the oxidation zone at Shinkolobwe, Shaba province (Deliens and Piret 1982a). The phase occurs with curite lepersonnite-(Gd), sklodowskite, uranophane, becquerelite and rutherfordine. Bijvoetite-(Y) remains up to now unique to Shinkolobwe.

Billietite



Originally described from below the 57 metre-level of the Shinkolobwe uranium deposit, Shaba province, where it is found sparingly as amber yellow platelets in altered uraninite (Vaes 1947a).

Vaes suggested the formula $\text{BaO} \cdot 6\text{UO}_3 \cdot 10\text{H}_2\text{O}$ for this phase, whereas Frondel and Cuttitta (1953) proposed a composition closer to $\text{BaO} \cdot 6\text{UO}_3 \cdot 11\text{H}_2\text{O}$ and identical to that put forward by Brasseur (1949). Frondel and Cuttitta further suggested a more general formula for the becquerelite-lead becquerelite-billietite series of:



Billietite was erroneously regarded by Schoep and Stradiots (1948) as a variety of becquerelite. The billietite crystal structure has subsequently been refined by Thoreau (1948) Potdevin and Brasseur (1958) and Toussaint and Brasseur (1959).

Pagoaga *et al.* (1987)* present more recent crystal structure and crystal chemistry data for billietite. The phase is isostructural with compregnacite.

Boodtite

Boodtite is recorded as friable, gray-black material, admixed with talc, kaolinite and quartz, from the Star of the Congo mine, Shaba province (de Leenheer 1936). Billiet and Vandendriessche (1939) suggest that boodtite, together with trieuite and mindigite, are all varieties of a single species having the formula $(\text{Co}_2\text{O}_3 \cdot \text{CuO}) \cdot \text{H}_2\text{O}$. The phase is an impure heterogenite (Hey 1962c).

Borgniezite

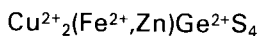
A soda amphibole first described from carbonates and adjacent schists at Lueshe, Kivu province by de Bethune and Meyer (1956). Previously recorded without a name by de Bethune in 1952. The mineral is regarded as a sodium amphibole (Leake 1978) and its status therefore still remains uncertain.

Brandallite

A misprint for (thorian) crandallite from the Kobokobo pegmatite, Kivu province (van Wambeke 1971). The name appears as thorian brandallite.

Briartite

Stannite group



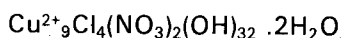
Briartite-Renierite series

Briartite is the germanium analogue of stannite. The phase was first found as inclusions in chalcopyrite, renierite, tennantite and sphalerite from the Prince Leopold mine, Kipushi, Shaba province, (Francotte *et al.*, 1965). The type material is an iron-rich variety, containing between 5.1-9.5 wt% Fe; 6.9-10.8 wt% Zn and up to 1 wt% Ga.

A gallian-zincian (12.2 wt% Zn and 2.2wt% Ga) and zincian (12.2 wt% Zn and 2.6 wt% Fe) varieties were simultaneously described by these authors from the Tsumeb deposit in Namibia. A series between briartite and renierite is suggested by Levy (1968).

Buttgenbachite

Connellite group



Buttgenbachite-Connellite series

Buttgenbachite is the nitrate analogue of connellite and was initially found as azure-blue,

radiating crystalline sprays and felt-like aggregates in cavities of cuprite from the Likasi deposit, Shaba province (Schoep 1925a). Intermediate members of the series are also described from Likasi by Schoep (1926b) and Buttgenbach (1926b). The crystal structure of buttgenbachite has since been revised by Fanfani *et al.* (1973).

Caringbullite

An incorrect spelling of claringbullite, from the M'sesa copper deposit, Kambove, Shaba province, appearing in volume 29 (78M-0884) of Mineralogical Abstracts (1978).

[?] *Carollite*

A presumed misprint of carrollite from Kalongwe, Shaba province, given in Mineralogical Abstracts (1959-1960, p. 259) for the Derriks and Oosterbosch (1958) entry. It should be emphasised that carrollite is a frequently misspelt mineral name and that this documentation is not with certainty, the first record of such a misspelling (misprint).

Cattierite

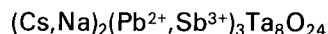
Pyrite group



Cattierite-Vaesite-Pyrite series

The cobalt analogue of pyrite originally described from the Shinkolobwe deposit, Shaba province (Kerr 1945). The phase occurs as tobacco-brown cubes, masses and disseminations in mineralised veins, especially below the 132 metre-level of the deposit (Derriks and Vaes 1956). The crystal structure of cattierite has been refined by Pratt and Bayliss (1979). Intermediate members (20.5-21.3 wt% Co) of the pyrite-cattierite binary system, occur in the Chibuluma deposit, Copperbelt province, Zambia (Riley 1965).

Cesplumtantite



Cesplumtantite occurs as colourless veinlets and elongated concretions in a museum specimen of thoreaulite from the Manono granite pegmatite, Shaba province (Voloshin *et al.*, 1986); cesplumtantite is associated with lithiotantite, cassiterite, microlite and calciotantite. The phase remains unique to Manono.

[?] *Chalcantite*

An erroneous spelling of chalcantite given in de Kun (1965) with reference to the Shaban copper deposits. There appears to be no earlier recording of this name in any of the established literature.

Chalcocite - rose gray

Jointly described from the Kipushi (Zaire) and Tsumeb (Namibia) deposits as infillings along fractures in digenite (Schneiderhohn 1920). Ramdohr (1980) regards the phase as a mixture of lautite and betechtinite.

Chalocotrycite

An erroneous spelling of chalcotrichite given in de Kun (1965) with reference to the Shaban copper deposits. There appears to be no earlier recording of this name in any of the established literature.

Chervettetite

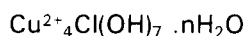
An incorrect spelling of chervetite cited under the wakefieldite-(Ce) entry for the Kusu deposit (Roberts *et al.*, 1990). There appears to be no earlier recording of this name in any of the established literature.

Chinkolobwhite

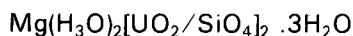
An erroneous spelling variant of chinkolobwite appearing in Rice (1955) under the sklodowskite entry. There appears to be no earlier recording of this name in any of the established literature.

Chinkolobwite

A name given by Schoep (1923b, 1923c) to a phase from the Kasolo Hill extension of the Shinkolobwe deposit, Shaba province. The mineral is identical to sklodowskite (Schoep 1925e).

Claringbullite

Simultaneously described by Fejer *et al.* (1977) from the M'sesa mine, Kambove, Shaba province (Zaire); the Nchanga West orebody of the Nchanga open pit, Copperbelt province (Zambia) and from Bisbee, Cochise county Arizona.

Clino-sklodowskite

A name given by Strunz (1957) for a supposed monoclinic dimorph of orthorhombic sklodowskite from the Shinkolobwe, Shaba province and Jachymov, Czechoslovakia. Status of clino-sklodowskite remains uncertain.

Cobalt-calcite

A name given to a phase from the Tantara deposit, Shaba province (de Kun 1965). No doubt a variant of cobaltocalcite. There appears to be no earlier recording of this name in any of the established literature.

Cobalt-vaesite

Cattierite-Vaesite series

A name given to a cobaltoan vaesite by Derriks and Vaes (1956) occurring between the 114 and 150 metre-levels of the Shinkolobwe deposit, Shaba province. The phase contains between 9.5-12.9% Co and thus an intermediate member of the cattierite-vaesite series.

[?] *Colombite*

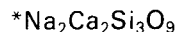
A probable spelling misprint for columbite from the Kobokobo pegmatite, Kivu province (Safianikoff and van Wambeke 1967).

Columbotantalite (Columbo-tantalite)

A non-committal generic term for members of the columbite-tantalite series from the Kobokobo pegmatite, Kivu province (van Wambeke 1958a; de Kun 1959). The term was initially used by Lancsweert (1954) in his review on deposits of the Maniema district. The name is now commonly applied to members of the columbite-tantalite series.

Combeite

Combeite group

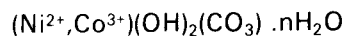


Combeite was first described as poorly-developed colourless, sub-millimetric prisms in nephelinites from Mount Shaheru, the extinct southern cone of Mount Nyiragongo, Kivu province (Sahama and Hytonen 1957a). The composition of combeite has since been redefined by Fischer and Tillmanns (1983, 1987)*.

A low temperature modification of combeite is reported from the Mayener Feld, Germany (Fischer and Tillmanns 1983). Dawson *et al.* (1989) have described combeite from the Oldoinyo Lengai carbonatite lava complex, Tanzania.

Comblainite

Pyroaurite group



Comblainite occurs as turquoise blue, cryptocrystalline alterations of uraninite and associated with heterogenite, becquerelite, curite and rutherfordine, in the Shinkolobwe deposit, Shaba province (Piret and Deliens 1980a). The phase remains unique to Shinkolobwe.

Complainite

A misprint for comblainite appearing in the index to volume 31 of Mineralogical Abstracts (1980).

Cornetite

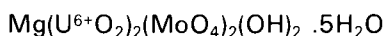
Cornetite group



First described as small, blue crystals, associated with heterogenite and pseudomalachite, in fine-grained sandstone from the Star of the Congo mine, Shaba province (Buttgenbach 1917). The crystal structure of cornetite was established by Ungemach (1929) though a more recent refinement is given by Berry (1950).

The mineral was apparently first recorded from the Bwana Mkubwa mine, Copperbelt province, Zambia, in 1910 (in Reeve 1963) which was later fully described by Hutchinson and Macgregor (1931).

The name cornetite should not be confused with corneite, a rock term of Michot (1959-1960) or perhaps with the ornetite, a spelling variant orueteite (Koechlin 1911).

Cousinite

Recorded as black thin blades, on altered ore containing uraninite and molybdenite at Shinkolobwe, Shaba province (Vaes 1958). Cousinite is associated with wulfenite. The status remains uncertain and is doubtless identical to a variety of umohoite.

Cupro-asbolane

Initially described from the Kambove deposit, Shaba province (de Leenheer 1938b). The phase contains 20.78 wt% CuO and 13.40 wt% Co_2O_3 . Cupro-asbolane is considered to be a member of the psilomelane group. The mineral is a cobaltian-cuprian wad.

Cupro-asbolite

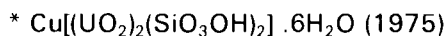
A spelling variant of cupro-asbolane from Kambove, Shaba province (de Leenheer 1938b).

Cuproplatine

A name given to presumably a copper-bearing platinum from placers of the Lubero district, Kivu province (Caron et al., 1986). There appears to be no earlier recording of this name in any of the established literature.

Cuprosklodovskite

The original spelling of cuprosklodowskite (Buttgenbach 1933b).

Cuprosklodowskite

First described as yellowish-green needles in the Kambove and Kalongwe deposits, Shaba province (Buttgenbach 1933b).

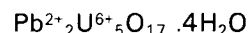
Refined crystal data for cuprosklodowskite are given by Melon and Dejacé (1959) and Rosenzweig and Ryan (1975)*. Crystal chemistry studies on uranyl silicates, by Stohl and Smith (1981) place cuprosklodowskite in a group in which the U:Si ratio is 1:3. The composition of cuprosklodowskite has more recently been revised by Smith (1984).

Cuprosklodowskit

An erroneous spelling variant of cuprosklodowskite from Shaba province (Betechtin 1971).

Cuprosklowskite

A spelling variant of cuprosklodowskite (Buttgenbach 1933b).

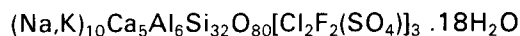
Curite

Initially found as orange-yellow, acicular crystals and crystal aggregates from the Shinkolobwe uranium deposit, Shaba province (Shoep 1921). Further studies on bequerelite were made by Billiet (1926). More recent X-ray powder data for curite are provided by Deliens (1977b) whereas its crystal structure has more recently been redetermined by Mereiter (1979).

Curite commonly occurs either as pseudomorphs after uraninite at Shinkolobwe (Vernadsky and Chamie 1924; van Aubel 1927; Schoip 1930; Hacquaert 1927a, 1927b) or as a constituent of colloform 'gummitite' crusts (Schoep and de Leenheer 1937).

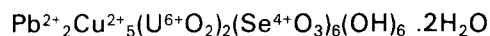
Delhayelite

Delhayelite group



Delhayelite was first recorded as colourless, platy crystals in kalsilite-melilite-nephelinite lava from Mount Shaheru, the extinct southern cone of Mount Nyiragongo, Kivu province (Sahama and Hytonen 1959). Minerals of the delhayelite group are reviewed by Dorfman and Chiragov (1986).

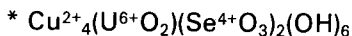
Hyrodelhayelite, a hydrated alteration product of delhayelite is recorded from the Khibina alkaline massif, Kola, USSR (Dorfman and Chiragov 1979).

Demesmaekerite

Initially found as bottle-green, crystalline material, in the lower part of the oxidation zone within altered dolomites of the Musonoi copper-cobalt deposit, near Kolwezi, Shaba province (Cesbron et al., 1965). Demesmaekerite occurs with cuprosklodowskite, kasolite, malachite, chalcocite, guilleminite, chalcocite and selenian digenite. The structure of demesmaekerite has

since been refined by Ginderow and Cesbron (1983). The phase remains unique to Musonoi.

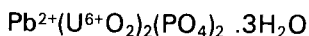
Derriksite



Described by Cesbron *et al.* (1971) as rare green microcrystalline crusts on selenian digenite in the lower part of the oxidation zone at Musonoi, Shaba province. Derriksite occurs with demesmaekerite and chalcomenite and remains unique to Musonoi.

The essential water molecule given in the original formula is in fact absorbed and not bonded (Ginderow 1983) and the composition is revised accordingly*.

Dewindtite



Described by Schoep (1922a) from the Shinkolobwe uranium deposit, Shaba province, where it occurs as a canary yellow powder, associated with torbernite, dumontite and kasolite. Stasite described by Schoep (1922b) was considered to be dimorphous with dewindtite. Schoep (1925b) later reviewed the physical properties and mineral chemistry of dewindtite.

The validity of type dewindtite is doubted by Ross (1956) who considers the phase to be a possible mixture of lead autunite and renardite.

In fact dewindtite is a true mineral species whereas renardite is a mixture of sheets of dewindtite and of phosphuranylite (Piret *et al.*, in press).

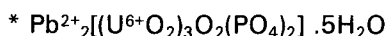
Diderichite

The phase was named and described by Vaes (1947a) from the Shinkolobwe deposit, Shaba province, where it occurs as yellow-green, fibrous crusts and laths. Diderichite is identical to rutherfordine (Fronzel and Meyrowits 1956).

Droogmansite

Droogmansite occurs as small orange-yellow globules with sklodowskite and curite in the Kasolo Hill extension of the Shinkolobwe deposit, Shaba province (Buttgenbach 1925). The mineral appears to be related to sklodowskite and remains inadequately described. Droogmansite is identical to kasolite. (Deliens, 1978).

Dumontite



Dumontite is the phosphate analogue of hügelite and initially found as ochre-yellow crystalline material in the Shinkolobwe uranium

deposit, Shaba province (Schoep 1924g) occurring with parsonsite and metatorbernite. Studies on dumontite were continued by Billiet (1926). Thoreau *et al.* (1958) have confirmed the composition of dumontite and its crystal structure has since been revised by Piret and Piret-Meunier (1988)*.

Epiianthinite

Initially described as yellow crystals from the Shinkolobwe deposit, Shaba province (Schoep and Stradiots 1947). The mineral is either identical to wyartite (Guillemin and Protas 1959) or schoepite. X-ray spectra of most epiianthinite are identical to those of schoepite (M. Deliens, pers. comm.).

Epijanthinite

A spelling variant of epiianthinite given by Hintze (1937)

Eylettersite

Crandallite group



Crandallite-Eylettersite series

Eylettersite is the thorium analogue of crandallite and is recorded as creamy-white, pulverulent nodules in the Kobokobo pegmatite, Kivu province (van Wambeke 1972). The phase is associated with cyrtolite, columbite, apatite and phosphuranylite and, thus far, remains unique to Kobokobo.

Eylettersite I

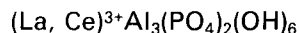
A name given to altered eylettersite from the Kobokobo pegmatite, Kivu province (van Wambeke 1972).

Eylettersite II

A name given to an additional alteration product of eylettersite from the Kobokobo pegmatite, Kivu province (van Wambeke 1972).

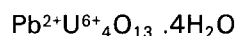
Florencite-(La)

Crandallite group



Florencite-(La) is the lanthanum analogue of crandallite, initially described as a lanthanum-rich florencite by Lefebvre and Gasparrini (1980) in altered siltstones of the Shituru copper deposit, Shaba province. The phase remains unique to Shituru.

Fourmarierite

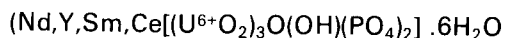


Originally described as reddish-orange to carmine-red crystals from the Shinkolobwe uranium deposit, Shaba province, (Buttgenbach 1924b; Melon 1924; Schoep 1924d). Fourmarie-

rite from Shinkolobwe occurs as alteration pseudomorphs after uraninite, along with torbernite and kasolite.

Studies on fourmarierite were continued by Billiet (1926), with Brasseur (1948) suggesting the formula $\text{PbO} \cdot 4\text{UO}_3 \cdot 7\text{H}_2\text{O}$. Toussaint and Brasseur (1959) gave further structural data, though more recent X-ray powder values for fourmarierite are provided by Deliens (1977b).

Francoisite-(Nd)



Francoisite-(Nd) was described by Piret *et al.* (1988) from uraniferous pockets in the Kamoto copper-cobalt deposit, near Kolwezi, Shaba province. Francoisite-(Nd) occurs as yellow aggregates of tabular crystals and remains unique to Kamoto.

Gallite

Chalcopyrite group



Gallite, the gallium analogue of chalcopyrite, is the first recorded gallium mineral. The mineral was initially described by Strunz *et al.* (1958b) from the Prince Leopold mine, Kipushi, Shaba province and from Tsumeb, Namibia.

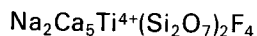
Gallite, the unnamed mineral-(O) of Strunz *et al.* (1958a) is regarded by Ramdohr (in Ramdohr 1980) as a Ga^{3+} sulphide.

Gerhardtite

An erroneous spelling of gerhardtite (Wells and Penfield 1885) given in de Kun (1965) with reference to the Shaban copper deposits.

Götzenite

Seidozerite group



Götzenite-Rosenbuschite series

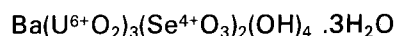
Götzenite was originally described by Sahama and Hytonen (1957a) from Mount Shaheru, the extinct southern cone of Mount Nyiragongo, Kivu province. Götzenite from the type locality occurs as colourless, prismatic, sub-millimetric crystals in ipinitic nephelinite lavas. The composition of götzenite has since been refined by Sahama *et al.* (1966). Götzenite forms an isomorphous series with rosenbuschite (Neumann 1962) thereby representing the titanium end-member. The phase is also isostructural with hainite (Johan and Cech 1989).

Calcium rinkite (Borneman-Starynkevick 1935) is a rare-earth-niobian-strontian götzenite (Sahama 1960). Similarly, turite (Kukharenko *et al.*, 1965) is redefined as a cerian götzenite.

Guileminite

A misprint of guileminite given by Roberts *et al.* (1990) under the marthozite type-entry.

Guilleminite



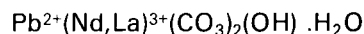
Originally found as canary yellow coatings, silky masses and tabular crystals in geodes in the oxidation zone within altered dolomites of the Musonoi copper-cobalt deposit, Shaba province (Pierrot *et al.*, 1965).

The phase is also recorded from Shinkolobwe (Gautier *et al.*, 1989) and a guilleminite-type mineral of similar composition occurs in pitch-blende veins from the Liauzun-en-Olloix granite, Puy-de-Dôme, France (Agrinier *et al.*, 1966).

Gysinite

A name initially given by Sarp and Bertrand (1985) to a rare earth-bearing carbonate from Shinkolobwe. The mineral has since been renamed gysinite-(Nd) in accordance with the Levinson Rule (see Nickel and Mandarino 1988).

Gysinite-(Nd)



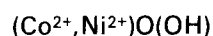
Gysinite-(Nd) is the renamed gysinite and corresponds to the lead-neodymium analogue of ancylite. The mineral was first described by Sarp and Bertrand (1985) from the Shinkolobwe uranium deposit, Shaba province, where it occurs as light pink to reddish pink, millimetric euhedra, with malachite, schuilingite-(Nd) cerussite, talc-chlorite, bornite, wulfenite, kasolite, garnet and gold. The true locality is, however, Kasompi, Shaba, Zaire, as determined from the associated minerals (M. Deliens, pers. comm.).

Gysinite-(Nd) is also described from Sardinia, Italy (Olmi *et al.*, 1988).

Heterogenite-H

Presumably a synonym for heterogenite-2H from the Mindigi deposit, Shaba province, mentioned by Deliens and Goethals (1973).

Heterogenite-2H



Heterogenite-2H is the hexagonal dimorph of heterogenite-3R and initially described from the Mindigi deposit, Shaba province (Deliens and

Goethals 1973). Heterogenite-2H with a nickel content much less than that of the type material is also recorded from New Caledonia (Llorca 1986).

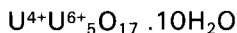
Hydrotenorite

A phase originally described from l'Etoile du Congo mine, Shaba province (de Leenheer 1937). The mineral appears to be a mixture of tenorite, chrysocolla and water. Billiet and Vandendriessche (1938) suggest that hydrotenorite is identical to tenorite.

Ianthinite (of Bignand)

An ianthinite-type phase described by Bignand (1955) from the Shinkolobwe deposit, Shaba province. The mineral is identical to wyartite (Guillemin and Protas 1959).

Ianthinite (of Schoep)



Described by Schoep (1925c, 1926a, 1926c) as violet to black crusts and veinlets in altered uraninite from the Shinkolobwe uranium deposit, Shaba province (see also Guillemin and Protas 1959a, 1959b).

Ianthite

An error for the ianthinite (of Schoep) from Shinkolobwe, given by English (1939).

Iianthinit

Another spelling variant of ianthinite (of Schoep) appearing in Hintze (1937).

Janthiniet (*Janthinit*)

The original Flemish spelling of ianthinite (of Schoep) from Shinkolobwe.

Juliënite

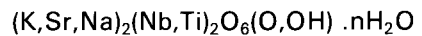


Juliënite occurs as thin crusts of minute blue, acicular crystals, associated with Co-rich wad, in the Chamibumba (Shamitumba) deposit, Kambove district, Shaba province (Schoep 1928b, 1931). Further studies on juliënite were carried out by Cuvelier (1933) and Schoep and Billiet (1934a, 1934b). Originally and erroneously regarded as the cobalt analogue of buttgenschachite; the composition was more correctly deduced by Cuvelier and de Sweemer (1932) and de Sweemer (1933). The phase remains unique to Chamibumba and is compositionally unique, being the first and, thus far, only recorded naturally-occurring thiocyanide.

The name should not be confused with julianite (= tennantite) of Dana (1892).

Kalipyrochlore

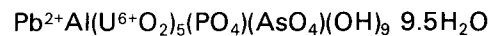
Pyrochlore group



Pyrochlore subgroup

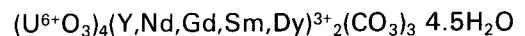
Originally recorded as an unnamed phase by van Wambeke (1965) from the Lueshe carbonatite, Kivu province. The mineral was found as millimetric octahedra with ilmenite, barian goyazite and rutile in both the carbonatite and the adjacent alluvium and residual soils. The phase corresponds to the potassium analogue of pyrochlore and named accordingly by Hogarth (1977). The phase remains unique to Lueshe.

Kamitugaïte



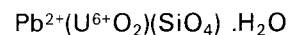
Kamitugaite was described by Deliens and Piret (1984a) as thin, yellow transparent tablets in the oxidation zone Kobokobo pegmatite, Kivu province where it occurs with triangulite, threadgoldite, dumontite and studtite. The phase remains unique to Kobokobo.

Kamotoïte-(Y)



Described by Deliens and Piret (1986b) from the Kamoto copper-cobalt deposit, Shaba province, where it occurs as bright yellow crusts on a uraninite matrix. The mineral is also recorded from a pegmatite in Norway (M. Deliens, pers. comm.).

Kasolite



Kasolite-Uranophane series

Kasolite was first found as ochre-yellow, flakes in the Shinkolobwe deposit, Shaba province (Schoep 1921b).

Further studies on kasolite were made by Buttgenbach (1922) and Billiet (1926). Sidorenko *et al.* (1975) suggest that kasolite belongs to one of three groups of uranyl silicates, in which the $UO_2/[SiO_4]^{4-}$ ratio is given as unity; however, more recent studies on uranyl silicates, by Stohl and Smith (1981) place kasolite in a group in which the U:Si ratio is 1:3.

Pilbarite, from the Wodgina pegmatites, Western Australia (Simpson 1910) is a mixture containing kasolite (Honea 1957).

The name kasolite should not be confused with kasoite (see Spencer 1937) - a barian feldspar.

Katangite

Katangite was originally described from the Tantara deposit, Shaba province, Buttgenbach (1921) and initially thought to be identical to chrysocolla. Further studies on katangite were carried out by Schoep (1930c) who compared the phase to bisbeeite. Katangite is identical to either plancheite or chrysocolla (van Oosterwyck-Gastuche 1974, 1977).

The name katangite should not be confused with katungite, the alkali ultrabasic volcanic rock of Holmes (1937).

Keno-eylettersite

A name suggested by van Wambeke (1971) for relatively unaltered eylettersite from the Kobokobo pegmatite, Kivu province. The term keno- is taken from a proposal by Permingeat (*in van Wambeke 1971*) who suggests it as a prefix modifier for cation deficient members belonging to the pyrochlore group.

Keno-mitridatite

Zaire/Rwanda

A name suggested by van Wambeke (1971) for relatively unoxidised mitridatite from the Kobokobo pegmatite, Kivu province and the Buranga pegmatite (Rwanda). The term keno- is taken from a proposal by Permingeat (*in van Wambeke 1971*) who suggests it as a prefix modifier for cation deficient members belonging to the pyrochlore group.

Kipushite**Kipushite-Phillipsburgite Series**

Originally described from the Kipushi copper deposit, Shaba province (Buttgenbach 1926a, 1927, 1932). The mineral was later thought by Buttgenbach (1941) to be arakawaite (= veszelyite). Kipushite is reinstated as a distinct species (Piret *et al.*, 1985) on material from the Kipushi mine; the phase occurs with pseudomalachite, hemimorphite, malachite, pyromorphite, veszelyite, vauquelinite and libethenite.

Braithwaite and Ryback (1988) record a slightly arsenatian kipushite from the Black Pine mine, Phillipsburg, Montana and a highly arsenatian kipushite is reported from Potts Gill, Caldebeck Fells, Cumbria, England. Braithwaite and Ryback further suggest the existence of a solid solution series between the arsenate analogue philipsburgite (Peacor *et al.*, 1985) and kipushite.

Kirschsteinite

A misprint of kirschsteinite appearing under the iron monticellite entry of Roberts *et al.* (1990).

Kirschsteinite

Olivine group

**Kirschsteinite-Monticellite series**

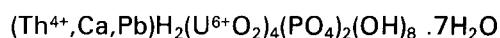
Kirschsteinite is the name given by Sahama and Hytonen (1957b) to a mineral approaching the Fe^{2+} end-member of the monticellite- $\text{CaFe}^{2+}\text{SiO}_4$ series. The phase occurs in melilite-nephelinite lavas from Mount Shaheru, Kivu province, where it occurs as slightly greenish, massive material associated with kalsilite, götzenite and combeite. The type material is a magnesian variety containing between 50 mol% and 76.5 mol% kirschsteinite.

Magnesian kirschsteinite (containing ~51 mol% kirschsteinite) is recorded from the Tazheran Massif, Transbaikalia, USSR (Konev *et al.*, 1970) and in the Angra dos Reis achondrite meteorite, Brazil (Prinz *et al.*, 1977).

An unusual, semi-natural occurrence of kirschsteinite is recorded from residues of a salt horizon of the Salado Formation, near Carlsbad, New Mexico (Kahn and Smith 1966).

Kivuite

Phosphuranylite group



Kivuite is the thorium analogue of both phosphuranylite and renardite. The phase was first described by van Wambeke (1958b, 1958c) as minute, yellow plates, in the Kobokobo pegmatite, Kivu province; kivuite occurs with uraninite, phosphuranylite, renardite, cyrtolite, columbite-tantalite (columbotantalite) and apatite. A plumbian kivuite is also recorded from Kobokobo. The phase remains unique to the deposit.

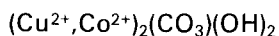
The name should not be confused with kivite, a melanocratic leucite-basanite from the Birunga volcanic field, Zaire (Finch 1912; Lacroix 1923).

Kobokobite**Frondelite-Rockbridgeite series**

Kobokobite occurs as dull green crusts of radiating fibres and masses in the Kobokobo pegmatite, Kivu province (Thoreau 1957). The phase is regarded as an intermediate member of the frondelite-rockbridgeite series having $\text{Fe}^{2+} = \text{Mn}^{2+}$, though is perhaps identical to rockbridgeite.

Kolwezite

A spelling error for kolwezite, from the type-occurrence, appearing in volume 33 (82M-1807) of Mineralogical Abstracts (1982).

Kolwezite Rosasite group

Kolwezite-Rosasite series

Kolwezite is the cobalt analogue of rosasite and glaucosphaerite. The mineral was first described by Deliens and Piret (1980) from the Kolwezi-Kamoto-Musonoi deposit, Shaba province. Kolwezite occurs as black, microcrystalline crusts and pale brown, millimetric, isolated spherules, associated with cobaltian dolomite.

Kolwezite is also recorded in oxidised ore of the Tuckers Tunnel uranium deposit, near Durango, Colorado (Williams 1982).

Kusuite

A name originally given to a rare earth vanadate from the Kusu deposit (Deliens and Piret 1977). The phase is redefined by Deliens and Piret (1986a) as a plumboan variety of wakefieldite-(Ce) in accordance with the Levinson rule for the rare earth-bearing minerals.

Lead-becquerelite

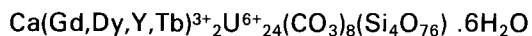
An unnecessary name given by Frondel and Cuttitta (1953) to plumboan becquerelite from the Shinkolobwe deposit, Shaba province.

Lead microlite

An unfortunately-used synonym for plumbomicrolite from the Mumba district, Kivu province (Sayad Eid and von Knorring 1976).

Lepersonnite

A name initially given by Deliens and Piret (1982a) to a rare earth-bearing mineral from Shinkolobwe. Renamed lepersonnite-(Gd) in accordance with the Levinson Rule for rare earth minerals (Nickel and Mandarino 1988).

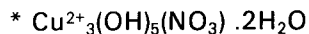
Lepersonnite-(Gd)

First found as bright yellow, mammillary crusts and isolated spherules consisting of radiating acicular crystals with bijvoetite-(Y) in the Shinkolobwe uranium deposit, Shaba province (Deliens and Piret 1982a). Lepersonnite-(Gd) is the renamed lepersonnite. The phase remains unique to the type-locality.

Li-biotite

An abbreviated form for lithian biotite appearing in the index of Mineralogical Abstracts (1961-1962) and referring to a phase from the Manono pegmatite, Shaba province (Herman *et al.*, 1960-

1961). There appears to be no recording of this name in any of the established literature.

Likasite

First described as blue, tabular crystals on cuprite, or bottle-blue masses in cuprite, from the Likasi deposit, Shaba province (Schoep *et al.*, 1955); likasite may be pseudomorphed by malachite. Originally regarded as a phosphate-nitrate, but the composition of likasite has since been revised by Effenberger (1986)*.

Declercq *et al.* (1977) suggested the presence of the phosphite (P^{3-}) radical in likasite, though this has been discounted by Fleischer and Cabri (1978).

A likasite-like mineral is recorded from Pitkin county, Colorado (Rouse 1982) but otherwise the phase remains unique to Likasi.

[?] Lithiophyllite

A spelling misprint for lithiophilite from the Kobokobo pegmatite, Kivu province (Safiannikoff and van Wambeke 1967).

Lubumbashite

Described from the Lubumbashi area, Shaba province (de Leenheer 1934a, 1934b). The phase is identical to heterogenite.

Ludjibaite

A dimorph of pseudomalachite occurring as blue-green blades, forming crest-like aggregates on deep green pseudomalachite in red micaceous shale at Ludjiba, Zaire, with libethenite (Piret and Deliens 1988).

Lueshite

Lueshite - Perovskite series

Lueshite is a dimorph of natroniobite (Bulakh *et al.*, 1960) and initially described by Safiannikoff (1959) from the contact zone of the cancrinite syenite and pyrochlore-rich carbonatite at Lueshe, Kivu province. The mineral occurs as black, centimetric cubes and as encrustations on yellow mica.

Lueshite is identical to the earlier described igdloite, an inadequately characterised mineral from Igdlunguaq, Greenland (Dano and Sorensen 1959). The name lueshite has priority. A titanian variety (titanium lueshite) containing 17.47-22.18% TiO_2 is recorded from the Kovdor massif, USSR (Lapin and Kazakova 1966), and represents

an intermediate member of the lueshite-perovskite series.

The name lueshite should not be confused with either luetheite, the hydrated copper-aluminium arsenate phase of Williams (1977) or its erroneous spelling variant luethite, which appears in volume 30 of Mineralogical Abstracts (1979).

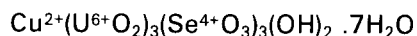
Lumbumbashite

A spelling variant of lubumbashite given by Hey (1955).

Lusungite Crandallite group
 $(\text{Sr}, \text{Pb}^{2+})\text{Fe}^{3+}_3(\text{PO}_4)_2(\text{OH})_5 \cdot \text{H}_2\text{O}$

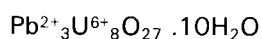
Lusungite is described as dark brown, pulverulent masses, associated with goethite and quartz, in the phosphate-rich zone of the Kobokobo pegmatite, Lusungu River district, Kivu province (van Wambeke 1958a). Lusungite is isostructural with hidalgoite, svanbergite and plumbogummite. The phase remains unique to Kobokobo.

Marthozite



Described by Cesbron *et al.* (1969) as yellowish-green to greenish-brown microcrystals, associated with uranophane, kasolite, malachite, chalcomenite, sengierite and several other uranyl selenites, in the oxidation zone within altered dolomites of the Musonoi copper-cobalt deposit, Shaba province. The phase remains unique to Musonoi.

Masuyite

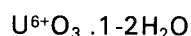


Masuyite was originally described as orange-red scales in cavities within uraninite from below the 57 metre-level of the Shinkolobwe uranium deposit, Shaba province (Vaes 1947a). Masuyite occurs with uranophane, sklodowskite and sharpite. More recent X-ray powder data for masuyite is provided by Deliens (1977b). Also occurs at Kamoto, Shaba.

Meta-saléeite

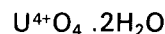
A name suggested by Mrose (1950) for type saleeite, which corresponds to meta-autunite-I. The name may be an unnecessary synonym for meta-autunite.

Metaschoepite



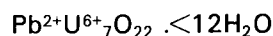
Metaschoepite occurs as a yellow alteration product of schoepite in the Shinkolobwe uranium deposit, Shaba province (Christ and Clark 1960).

Metastudtite



A natural peroxide mineral, first described from the Shinkolobwe uranium deposit, Shaba province (Deliens and Piret 1983b). Metastudtite is found as pale yellow, fibrous aggregates, in either grey dolomitic rock associated with wolsendorfite, or on massive uraninite associated with uranophane, kasolite and soddyite. The phase remains unique to Zaire.

Metavandendriesscheite

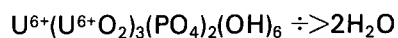


Initially described from the Shinkolobwe uranium deposit, Shaba province (Christ and Clark 1960). The phase occurs as an alteration of vandendriesscheite and remains unique to Shinkolobwe.

Meta-vanmeersscheite

A misprint for meta-vanmeersscheite appearing in the 32nd list of new mineral names (Hey 1982).

Meta-vanmeersscheite

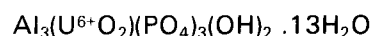


First described as canary-yellow tablets in the hydrothermal and supergene alteration zones of the Kobokobo pegmatite, Kivu province, associated with vanmeersscheite and studtite (Deliens and Piret 1982a). The phase remains unique to Kobokobo.

Mindigite

Described by de Leenheer (1934a, 1934b) as pitch-black, glassy, botryoidal crusts from the Mindigi deposit, Shaba province. A manganoan mindigite is recorded from Kambove and Luashi, Shaba province (de Leenheer 1936). Billiet and Vandendriessche (1939) suggest that mindigite, together with trieuite and boodtite, are all varieties of a single species having the formula $(\text{Co}_2\text{O}_3 \text{CuO}) \cdot \text{H}_2\text{O}$. Mindigite is identical to heterogenite (Hey 1962c).

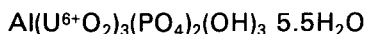
Moreauite



Moreauite was first described from the uranium-rich portion of the Kobokobo pegmatite, Kivu province (Deliens and Piret 1985). Moreauite occurs as nodules and books of greenish yellow tablets, associated with furongite, phosphosiderite and ranunculite. The phase remains unique to Kobokobo.

Mumbite

A name given by Stepanov *et al.* (1982) to pyrochlore from alluvials of the Mumba district, Kivu province. The name should not be confused with mundite of Deliens and Piret (1981a).

Mundite

Mundite is recorded as yellow, tabular crystals, associated with other aluminium uranyl phosphates, in the uranium-rich portion of the Kobokobo pegmatite, Kivu province (Deliens and Piret 1981a). The phase remains unique to Kobokobo.

The name mundite should not be confused with mumbite of Stepanov *et al.* (1982).

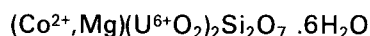
Nickel cattierite

A name applied to a nickelian cattierite from Shinkolobwe, Shaba province (Derrick and Vaes 1956).

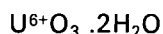
Oosterboschite

Oosterboschite was first described by Johan *et al.* (1970) from the oxidation zone of the Musonoi deposit, near Kolwezi, Shaba province. The phase occurs as polysynthetically-twinned, sub-millimetric grains, with palladian trogtalite, covellite and selenian digenite.

Oosterboschite is one of only two naturally-occurring palladium selenides so far recorded; the other phase is palladseite (Davis *et al.*, 1977). Phase relationships amongst the various palladium selenides have been studied by Olsen *et al.* (1979). Oosterboschite remains unique to Musonoi.

Oursinite

Initially recorded as an unnamed phase from the Shinkolobwe deposit, Shaba province (Deliens and Piret 1982a). The mineral has now been fully characterised and named by Deliens and Piret (1983a). Oursinite occurs as pale yellow acicular crystals forming radial aggregates associated with soddyite, kasolite, schoepite, sklodowskite, torbernite, lepersonnite, bijvoetite and curite. Oursinite remains unique to the type-locality.

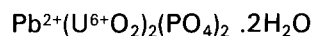
Paraschoepite

Initially described from the Shinkolobwe uranium deposit in Shaba province, as yellow

crystals on schoepite (Schoep and Stradiot 1947). Paraschoepite is also recorded with arsenuranylite, in the oxidation zone of an unspecified deposit in the USSR (Belova 1958).

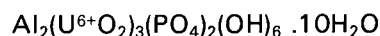
Parsonsite

A spelling error for parsonsite, from Shinkolobwe, listed in Embrey and Fuller (1980).

Parsonsite

Parsonsite is the phosphate analogue of hallimondite (Walenta and Wimmenauer 1961) and was first recorded as a brownish, crystalline powder, with metatorbernite, in the Shinkolobwe uranium deposit, Shaba province (Schoep 1923a, 1923c).

Chemical and crystal structure data for parsonsite are given by Frondel (1950).

Phuralumite

Phuralumite is found as sub-millimetric, lemon-yellow prismatic crystals, with meta-autunite, phosphuranylite and other aluminium uranyl phosphates, in the uranium-rich portion of the Kobokobo pegmatite, Kivu province (Deliens and Piret 1979b). The crystal structure of phuralumite has since been refined by Piret *et al.* (1979a) and is of the phosphuranylite type. Phuralumite remains unique to Kobokobo.

The name phuralumite should not be confused with the phurcalite of Deliens and Piret (1978) a hydrated calcium uranyl phosphate from East Germany.

Plancheite I

A name given by van Oosterwyck-Gastuche (1977) for plancheite from Tantara, Shaba province, that the now proves identical with shattuckite.

Plancheite II

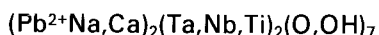
A name given by van Oosterwyck-Gastuche (1977) for asbestiform plancheite from Tantara, Shaba province.

Plancheite III

A name given by van Oosterwyck-Gastuche (1977) for a variety of plancheite from Shaba province.

Plancheite X

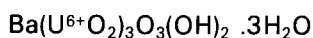
A working name given by van Oosterwyck-Gastuche (1974) for a variety of plancheite from Tantara, Shaba province.

Plumbomicrolite Pyrochlore group

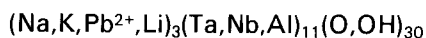
Microlite subgroup

Plumbomicrolite is the lead analogue of microlite, initially described from alluvial cassiterite deposits of the Mumba district, Kivu province (Safiannikoff and van Wambeke 1961). The phase occurs as greenish-yellow and orange crystalline masses and rare octahedra, associated with manganotantalite, microlite and simpsonite.

Plumbomicrolite is also recorded from the Mount Ploskaya amazonite pegmatite, Kola Peninsula, USSR (Stepanov *et al.*, 1984).

Protasite

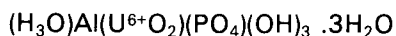
Protasite occurs as bright orange, pseudo-hexagonal, sub-millimetric platelets, associated with uraninite, at Shinkolobwe, Shaba province, (Pagoaga *et al.*, 1985). The crystal structure and crystal chemistry of protasite have since been redetermined by Pagoaga *et al.* (1987)*.

Rankamaite

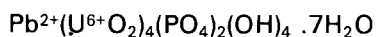
Rankamaite-Sosedkoite series

Originally described from alluvials of the Mumba area, Kivu province, where it occurs as massive, white to creamy white, felted matrix, on corroded crystals of simpsonite and cassiterite, in water-worn pebbles to 100 g (von Knorring *et al.*, 1969).

Rankamaite, the Na-hydrous analogue of sosedkoite (Voloshin *et al.*, 1984) is also described from pegmatites in the USSR.

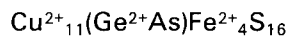
Ranunculite

Ranunculite was first described by Deliens and Piret (1979a) in the uranium-rich portion of the Kobokobo pegmatite, Kivu province. Ranunculite occurs as sub-millimetric, golden-yellow, nodules, with meta-autunite, phosphuranylite and a series of other aluminium uranyl phosphates. The phase remains unique to Kobokobo.

Renardite Phosphuranylite group

Renardite is the lead analogue of phosphuranylite and was first found as yellow crystals in the shinkolobwe uranium deposit, Shaba province (Schoep 1928a).

The phase is now regarded as a mixture of sheets of dewindtite and phosphuranylite (Piret *et al.*, in press).

Renierite

Briartite-Renierite series

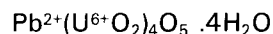
Renierite was initially described as inclusions in chalcopyrite, sphalerite, galena and tennantite at the Prince Leopold mine, Kipushi, Shaba province.

The phase was first noted by Thoreau (1928) and described in detail as presumed 'orange bornite' or chalmersite by Légraye (1933). Renierite was fully characterised and named by Vaes (1948a). Bernstein (1986) suggests a coupled solid solution series between the zincian and arsenian end-members; the type material is presumably an arsenian variety.

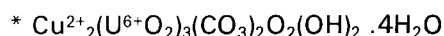
The crystal structure of renierite has more recently been refined by Bernstein *et al.* (1989).

Zincian (to 1.23% Zn) arsenian (to 4.95% As) and gallian (to 0.56% Ga) varieties of renierite are recorded at Tsumeb (in Lombaard *et al.*, 1986). Arsenian and zincian varieties of renierite are also described from Ruby Creek, Alaska and Jamestown, Colorado (Bernstein op. cit.) and from the Furutobe mine (4.9% As) Japan (Hayashi *et al.*, 1985).

A series between briartite and renierite is suggested by Levy (1968). The name renierite should not be confused with reinerite of Geier and Weber (1958).

Richetite

Described as black hexagonal tablets, with uranophane, from below the 57 metre-level of the Shinkolobwe deposit, Shaba province (Vaes 1947a). Crystal structure data for richetite are given by Piret and Deliens (1984). Richetite remains unique to Shinkolobwe.

Roubaultite

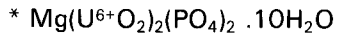
Roubaultite occurs as platy, green crystalline rosettes on uraninite in the Shinkolobwe uranium deposit, Shaba province (Cesbron *et al.*, 1970). Roubaultite occurs in the oxidation zone of the deposit, with becquerelite, vandenbrandeite, soddyite and cuprosklodowskite. The phase was originally described as a hydrated copper uranyl hydroxide but the composition has since been redefined by Ginderow and Cesbron (1985)*. Roubaultite is also recorded in dolomitic rocks of the Kamoto deposit, Shaba province (Deliens 1988). The phase remains unique to Zaire.

Saléite

The original, but erroneous, spelling of saléite given by Thoreau and Vaes (1932) for the type material.

Saléeite

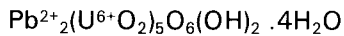
Autunite group



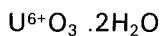
Novacekite-Saléeite series

Saléeite is the phosphate analogue of novacekite and was first described under the name saleite from the Shinkolobwe uranium deposit, Shaba province (Thoreau and Vaes 1932). A series between saléeite and novacekite is suggested by Frondel (1951). Piret and Deliens (1980b) have noted that holotype saléeite dehydrates under normal atmospheric conditions; the decahydrate phase however is regarded as the fully-hydrated form, as earlier suggested by Mrose (1950) for material from Schneeberg.

Members of the saléeite-novacekite series, including an arsenatian saléeite, containing 4.5% As_2O_5 , occur at Schneeberg, East Germany (Mrose 1950).

Sayrite

Described as yellow-orange to red-orange, prismatic crystals, with uranophane, becquerelite, masuyite and richetite, from the Shinkolobwe uranium deposit, Shaba province (Piret *et al.*, 1983). Sayrite remains unique to Shinkolobwe.

Schoepite

Schoepite was initially described by Walker (1923) in altered uraninite ore from the Shinkolobwe uranium deposit, Shaba province. The phase occurs as minute yellow drusy or granular crystals, with becquerelite, curite and vanden-driesscheite.

Further studies on schoepite were carried out by Buttgenbach (1924) and Schoep (1924a, 1924b, 1924c). Schoepite from Shinkolobwe may contain up to 4.56% PbO (Schoep 1924a). The crystal structure of schoepite has since been refined by Ungemach (1929) and Toussaint and Brasseur (1959).

Schoepite I

A name given to amber brown, unaltered schoepite from Shinkolobwe, Shaba province by Christ and Clark (1960).

Schoepite II

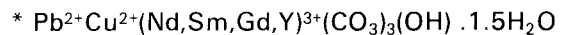
A name given to a yellow alteration product of schoepite from Shinkolobwe, Shaba province by Christ and Clark (1960); the phase is identical to metaschoepite.

Schoepite III

A completely-yellow alteration product of schoepite from Shinkolobwe, Shaba province is termed schoepite III by Christ and Clark (1960) which they consider to be identical to paraschoepite.

Schuilingite

A name originally given by Vaes (1947c) to a hydrated lead-copper-calcium hydroxyl-carbonate, from Kasompi. The phase has a substantial rare earth content and is renamed schuilingite-(Nd) on a re-evaluation of its composition by Piret and Deliens (1982b).

Schuilingite-(Nd)

Originally described by Vaes (1947c) from the Kasompi deposit, Shaba province. The phase occurs as turquoise to azure-blue, crystalline crusts, associated with cerussite, calcite and pyrite.

The validity of schuilingite-(Nd) as a distinct species was confirmed by Guillemin and Pierrot (1957). Originally described as a hydrated hydroxyl-carbonate of Pb, Cu and Ca; the composition was more recently redefined by Piret and Deliens (1982b)*. The phase apparently remains unique to Zaire.

Selenio-molybdenite

A name applied by Derriks and Vaes (1956) to a selenian molybdenite from the Shinkolobwe deposit, Shaba province. The name is also used by Vuorelainen and Hakli (1964) for selenian molybdenite from the Kuusamo district, Finland.

Seleniosiegenite (Selenio-siegenite)

Essentially a selenian siegenite, containing 11% Se, from the Shinkolobwe deposit, Shaba province (Vaes 1947b; Derriks and Vaes 1955). The name is also applied by Vuorelainen and Hakli (1964) to a selenian siegenite from the Kuusamo district, Finland.

Seleniovaesite (Selenio-vaesite)

Essentially a selenian vaesite, containing 19% Se, from the Shinkolobwe deposit, Shaba province (Vaes 1947b; Derriks and Vaes 1955). The name is also applied by Vuorelainen and Hakli (1964) to a selenian vaesite from the Kuusamo district, Finland.

Selenium molybdenite

A name applied to the hypothetical selenium analogue of molybdenite, by Derriks and Vaes

(1956) to account for the selenium content of molybdenite from Shinkolobwe, Shaba province. The name is now a synonym of drysdallite.

Selenium-siegenite

A name given by Derriks and Vaes (1956) to presumably selenio-siegenite from Shinkolobwe, Shaba province.

Selenium-vaesite

A name given by Derriks and Vaes (1956) to presumably selenio-vaesite from Shinkolobwe, Shaba province.

Selenolinnæite

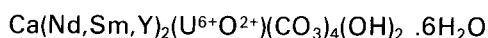
An unnecessary name for selenian linnaeite from Shaba province (Cuvelier 1929). The name selenio-linnaeite is applied by Vuorelainen and Hakli (1964) to a selenian linnaeite from the Kuusamo district, Finland.

Sengierite Carnotite group



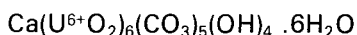
Initially described as small green crystals from Luiswishi, Likasi district, Shaba province (Vaes and Kerr 1949); sengierite occurs with malachite, chrysocolla and vandenbrandeite. Piret *et al.* (1980)* have recently refined the crystal structure of sengierite.

Shabaite-(Nd)



Shabaite-(Nd) is described by Deliens and Piret (1989) from the Kamoto-East copper-cobalt deposit, Shaba province. Shabaite-(Nd) remains unique to the type-locality.

Sharpite

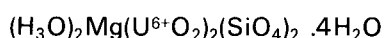


First described as yellowish-green, fibrous crusts from the Shinkolobwe deposit, Shaba province (Melon 1938). Sharpite occurs with uranophane, curite, becquerelite and masuyite and was initially regarded as an uranyl carbonate.

Shinkolobwite

A spelling variant of chinkolobwite (= sklodowskite) from the Shinkolobwe deposit and perhaps the more appropriate form.

Sklodowskite



Sklodowskite was first described as citron yellow, crystalline aureoles to pitchblende within the upper oxidation zone in the Shinkolobwe deposit, Shaba province (Schoep 1924e, 1924f).

The phase was considered isomorphous with uranophane (Schoep 1927) and a comparison between uranophane and sklodowskite is given by Billiet (1936). Gorman (1957) however, gives data that preclude complete isomorphism between uranophane and sklodowskite. Crystal structure data for sklodowskite are given by Mokeeva (1959) and Gevork'yan *et al.* (1979).

Soddyite

The initial, but erroneous spelling of soddyite (Schoep 1922c) given to the type material.

Soddyite



Initially described as pale yellow, fine-grained, crystalline material, intermixed with curite, metatorbernite, sklodowskite and kasolite, in the Shinkolobwe deposit, Shaba province (Schoep 1922c). Originally named soddyite but corrected to soddyite by Billiet (1926).

Sidorenko *et al.* (1975) suggest that soddyite belongs to one of three groups of uranyl silicates, in which the ratio $\text{UO}_2/[\text{SiO}_4]^{4-}$ is >1 . Crystal structure refinement for soddyite is given by Gevork'yan *et al.* (1979) and that for synthetic soddyite by Belokoneva *et al.* (1979).

Stainerite

An erroneous spelling of stainierite given by Rice (1955).

Stainierite

Stainierite was originally described from Mindigi, Shaba province, (Cuvelier 1929; Schoep 1930b) and regarded as the crystalline equivalent of heterogenite. Schoep and Cuvelier 1930) proposed the name stainierite and suggested the formula $(\text{Co,Fe,Al})_2\text{O}_3 \cdot \text{H}_2\text{O}$. De Jong (1930) has reviewed the mineral chemistry of stainierite. Hey (1962c) considers stainierite to be identical to heterogenite.

However, Orcel *et al.* (1958) regard stainierite as distinct from heterogenite, being of the brucite-type with the composition $\text{Co}(\text{OH})_2$; Yakhontova and Gruder (1980) consider stainierite to be a valid species and recognise several polytypes (stainierite-2H and stainierite-3H) to which the general formula HCoO_2 can be applied.

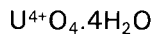
Stasite

Initially considered to be a dimorph of dewindtite, occurring at Kasolo, Shaba province (Schoep 1922b). Stasite is identical to dewindtite (Schoep 1923a, 1923c).

Stilleite Sphalerite group

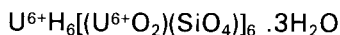
Stilleite is the selenium analogue of sphalerite and first described as massive, grey, metallic grains, associated with linnaeite, selenioaesite, molybdenite and clausthalite and as inclusions in linnaeite and selenioaesite in the Shinkolobwe deposit, Shaba province (Ramdohr 1956).

The sphalerite-stilleite isomorphous series is reviewed by Klemm (1961). A mercurian stilleite occurs at Cerro de Umango, Argentina (in Ramdohr 1980).

Studtite

First described as whitish-yellow to yellow, acicular crystals, associated with uranophane and rutherfordine in the Shinkolobwe uranium deposit, Shaba province (Vaes 1947a).

Originally thought by Vaes to be a hydrated uranium carbonate but later confirmed by Walenta (1974) as a hydrated peroxide (the first recording of a natural peroxide mineral).

Swamboite Uranophane group

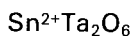
Occurs as very plate yellow, sub-millimetric needles on soddyite crystals, with curite and lining small cavities in de-calcified hematite sandstones, from the Swambo deposit, near Shinkolobwe, Shaba province (Deliens and Piret 1981). Swamboite remains unique to Swambo.

Tantalpolycrase

A name given to an inadequately-described phase from the Liha district (van Wambeke 1967).

Th-crandallite

An unnecessary name given to thorian crandallite from the Kobokobo pegmatite, Kivu province (van Wambeke 1971).

Thoreaulite

Thoreaulite is the tantalum analogue of foordite and was first described from the Manono pegmatite, Shaba province (Buttgenbach 1933).

Maksimov *et al.* (1976) have refined the crystal structure of thoreaulite, largely confirming the previously published dimensions of the monoclinic cell. Nekrasov *et al.* (1982) suggest that tin is present as Sn^{4+} in thoreaulite.

Thoreaulith

A spelling variant of thoreaulite from the Manono pegmatite, given by Betehtin (1971).

Thorophosphuranylite

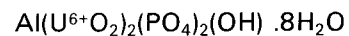
An unnecessary name for a thorian phosphuranylite from the Kobokobo pegmatite, Kivu province (van Wambeke 1958b).

Thororenardite

An unnecessary name for a thorian renardite from the Kobokobo pegmatite, Kivu province (van Wambeke 1958b).

Threadgoldite

Autunite group



Meta-vanuralite-Threadgoldite series

Threadgoldite is the phosphate analogue of meta-vanuralite; the phase was described initially in the uranium-rich portion of the Kobokobo pegmatite, Kivu province (Deliens and Piret 1979c). Threadgoldite occurs as greenish-yellow micaceous, tabular, millimetric crystals with other aluminium uranyl phosphates. The torbernite-type crystal structure of threadgoldite was deduced by Piret *et al.* (1979b) and more recently refined by Khosrawan-Sazedji (1982).

Topasolite

A name given to topaz by de Khun (1965) with reference to material from the Mokaima deposit, Kailo district.

[?] Torbenite

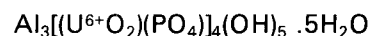
A misprint for torbernite from Shinkolobwe, given in Deliens (1979).

Treadgoldite

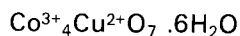
An erroneous spelling of threadgoldite listed in the 32nd list of New Mineral Names (Hey 1982).

Triangulite

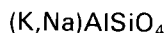
Ranunculite group



First described as bright yellow aggregates of flat triangular or rhombohedral crystals, associated with meta-autunite, beryl, metamict zircon, phosphuranylite, ranunculite and furongite in the quartz-feldspar-columbite zone of the Kobokobo pegmatite, Kivu province, (Deliens and Piret 1982b). The phase remains unique to Kobokobo.

Trieuite

A black, amorphous mineral occurring in the l'Etoile du Congo mine, Shaba province (de Leenheer 1935) and regarded as a cuprian heterogenite. Billiet and Vandendriessche (1939) suggest that trieuite, together with mindigite and boodtite, are all varieties of a single species having the formula $(\text{Co}_2\text{O}_3 \text{ CuO}) \cdot \text{H}_2\text{O}$. Trieuite is identical to heterogenite (Hey 1962c).

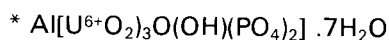
Trikalsilite (Tri-kalsilite)

Trikalsilite occurs as colourless, massive, parallel growths, associated with nepheline and kalsilite in porphyritic lavas from Kabfumu, northern Kivu province, where it was first described by Sahama and Smith (1957c).

Trikalsilite is polymorphous with kalsilite, kaliophilite and tetrakalsilite. The crystal structure of trikalsilite has since been revised by Bonaccorsi *et al.* (1988). The phase remains unique to Kabfumu.

[?] *Triphyllite*

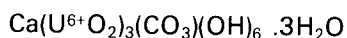
A misprint for triphylite from the Kobokobo pegmatite, Kivu province (de Kun 1965).

Upalite

Found as amber-yellow, sub-millimetric needles associated with meta-autunite, phosphuranylite and other aluminium uranyl phosphates, in the uranium-rich portion of the Kobokobo pegmatite, Kivu province (Deliens and Piret 1979b). The phase remains unique to Kobokobo.

Revised crystal structure and compositional data are given by Piret and Declercq (1983)*.

The name upalite should not be confused with that of cupalite (Razin *et al.*, 1985) a naturally-occurring copper-aluminium alloy.

Uranalcarite

Uranalcarite occurs as bright yellow, acicular crystals, associated with uranophane, uraninite, wyartite and masuyite, in the Shinkolobwe deposit, Shaba province (Deliens and Piret 1984b). Uranalcarite remains unique to Shinkolobwe.

Uranolepidite

The mineral occurs as dark green, lamellar masses in the Shinkolobwe, deposit, Shaba province (Thoreau 1932, 1933). Uranolepidite is identical to vandenbrandeite (Schoep 1932).

Uranothorogummite

Described by (van Wambeke 1967) from the Mapembe pegmatite. Also recorded by van Wambeke from Kasika and Lueshe, Kivu province. Uranothorogummite is a uranian thorogummite.

Vaesite

Pyrite group

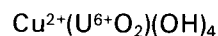


Cattierite-Vaesite series.

Vaesite is the nickel analogue of pyrite and originally described from the Kasompi deposit, Shaba province (Kerr 1945). Vaesite occurs as grey, metallic cubes and octahedra, associated with pyrite and randomly disseminated in dolomite.

A ferrian-(cobaltian)-vaesite occurs with villamaninite at Carmenes, Spain (Hey 1962c). A cobaltian vaesite (17.0-17.8 wt% Co) occur in the Kalgoorlie district, Western Australia (Ostwald 1980).

The name should not be confused with vasite, a spelling variant of wasite (in Dana 1892).

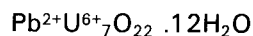
Vandenbrandeite

Initially described as a dark green alteration product of uraninite from the Kalongwe deposit, Shaba province (Schoep 1932) associated with kasolite, sklodowskite and cuprosklodowskite. More recent compositional and crystal structure data are given by Milne and Nuffield (1951).

Vandenbrandeite is also recorded from the Shinkolobwe deposit where it was originally described as uranolepidite (Thoreau 1933). The phase is apparently unique to Zaire.

Vandenbrandite

A spelling variant of vandenbrandeite given in the 7th edition of Dana's System of Mineralogy (Palache *et al.*, 1944).

Vandendriesscheite

Originally, from the Shinkolobwe uranium deposit, Shaba province, occurring as amber orange crystals associated with fourmarierite and rutherfordine (Vaes 1947a).

The crystal structure was later refined by Thoreau (1948) and Toussaint and Basseur (1959). Deliens (1977b) has provided new X-ray powder data for vandendriesscheite.

Vandendriesscheite I

A name applied to vandendriesscheite from Shinkolobwe, by Christ and Clark (1960).

Vandendriesscheite II

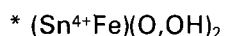
A name applied to metavandendriesscheite from Shinkolobwe, by Christ and Clark (1960).

Vanmeerscheite

A misprint for vanmeersscheite appearing in the 32nd list of new mineral names (Hey 1982).

Vanmeersscheite

First described as canary-yellow tablets in the hydrothermal and supergene alteration zones of the Kobokobo pegmatite, Kivu province, associated with metavanmeersscheite and studtite (Deliens and Piret 1982a). The phase remains unique to Kobokobo.

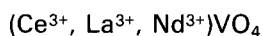
Varlamoffite

Initially described from the Atondo deposit, Kalima district, where it occurs both as yellow, massive, earthy fillings in geodes lined with cassiterite and as pseudomorphs after stannite. The mineral, first thought to be cassiterite, was first noted by de Dycker and fully characterised and named by Buttgenbach (1947). The phase was earlier described from Bolivia as souxite (Herzenberg 1946) for which the formula $SnO_2 \cdot nH_2O$ was given. Because the Zairean material was more fully investigated, the Bolivian phase is relegated to synonym status (Buttgenbach 1950).

Buttgenbach gave the formula as H_2SnO_3 . Gastellier (1950) however suggest that the Fe^{3+} component of varlamoffite is of a structural nature and not due to admixed iron minerals as previously supposed. The composition of varlamoffite has since been revised by *Niggli (1953) who considers it to be a valid species on the basis of X-ray data though this has been queried by Alexander and Flinter (1965). Antun (1960) confirms varlamoffite as a distinct species and not a mixture.

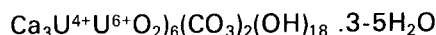
Wakefieldite-(Ce)

Xenotime group



Wakefieldite-(Ce) is the renamed kusuite and is the cerium analogue of wakefieldite-(Y). The phase was initially described from the oxidation zone of the Kusu deposit, 85km southwest of Kinshasa, Bas Zaire province (Deliens and Piret 1977; Deliens and Piret 1986a); associated minerals include mottramite, chervetite, cuprite, diopside, heyite, malachite, plancheite and vanadinite. The type material is a plumboan variety.

A lead-free wakefieldite-(Ce) is recorded from Tiferline, Morocco (Baudracco-Gritti *et al.*, 1987).

Wyartite

Wyartite occurs as a black to velvet-black alteration product of wolsendorfite and uraninite, from the Shinkolobwe deposit, Shaba province (Guillemin and Protas 1959). Wyartite is the redefined ianthinite of Bignand (1955) and thus distinct from the ianthinite of Schoep (Destas *et al.*, 1958).

Two forms of wyartite have been observed by Clark (1960) which are accordingly designated wyartite I and II. The phase remains unique to Shinkolobwe.

Wyartite I

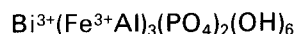
One of the two distinct forms of wyartite from the Shinkolobwe deposit, Shaba province observed by Clark (1960). Wyartite I is presumably the equivalent of wyartite.

Wyartite II

One of the two distinct forms of wyartite verified by Clark (1960) from the Shinkolobwe deposit. Wyartite II represents a variety of wyartite, in which there are changes to the internal structure, but no visible external changes.

Zairite

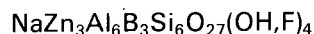
Crandallite group



Zairite is the ferric analogue of waylandite and initially described from the Etaetu deposit, Kivu province (van Wambeke 1975). Zairite occurs as greenish masses in the weathering zone of the deposit, together with wolframite and an unnamed bismuth phosphate. The phase remains unique to the type locality.

Zn-tourmaline

Tourmaline group



A name appearing in the index of Mineralogical Abstracts (volume 16) and referring to the blue zincian elbaite described by Jedwab (1962) from pegmatites of the Muika district. This phase contains 2.85% ZnO.

The name is more recently used for the hypothetical zinc end-member of the tourmaline group by Sokolov *et al.* (1988) with reference to zincian tourmalines (containing up to 3.83% ZnO) from unspecified rare metal pegmatites in the USSR. The name may perhaps be retained for the hypothetical end-member.

3.2.- Type-Mineralogy of the Unnamed Phases

Thirteen unnamed phases are presented, several of these still remain uncharacterised.

Al-PO₄-hydrate

The phase occurs with mitridatite in the Kobokobo pegmatite, Kivu province (van Wambeke 1971).

Bi-PO₄

Occurs with zairite from the Etaetu deposit, Kivu province (van Wambeke 1975).

Ca-Mg-uranyl molybdate

Recorded by Deliëns (1975b) from the Shinkolobwe deposit, Shaba province, where it occurs with iriginite, umohoite, wulfenite, zippeite and siegenite.

Co-Mg-Ni-uranyl silicate (= oursinite)

Recorded by Deliëns and Piret (1982a) from the Shinkolobwe mine, Shaba province. The phase has now been fully characterised and is named oursinite (Deliëns and Piret 1983a).

Cu-Cl

Recorded from emission spectrograms of flows from the Nyiragongo volcano, Kivu province (Herman *et al.*, 1960). Perhaps identical to tolbachite (CuCl₂) of Bergasova and Filatov 1983).

K-Co-F KCoF₃

Recorded as a sublimate from Nyiragongo, Kivu province (Herman *et al.*, 1960), though the mineral, in fact, may be a laboratory product. The phase is given as KCaF₃ in Mineralogical Abstracts.

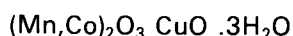
K-Mg-F KMgF₃

Recorded as a sublimate from Nyiragongo, Kivu province (Herman *et al.*, 1960). The phase in fact, may be a laboratory product.

K-Zn-SO₄ K₂Zn(SO₄)₂ .2H₂O

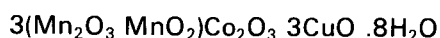
Occurs as a sublimation product in the Rugarama cone, Nyamuragira volcano, Kivu province (Deliëns 1975).

Mn-Co-Cu-oxide hydrate



Recorded by de Leenheer (1936) with malachite from the Ruashi deposit, Shaba province.

Mn³⁺-Mn⁴⁺-Co-Cu-oxide hydrate



Recorded by de Leenheer (1936) from the Kambove deposit, Shaba province.

K-analogue pyrochlore (= kalipyrochlore)

Recorded by van Wambeke (1965) from the alluvials and residuals deposits associated with the Lueshe carbonatite, Kivu province. The phase is now fully characterised and named kalipyrochlore (Hogarth 1977).

Sr-Fe-Pb-W-PO₄

A mineral of the goyazite-gorceixite group occurring as brown powdery coatings on diamond from alluvials of the Lowa Rive, Maniema district, Kivu province (Varlamoff 1964).

Wodginite-like mineral

A wodginite-like mineral is mentioned by von Knorring (1974) as occurring with simpsonite, rankamaite and cassiterite, in the Mumba area, Kivu province.

4.- TOPOGRAPHICAL MINERALOGY OF THE VALID TYPE-MINERALS

4.1.- Topographical Trends

A total of 292 valid type-minerals are documented from Africa, for the period 1838-1988 (Daltry in press); this number has now increased to 299, for the same period ending 1990. Zaire is the most productive country for African type-minerals as shown in Table 4.

Table 4.- Principle Countries for Approved African Type-Minerals

Position	Country	Number of type-phases
1	Zaire *	91
2	Namibia	59
3	South Africa	53
4	Morocco	15
5	Madagascar	11
6	Gabon	9
7	Kenya	7
7	Uganda	7
9	Zambia	6
9	Zimbabwe	6
10	Tanzania	5

The 91 approved Zairean minerals are described from 25 type-localities, mostly in Kivu provinces, as summarised in Table 5. The number of Zairean type-localities is the largest for any of the African countries.

Seventeen of the 42 documented uranyl phosphate minerals were first described from Zaire. Twelve of these are from the Kobokobo pegmatite and represents the single largest assemblage of type-uranyl phosphates for any locality.

Furthermore, eleven of the Kobokobo type-phosphates are aluminium-uranyl species.

Fifteen of the 23 recorded uranyl oxide hydrates were first found in Zaire, 14 of which occur at Shinkolobwe. The uranyl oxide hydrate assemblage at Shinkolobwe is also the largest number of type-uranyl oxide hydrates for any single deposit worldwide.

There are 8 recorded type-uranyl carbonate minerals from Zaire. Four of these are rare earth-bearing phases and compositionally-unique to Zaire. The 4 type-uranyl selenites from Musonoi represent the total number of documented uranyl

selenites in the mineral kingdom and is thus the single largest assemblage of its type anywhere in the world. Like-wise, studtite and metastudtite are the only representatives of naturally-occurring peroxide minerals and julienite is the only natural thiocyanide on record.

ACKNOWLEDGEMENTS

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REFERENCES

- AGRINIER, H., GEFFROY, J. & RAOUL, F., 1966.- Présence de sélénium natif et d'autres composés sélénifères dans l'indice à pechblende de Liauzun, près d'Olloix (Puy de Dôme). *C.R. Acad. Sci. Paris*, 263 : 465-467.
- ALEXANDER, J.B. & FLINTER, B.H., 1965.- A note on varlamoffite and associated minerals from the Batang Padang district, Perak, Malaya, Malaysia. *Mineral. Mag.* 35 : 622-627.
- ANTUN, P., 1960.- Sur la genèse et les propriétés de stannites et de varlamoffites du Maniema (Congo Belge). *Bull. Serv. géol. Congo Belge et Ruanda-Urundi*, 9 : 31 p.
- AUBEL van, R., 1927.- Sur la présence d'uraninite cristallisée dans les gîtes uranifères de Kasolo (Katanga). *C.R. Acad. Sci.* 185 : 586-587.
- BAUDRACCO-GRITTI, C., QUARTIERI, S., VEZZALINI, G., PERMINGEAT, F., PILLARD, F. & RINALDI, R., 1987.- Une wakefieldite-(Ce) non-plombifère: nouvelles données sur l'espèce minérale correspondant à l'orthovanadate de cérium. *Bull. Minéral.* 110 : 657-663.
- BELOKONEVA, E.L., MOKEEVA, V.I., KUZNETSOV, L.M., SIMONOV, M.A., MAKAROV, M.A. & BELOV, N.V., 1979.- Crystal structure of synthetic soddyite $(\text{UO}_2)_2[\text{SiO}_4](\text{H}_2\text{O})_2$. *Sov. Phys. Dokl.* 24 : 315-317.
- BELOVA, L.N., 1958.- [Arsenuranylite, the arsenic analogue of phosphuranylite]. *Zap. Vses. Mineralog. Obshch.* 87 : 589-602 [in Russian].
- BERGASOVA, L.P. & FILATOV, S.K., 1983.- [The new mineral tolbachite.] *Dokl. Akad. Nauk. SSSR*, 279 : 415-417. [in Russian].
- BERNSTEIN, L.R., 1986.- Renierite, $\text{Cu}_{10}\text{ZnGe}_2\text{Fe}_4\text{S}_{16}\text{-Cu}_{11}(\text{Ge,As})\text{Fe}_4\text{S}_{16}$: a coupled solid solution series. *Am. Mineral.* 71 : 210-221.
- BERNSTEIN, L.R., REICHEL, D.G. & MERLINO, S., 1989.- Renierite crystal structure refined from Rietveld analysis of powder neutron-diffraction data. *Am. Mineral.* 74 : 1177-1181.
- BERRY, L.G., 1950.- On pseudomalachite or cornetite. *Am. Mineral.* 35 : 365-385.
- BETECHTIN von, A.G., 1971.- *Lehrbuch der speziellen Mineralogie*. 683 p. Deutscher Verlag für Grunstoffindustrie, Leipzig.
- BETHUNE de, P. & MEYER, A., 1956.- Les carbonatites de la Lueshe (Kivu, Congo Belge). *C.R. Acad. Sci. Paris*, 243 : 1132-1134.

Table 8.- Chemical Group Classification of Zairean Approved Type-Minerals

<i>Sulphide</i>	<i>Sulphogermanides</i>	<i>Selenide</i>	
Cattierite Gallite Vaesite	Briartite Renierite	Oosterboschite Stilleite	
<i>Complex Oxide</i>		<i>Hydroxide</i>	
Cesplumtantite Kalipyrochlore Lueshite	Plumbomicrolite Rankamaite Thoreaulite	Heterogenite-2H Varlamoffite	
	<i>Uranyl Oxide Hydrates</i>	<i>Uranyl Peroxide Hydrates</i>	
Becquerelite Billietite Curite Fourmarierite Ianthinite (Schoep) Masuyite Metaschoepite Metavandendriesscheite	Paraschoepite Protasite Richetite Sayrite Schoepite Vandenbrandite Vandendriesscheite	Metastudtite Studtite	
<i>Halogen Compounds</i>	<i>Thiocyanide</i>	<i>Nitrate</i>	
Buttgenbachite Claringbullite	Juliënite	Likásite	
<i>Carbonates</i>	<i>Phosphates</i>		
Comblainite Gysinite-(Nd) Kolwezite Schuilingite-(Nd)	Cornetite Eylattersite Florencite-(La) Kipushite	Ludjibaite Lusungite Zairite	
<i>Uranyl Carbonates</i>	<i>Uranyl Phosphates</i>		
Bijvoetite-(Y) Kamotoite-(Y) Lepersonnite-(Gd) Roubaultite Shabaite-(Nd) Sharpite Uranalcarite Wyartite	Althupite Dewindtite Dumontite Francoisite-(Nd) Kamituyaita Kivuite Metavanmeersscheite Moreauite Mundite	Parsonsite Phuralumite Ranunculite Saléeite Threadgoldite Triangulite Upalite Vanmeersscheite	
<i>Vanadate</i>	<i>Uranyl Divanadate</i>	<i>Uranyl Selenites</i>	<i>Tungstate</i>
Wakefieldite-(Ce)	Sengierite	Demesmaekerite Derricksite Gilleminite Marthozite	Anthoinite
<i>Silicates</i>	<i>Aluminosilicates</i>	<i>Uranyl Silicates</i>	
Andremeryerite Combeite Delhayelite Gotzenite Kirschsteinite	Trikalsilite	Cuprosklodowskite Kasolite Oursinite Sklodowskite Soddyite Swamboite	

- BIGNAND, C., 1955.- Sur les propriétés et les synthèses de quelques minéraux uranifères. *Bull. Soc. fr. Minéral. Cristallogr.* 78 : 1-26.
- BILLIET, V., 1926.- Over de bepaling van becquerelite, janthiniet, -van de immersite method- van Becke. *Natuurwet. Tijdschr. Antwerpen*, 7 : 112.
- BILLIET, V., 1928.- Détermination des indices de réfraction de la becquerelite, de la curite, de la kasolite, de la fourmarierite, de la parsonsite, de la dumontite et de l'ianthinite. *Bull. Soc. franc. Minéral.* 49 : 136-140.
- BILLIET, V., 1936.- Uranotiel en sklodowskiet. *Natuurwet. Tijdschr. Ghent*, 8 : 284.
- BILLIET, V. & VANDENDRIESSCHE, A., 1938.- Sur l'hydrotenorite; son identité avec la tenorite. *Bull. Soc. belge Géol.* 48 : 333-337.
- BILLIET, V. & VANDENDRIESSCHE, A., 1939.- Les oxydes hydratés de cobalt du Katanga. *Bull. Soc. belge Géol.* 49 : 63.
- BONACCORSI, E., MERLINO, S. & PASERO, M., 1988.- Triakalsilite : its structural relationships with nepheline and tetrakalsilite. *Neues Jahrb. Mineral. Mh.* 559-567.
- BORNEMAN-STARYNKEVICK, I.D., 1935.- Materials geochem. Khibina tundra. *Acad. Sci. USSR*, pp. 48,57,65.
- BRAITHWAITE, R.S.W & RYBACK, G., 1988.- Philipsburgite from Caldbeck Fells and kipushite from Montana, and their infrared spectra. *Mineral. Mag.* 52 : 529-533.
- BRASSEUR, H., 1948.- Properties and chemical formula of fourmarierite. *Am. Mineral.* 33 : 619-621.
- BRASSEUR, H., 1949.- Etude de la billietite. *Bull. Cl. Sci. roy. Acad. Belg.* 35 : 793-804.
- BULAKH, A., KUKHARENKO, A.A., KNIPOVICH, Yu.N., KONDRAT'eva, V.V., BAKLANOVA, K.A. & BARANOVA, E.N., 1960.- [Some new minerals in carbonatites from the Kola Peninsula.] [*Mat. Ann. Report, 1959, VSEGET*], 114-116. [in Russian].
- BUTTGENBACH, H., 1917.- *Les Minéraux et les Roches. Etudes pratiques de cristallographie, pétrographie et minéralogie.* 452 p. Vaillant-Carmanne, Liège.
- BUTTGENBACH, H., 1921.- Description des minéraux du Congo belge. *Bull. Cl. Sci. Acad. roy. Belg.* 6 : 38 p.
- BUTTGENBACH, H., 1922.- Note sur la kasolite. *Bull. Cl. Sci. Acad. roy. Belg.* 8 : 575-576.
- BUTTGENBACH, H., 1924a.- Nouvelles observations sur des cristaux de schoepite. *Ann. Soc. géol. Belg.* 47 : B163-B167.
- BUTTGENBACH, H., 1924b.- La fourmarierite, nouvelle espèce minérale. *Ann. Soc. géol. Belg.* 47 : C41-C43.
- BUTTGENBACH, H., 1925.- La droogmansite, nouvelle espèce provenant du gîte uranifère de Kasolo. *Ann. Soc. géol. Belg.* 48 : B219-B221.
- BUTTGENBACH, H., 1926a.- Description d'un minéral du Katanga: la kipushite. *Bull. Cl. Sci. Acad. roy. Belg.* 12 : 905-913.
- BUTTGENBACH, H., 1926b.- Minéraux de Katanga: 1. Cristaux de connellite-buttenbachite; 2. cristaux d'iodoargyrite. *Ann. Soc. géol. Belg.* 50 : B35-B41.
- BUTTGENBACH, H., 1927.- Description d'un minéral du Katanga. *Bull. Cl. Sci. Acad. roy. Belg.* 13 : 905-913.
- BUTTGENBACH, H., 1928.- Note sur la bialite, nouveau minéral et sur quelques autres minéraux de Katanga. *Ann. Soc. géol. Belg. Publ. rel. Congo belge.* 51 : C117-C123.
- BUTTGENBACH, H., 1929.- Note sur la bialite, nouvelle espèce minérale. *Ann. Soc. géol. Belg.* 51 : C117.
- BUTTGENBACH, H., 1932.- Nouveaux cristaux de kipushite. *Bull. Cl. Sci. Acad. roy. Belg.* 18 : 43-51.
- BUTTGENBACH, H., 1933a.- La thoreaulite, nouvelle espèce minérale (note préliminaire). *Ann. Soc. géol. Belg.* 61 : B327-B331.
- BUTTGENBACH, H., 1933b.- Sur un minéral de Kalongwe (Katanga). *Ann. Soc. géol. Belg.* 56 : B331-B332.
- BUTTGENBACH, H., 1941.- La kipushite et l'arakawaite. *Bull. Cl. Sci. Acad. roy. Belg. Bruxelles*, 17 : 448-457.
- BUTTGENBACH, H., 1947.- *Les Minéraux de Belgique et du Congo belge.* 182-183, Liège, Paris.
- BUTTGENBACH, H., 1950.- Souxite et varlamoffite. *Bull. Inst. roy. Colon. Belge.* 23 : 409-411.
- CARON, J.P.H., KAMPUNZU, A.B., LWANGO, L.B., MANTEKA, B. & NKANIKA, W.R., 1986.- Les ressources minérales d'âge Proterozoïque moyen en Afrique Equatoriale et l'évolution géodynamique de la chaîne Kibarienne. *UNESCO <Geology for Economic Development> Newsletter.* 5 : 138-152.
- CESBRON, F., BACKET, B. & OOSTERBOSCH, R., 1965.- La demesmaekerite, sélénite hydrate d'uranium, cuivre et plomb. *Bull. Soc. fr. Minéral. Cristallogr.* 88 : 422-425.
- CESBRON, F., OOSTERBOSCH, R. & PIERROT, R., 1969.- Une nouvelle espèce minérale: la marthozite, uranyl sélénite de cuivre hydrate. *Bull. Soc. fr. Minéral. Cristallogr.* 92 : 278-283.
- CESBRON, F., PIERROT, R. & VERBEEK, T., 1970.- La roubaultite, $Cu_2(UO_2)_3(OH)_{10} \cdot 5H_2O$, une nouvelle espèce minérale. *Bull. Soc. fr. Minéral. Cristallogr.* 93 : 550-554.
- CESBRON, F., PIERROT, R. & VERBEEK, T., 1971.- La derriksité, $Cu_2(UO_2)(SeO_3)_2(OH)_6 \cdot H_2O$, une nouvelle espèce minérale. *Bull. Soc. fr. Minéral. Cristallogr.* 94 : 534-537.
- CHRIST, C.L. & CLARK, J.R., 1960.- Crystal chemical studies of some uranyl oxide hydrates. *Am. Mineral.* 45 : 1026-1061.
- CLARK, J.R., 1960.- X-ray study of alteration in the uranium mineral wyartite. *Am. Mineral.* 45 : 200-208.
- CUVELIER, V. 1929.- Analyse van enkele zuiveren stoffen, technische produkten en kobaltmineralen. *Natuurwet. Tijdschr.* 11 : 170.
- CUVELIER, V. 1933.- De chemische samenstelling van Julieniet, nieuw kobalt mineraal. *Natuurwet. Tijdschr.* 15 : 17-20.
- CUVELIER, V. & de SWEENER, A. 1932.- L'analyse et la synthèse chimiques de la julienite. *Ann. Serv. Mines Com. Spec. Katanga*, 3 : 67-71.
- DALTRY, V.D.C., 1991.- Type mineralogy of Africa: A general review (1838-1988). *J. Afr. Earth Sci.* (in press).
- DANA, J.D., 1892.- *The System of Mineralogy of James Dwight Dana, 1837-1868.* 6th edn, 1134 p. New York.
- DANO, M. & SORENSEN, H., 1959.- An examination of some rare minerals from the nepheline syenites of South West Greenland. *Meddel. Gronland*, 162 : 1-35.
- DAVIS, R.J., CLARK, A.M. & CRIDDLE, A.J., 1977.- Palladseite, a new mineral from Itabira, Minas Gerais, Brazil. *Mineral. Mag.* 41 : 123.
- DAWSON, J.B., SMITH, J.V. & STEELE, I.M., 1989.- Combeite ($Na_{2-33}Ca_{1-74}others_{0-12}Si_3O_9$ from Oldoinyo Lengai, Tanzania. *J. Geol.* 97 : 365-372.
- DECLERQ, J.P., GERMAIN, G. and PIRET, P., 1977.- Composition et structure de la likasite $Cu_3P_2H_3(NO_3)(OH)_2 \cdot H_2O$. *Acta Crystallogr.* B33 : 1422-1427.
- DELIENS, M., 1974.- Les oxides hydratés de cobalt du Shaba méridional (République du Zaïre). *Ann. Mus. roy. Sci. Afr. centr. Tervuren, sér. 8, Sci. Geol.* 80 p.
- DELIENS, M., 1975a.- [Volcanic sublimates of Rugarama, Kivu region, Republic of Zaïre.] *Répub. Rwandaise, Bull. Serv. Géol.* 8 : 1-11. [in French]
- DELIENS, M., 1975b.- Une association d'uranium de Shinkolobwe (région du Shaba, république du Zaïre). *Ann. Soc. géol. Belg.* 98 : 155-160.
- DELIENS, M., 1977a.- Les minéraux types (holotypes) conservés en Belgique. *Ann. Soc. géol. Belg.* 100 : 205-206.
- DELIENS, M., 1977b.- Review of the hydrated oxides of U and Pb with new X-ray powder data. *Mineral. Mag.* 41 : 51-57.
- DELIENS, M., 1978.- Le droogmansite, espèce minérale discréditée. *Bull. Minéral.* 101 : 561-562.
- DELIENS, M., 1988.- Occurrence de roubaultite à Kamoto (Shaba, Zaïre). *Bull. Inst. roy. Sci. nat. Belg.* 58 : 295-296.
- DELIENS, M. & GOETHALS, H., 1973.- Polytypism of heterogenite. *Mineral. Mag.* 39 : 152-157.

- DELIENS, M. & PIRET, P., 1977.- La kusuite, $(\text{Ce}^{3+}\text{Pb}^{2+}\text{Pb}^{4+})\text{VO}_4$, nouveau minéral. *Bull. Soc. fr. Minéral. Cristallogr.* 100 : 39-41
- DELIENS, M. & PIRET, P., 1978.- La phurcalite $\text{Ca}_2(\text{UO}_2)_3(\text{PO}_4)_2(\text{OH})_4 \cdot 4\text{H}_2\text{O}$, nouveau minéral. *Bull. Soc. fr. Minéral. Cristallogr.* 101 : 356-358.
- DELIENS, M. & PIRET, P., 1979a.- Ranunculite, $\text{AlH}(\text{UO}_2)(\text{PO}_4)(\text{OH})_3 \cdot 4\text{H}_2\text{O}$, a new mineral. *Mineral. Mag.* 43 : 321-323.
- DELIENS, M. & PIRET, P., 1979b.- Les phosphates d'uranyle et d'aluminium de Kobokobo. II. La phuralumite $\text{Al}_2(\text{UO}_2)_3(\text{PO}_4)_2(\text{OH})_6 \cdot 10\text{H}_2\text{O}$ et l'upalite $\text{Al}(\text{UO}_2)_3(\text{PO}_4)_2(\text{OH})_3$. *Bull. Soc. fr. Minéral. Cristallogr.* 102 : 333-337.
- DELIENS, M. & PIRET, P., 1979c.- Les phosphates d'uranyle et d'aluminium de Kobokobo. IV. La threadgoldite $\text{Al}(\text{UO}_2)_2(\text{PO}_4)_2(\text{OH}) \cdot 8\text{H}_2\text{O}$ nouveau minéral. *Bull. Soc. fr. Minéral. Cristallogr.* 102 : 338-341.
- DELIENS, M. & PIRET, P., 1980.- La kolwezite, un hydroxycarbonate de cuivre et de cobalt analogue à la glaukosphaerite et à la rosasite. *Bull. Minéral.* 103 : 179-184.
- DELIENS, M. & PIRET, P., 1981a.- Les phosphates d'uranyle et d'aluminium de Kobokobo. V. La mundite, nouveau minéral. *Bull. Minéral.* 104 : 669-671.
- DELIENS, M. & PIRET, P., 1981b.- La swamboite, nouveau silicate d'uranium hydraté du Shaba, Zaïre. *Can. Mineral.* 19 : 553-557.
- DELIENS, M. & PIRET, P., 1982a.- Bijvoetite et lepersonnite, carbonate hydratés d'uranyle et de terres rares de Shinkolobwe, Zaïre. *Can. Mineral.* 20 : 231-238.
- DELIENS, M. & PIRET, P., 1982b.- Les phosphates d'uranyle et d'aluminium de Kobokobo. VI. La triangulite $\text{Al}_3(\text{UO}_2)_3(\text{PO}_4)_4(\text{OH})_5 \cdot 5\text{H}_2\text{O}$ nouveau minéral. *Bull. Minéral.* 105 : 611-614.
- DELIENS, M. & PIRET, P., 1983a.- L'oursinite $(\text{Co}_{0.86}\text{Mg}_{0.10}\text{Ni}_{0.04})\text{O} \cdot 2\text{UO}_3 \cdot 2\text{SiO}_2 \cdot 6\text{H}_2\text{O}$, nouveau minéral de Shinkolobwe, Shaba, Zaïre. *Bull. Minéral.* 106 : 305-308.
- DELIENS, M. & PIRET, P., 1983b.- Metastudtite $\text{UO}_4 \cdot 2\text{H}_2\text{O}$, a new mineral from Shinkolobwe, Shaba, Zaïre. *Am. Mineral.* 68 : 456-458.
- DELIENS, M. & PIRET, P., 1984a.- La kamitugaite, $\text{PbAl}(\text{UO}_2)_5[(\text{P,As})\text{O}_4]_2(\text{OH})_9 \cdot 9.5\text{H}_2\text{O}$, nouveau minéral de Kobokobo, Kivu, Zaïre. *Bull. Minéral.* 107 : 15-19.
- DELIENS, M. & PIRET, P., 1984b.- L'urancalcarite, $\text{Ca}(\text{UO}_2)_3\text{CO}_3(\text{OH})_6 \cdot 3\text{H}_2\text{O}$, nouveau minéral de Shinkolobwe, Shaba, Zaïre. *Bull. Minéral.* 107 : 21-24.
- DELIENS, M. & PIRET, P., 1985.- Les phosphates d'uranyle et d'aluminium de Kobokobo. VII. La moreauite, $\text{Al}_3(\text{UO}_2)(\text{PO}_4)_3(\text{OH})_2 \cdot 13\text{H}_2\text{O}$, nouveau minéral. *Bull. Minéral.* 108 : 9-13.
- DELIENS, M. & PIRET, P., 1986a.- La kusuite devient la wakefieldite-(Ce) plombifère. *Bull. Minéral.* 109 : 305.
- DELIENS, M. & PIRET, P., 1986b.- La kamotoite-(Y), un nouveau carbonate d'uranyle et de terre rares de Kamoto, Shaba, Zaïre. *Bull. Minéral.* 109 : 643-647.
- DELIENS, M. & PIRET, P., 1989.- La shabaite-(Nd), $\text{Ca}(\text{TR})_2(\text{UO}_2)(\text{CO}_3)_4(\text{OH})_2 \cdot 6\text{H}_2\text{O}$, nouvelle espèce minérale de Kamoto, Shaba, Zaïre. *European J. Mineral.* 1 : 85-88.
- DERRIKS, J.J. & VAES, J.F., 1956.- The Shinkolobwe uranium deposit: Current status of our geological and metallogenic knowledge. *Proc. U.N. Intern. Conf. Peaceful Uses of Atomic Energy (Geneva 1955)*. 6: Geology of Uranium and Thorium.
- DERRIKS, J.J. & OOSTERBOSCH, R., 1958.- The Swambo and Kalongwe deposits compared to Shinkolobwe; contribution to the study of Katanga uranium. *Proc. 2nd. U.N. Intern. Conf. Peaceful Uses of Atomic Energy*, 2: 663-695.
- DESTAS, A., VAES, J.F. & GUILLEMIN, C., 1958.- Minéraux d'uranium du Haut Katanga. *Les amis du Musée royal du Congo Belge (Tervuren, Belgique)* 81 p.
- DORFMAN, M.D. & CHIRAGOV, M.I., 1979.- [Hydrodelhayelite, a product of supergene alteration of delhayelite]. [*New data on minerals from the USSR*] 28 : 172-175 [in Russian].
- DUNN, P.J. & MANDARINO, J.A., 1988.- Formal definitions of type mineral specimens. *Mineral. Mag.* 52 : 129-131.
- EFFENBERGER, H., 1986.- Likasite, $\text{Cu}_3(\text{OH})_5(\text{NO}_3) \cdot 2\text{H}_2\text{O}$: revision of the chemical formula and re-determination of the crystal structure. *Neues Jahrb. Mineral. Mh.* 101-110.
- EMBREY, P.G. & FEJER, E.E., 1969.- Tavistockite and bialite discredited. *Mineral. Mag.* 37 : 123-127.
- ENGLISH, G.L., 1939.- *Descriptive List of New Minerals, 1892-1938*. 157 p. London & New York.
- FANFANI, L., NUNZI, A., ZANAZI, P.F. & ZANZARI, A.R., 1973.- The crystal structure of buttggenbachite. *Mineral. Mag.* 39 : 264-270.
- FEJER, E.E., CLARK, A.M., COUPER, A.G. & ELLIOTT, C.J., 1977.- Claringbullite, a new hydrated copper chloride. *Mineral. Mag.* 41 : 433-436.
- FINCKH, L., 1912.- *Die jungvulkanischen Gesteine des Kiwuseegebietes*: 14-19. Klinkhardt, Biermann, Leipzig.
- FISCHER, R.X. & TILLMANN, E., 1983.- Die kristallstrukturen von natürlichem $\text{Na}_2\text{Ca}_2\text{Si}_3\text{O}_9$ vom Mt. Shahu, Zaïre dem Mayener Feld, Eifel. *Neues Jahrb. Mineral. Mh.* 49-59.
- FISCHER, R.X. & TILLMANN, E., 1987.- Revised data for combeite, $\text{Na}_2\text{Ca}_2\text{Si}_3\text{O}_9$. *Acta Crystallogr.* C43 : 1852-1854.
- FLEISCHER, M. & CABRI, L.J.C., 1978.- New mineral names. *Am. Mineral.* 63 : 598-600.
- FRANCOTTE, J., MOREAU, J., OTTENBURGS, R., & LEVY, C., 1965.- La briartite, $\text{Cu}_2(\text{Fe,Zn})\text{GeS}_4$, une nouvelle espèce minérale. *Bull. Soc. fr. Minéral. Cristallogr.* 88 : 432-437.
- FRONDEL, C., 1950.- Studies of uranium minerals (I): Parsonsite and randite. *Am. Mineral.* 35 : 245-250.
- FRONDEL, C., 1951.- Studies of uranium minerals (IX): Saleeite and novacekite. *Am. Mineral.* 37 : 680-686.
- FRONDEL, C., 1956.- Mineral composition of gummite. *Am. Mineral.* 41 : 537-568.
- FRONDEL, C. & MEYROWITZ, R., 1956.- Studies of uranium minerals (XIX): Rutherfordine, diderichite and clarkeite. *Am. Mineral.* 41 : 127-133.
- FRONDEL, J.W. & CUTTITTA, F., 1953.- Studies of uranium minerals (XII): The status of billietite and becquerelite. *Am. Mineral.* 38 : 1019-1024.
- FRONDEL, J.W. & CUTTITTA, F., 1954.- Studies of uranium minerals (XVI): An alteration product of ianthinite. *Am. Mineral.* 39 : 1018-1020.
- GASTELLIER, S., 1950.- Note sur un minéral jaune trouvé par M. Varlamoff. *Bull. Inst. roy. Colon. Belge.* 21 : 412-419.
- GAUTIER, G., FRANCOIS, A., DELIENS, M. & PIRET, P., 1989.- Famous mineral localities: The uranium deposits of the Shaba region, Zaïre. *Mineral. Rec.* 20 : 265-289.
- GEIER, B.H. & WEBER, K., 1958.- Reinerit, $\text{Zn}_3(\text{AsO}_3)_2$, ein neues Mineral der Tsumeb Mine, Südwestafrika. *Neues Jahrb. Mineral. Mh.* : 160-167.
- GEVORK'YAN, S.V., MATKOVSKY, A.P., POVARRENYKH, A.S. & SIDORENKO, G.A., 1979.- [An infrared-spectroscopic study of some uranyl-bearing silicates.] *Mineral. Zh.* 1 : 78-85. [in Russian].
- GINDEROW, D., 1983.- Structure de la derricksite $\text{Cu}_4(\text{UO}_2)(\text{SeO}_3)_2(\text{OH})_6$. *Acta Crystallogr.* C39 : 1605-1607.
- GINDEROW, D. & CESBRON, F., 1983.- Structure de la demesmaeckerite, $\text{Pb}_2\text{Cu}_5(\text{SeO}_3)_6(\text{UO}_2)_2(\text{OH})_6 \cdot 2\text{H}_2\text{O}$. *Acta Crystallogr.* C39 : 824-827.
- GINDEROW, D. & CESBRON, F., 1985.- Structure de la roubaultite, $\text{Cu}_2(\text{UO}_2)_3(\text{CO}_3)_2\text{O}_2(\text{OH})_2 \cdot 4\text{H}_2\text{O}$. *Acta Crystallogr.* C41 : 654-657.
- GORMAN, D.H., 1957.- Studies of radioactive compounds: IX - Sklodowskite. *Can. Mineral.* 6 : 52-60.
- GUILLEMIN, C. & PIERROT, R., 1957.- Nouvelles données sur la schuilingite. *Bull. Soc. fr. Minéral. Cristallogr.* 80 : 549-551.
- GUILLEMIN, C. & PROTAS, J., 1959.- Ianthinite et wyartite. *Bull. Soc. fr. Minéral. Cristallogr.* 82 : 80-86.
- HACQUAERT, A.L., 1927a.- Pseudomorphosen in radioactieve mineralen van Katanga. *Natuurwet. Tijdsch.* 9 : 34-39.

- HACQUAERT, A.L., 1927b.- Présentation de quelques pseudomorphoses de minéraux uranifère de Kasolo (Katanga). *Ann. Soc. géol. Belg.* 50: C15-C16.
- HAYASHI, K.-I., KIKUTANI, T. & SUGAKI, A., 1985.- [As-bearing renierite from the Furutobe mine, Akita prefecture, Japan.]. *J. Jap. Assoc. Mineral. Petr. & Econ. Geol.* 80: 451-458.
- HERMAN, P., VANDERSTRAPPEN, R. & HUBAUX, A., 1960.- Sublimes du Nyiragongo, Kivu. *Centre National de Volcanologie (Belgique) Publ. No. 12*: 961-971.
- HERMAN, P., VANDERSTRAPPEN, R. & HUBAUX, A., 1960-1961.- Contribution à l'étude des minéraux congolais. *Ann. Soc. géol. Belg.* 84: 297-309.
- HERZENBERG, R., 1946.- Nuevos minerales de Bolivia. *Bol. Tecn., Fac. Nac. Ingen., Univ. Tecn. Oruro*, 1: 1-11.
- HEY, M.H., 1955.- *An Index of Mineral Species and Varieties arranged Chemically*. 728 p. British Museum, London.
- HEY, M.H., 1962a.- *An Index of Mineral Species and Varieties arranged Chemically*. 2nd edn. 728 p. British Museum, London.
- HEY, M.H., 1962b.- A new analysis of villamaninite. *Mineral. Mag.* 33: 169-170.
- HEY, M.H., 1962c.- Cobaltic hydroxide in nature. *Mineral. Mag.* 33: 253-258.
- HEY, M.H., 1982.- Thirty-second list of new mineral names. *Mineral. Mag.* 46: 515-528.
- HINTZE, C., 1937.- *Handbuch der Mineralogie*. 760 p. Ergänzungsband II. Leipzig.
- HOGARTH, D.D. 1977.- Classification and nomenclature of the pyrochlore group. *Am. Mineral.* 62: 403-410.
- HOLMES, A., 1937.- Petrology of katungite. *Geol. Mag.* 124: 200-219.
- HONEA, R.M., 1957.- Identity of pilbarite with thorumgumite and kasolite. *Am. Mineral.* 42: 908-910.
- HUTCHINSON, A. & MACGREGOR, A.M., 1921.- On cornetite from Bwana Mkubwa, Northern Rhodesia. *Mineral. Mag.* 19: 225-232.
- JEDWAB, J., 1962.- Tourmaline zincifère dans une pegmatite de Muika (Congo). *Bull. Soc. belge Géol.* 71: 132-135.
- JOHAN, Z. & CECH, F., 1989.- Nouvelles données sur la hainite, $\text{Na}_2\text{Ca} \equiv [(\text{Ti}, \text{Zr}, \text{Mn}, \text{Fe}, \text{Nb}, \text{Ta})_{1-50} \text{O}_{50} (\text{Si}_2\text{O}_7)_4]$ et ses relations cristallographiques avec la götzenite $\text{Na}_2\text{Ca}_5\text{Ti}(\text{Si}_2\text{O}_7)_2\text{F}_4$. *C.R. Acad. Sci. Ser. II*, 308: 1237-1242.
- JOHAN, Z., PICOT, P., PIERROT, R. & VERBEEK, Th., 1970.- L'oosterboschite $(\text{Pd}, \text{Cu})_7\text{Se}_5$, une nouvelle espèce minérale et la trogatalite cupropalladifère de Musonoi (Katanga). *Bull. Minéral.* 93: 476-481.
- JONG de, W.F., 1930.- Over goethiet, staineriet, diaspoor et heterogeniet. *Natuurwet. Tijdschr.* 12: 69-72.
- KAHN, J.S. & SMITH, D.K., 1966.- Mineralogical investigation in the debris of the Gnome event near Carlsbad, New Mexico. *Am. Mineral.* 51: 1192-1199.
- KERR, P.F., 1945.- Cattierite and vaesite: new Co-Ni minerals from the Belgian Congo. *Am. Mineral.* 30: 483-497.
- KHOSRAWAN-SAZEDJI, F., 1982.- On the space group of threadgoldite. *Tschermaks Mineral Petrogr. Mitt.* 30: 111-115.
- KLEMM, D.D., 1961.- Über die Mischkristallreihe Zinkblende-Stilleit. *Neues Jahrb. Mineral. Mh.* 253-257.
- KNORRING von, O., 1974.- On tantalum mineralization in some pegmatites from equatorial and southern Africa. *18th ann. Rep. res. Inst. afr. Geol., Univ. Leeds*: 34-38.
- KNORRING von, O., VORMA, A. & NIXON, P.H., 1969a.- Rankamaite, a new tantalum mineral from Kivu, Congo. *Bull. Geol. Soc. Finland*, 41: 47-56.
- KOECHLIN, R., 1911.- *Mineralogisches Taschenbuch der Wiener Mineralogischen Gesellschaft*. Vienna, 1st ed.
- KONEV, A.A., USHCHAPOVSKAYA, Z.F. & LEBEDEVA, V.S., 1970.- The first find of magnesium kirschsteinite in the USSR. *Dokl. Acad. Sci. USSR, Earth Sci. Sect.* 190: 136-138.
- KUKHARENKO, A.A., 1965.- [The Caledonian ultrabasic alkaline rocks and carbonates of the Kola peninsula and northern Karelia.] *Izdat. «Nedra» Moscow*: 418-423 [in Russian].
- KUN de, N., 1965.- *The Mineral Resources of Africa*. 740 p. Elsevier, New York.
- LACROIX, A., 1923.- *Minéralogie de Madagascar*. Challamel, Paris. 3: 265-267.
- LAPIN, A.V. & KAZAKOVA/ M.Ye., 1966.- Titanium lueshite from the Kovdor massif and isomorphism in the perovskite group. *Dokl. Acad. Sci., Earth Sci. Sect.* 171: 160-163.
- LEAKE, B.E., 1978.- Nomenclature of amphiboles. *Am. Mineral.* 63: 1023-1052.
- LEENHEER de, L., 1934a.- Over mindigiet, een nieuw Kobalthishydroxyde. *Natuurwet. Tijdschr.* 16: 237-241.
- LEENHEER de, L., 1934b.- La mindigite, un nouvel hydroxyde de cobalt. *Ann. Serv. Mines, Com. Spec. Katanga*, 5: 1-37.
- LEENHEER de, L., 1935.- Trieuit, een nieuw Kobalt mineraal. *Natuurwet. Tijdschr. Gent*, 17: 91.
- LEENHEER de, L., 1936.- Nieuwe kobalt mineralen. *Natuurwet. Tijdschr. Gent*, 18: 77-78.
- LEENHEER de, L., 1937.- Sur l'hydroténorite, minéral nouveau; sur la ténorite, et sur l'identité de ce dernier minéral avec la mélanochalcite. *Bull. Soc. belge Géol.* 47: 245-262.
- LEENHEER de, L., 1938b.- Sur quelques minerais de manganèse du Katanga. *Ann. Serv. Mines, Com. Spec. Katanga*, 8: 32-64.
- LEFEBVRE, J.-J. & GASPARRINI, C., 1980.- Florencite, an occurrence in the Zairian copper belt. *Can. Mineral.* 18: 301-311.
- LEGRAYE, M., 1933.- Une sulfure double de cuivre et de fer particulier des minerais de cuivre du Katanga: bornite orange ou chalmersite? *Bull. Cl. Sci. Acad. roy. Belg.* 19: 262-268.
- LEVINSON, A.A., 1966.- A system of nomenclature for rare-earth minerals. *Am. Mineral.* 51: 152-158.
- LEVY, C., 1968.- Contribution à la minéralogie des sulfures de cuivre du type Cu_3XS_4 . *Mém. Bur. Rech. Géol. Minières*, 54: 1-178.
- LLORCA, S., 1986.- Nouvelles données sur les hétérogénites (Nouvelle-Calédonie). *C.R. Acad. Sci. Sér. II*, 303: 1799-1802.
- LOMBAARD, A.F., GUNZEL, A., INNES, J. & KRUGER, T.L., 1986.- The Tsumeb lead-copper-zinc-silver deposit, south West Africa/Namibia. In: Anhaeusser, C.R. and Maske, S. (eds.). *Mineral Deposits of Southern Africa*: (2 vols.). Geological Society of South Africa: 1761-1787.
- MAKSIMOVA, N.V., ILYUKHIN, V.V. & BELOV, N.V., 1976.- Crystal structure of thoreaulite SnTa_2O_6 . *Soviet Phys. Dokl.* 20: 528-529.
- MATSUBARA, S., KATO, A. & NAGASHIMA, K., 1984.- Mpororite and anthoinite from the Kara mine, Tasmania. *Mineral. Mag.* 48: 397-400.
- MELON, J., 1924.- Analyse et composition de la fourmarierite. *Ann. Soc. géol. Belg.* 47: B200-B202.
- MELON, J., 1938.- La sharpite, nouveau carbonate d'uranyle du Congo Belge. *Bull. Inst. roy. colon. Belge.* 9: 333-336.
- MELON, J. & DEJACE, J., 1959.- La cuprosklodowskite. *Bull. Cl. Sci. Acad. roy. Belg.* 45: 507-515.
- MELON, J. & TOUSSAINT, J., 1950.- La thoreaulite de Kubitaka (Punia, Maniema, Congo Belge) et la cristallographie de la thoreaulite. *Ann. Soc. géol. Belg.* 74: 25-32.
- MICHOT, J., 1959-1960.- Acception généralisée du terme corneite. *Ann. Soc. géol. Belg.* 83: 87-89.
- MILES, N.M., HOGARTH, D.D. & RUSSELL, D.S., 1971.- Wakefieldite, yttrium vanadate, a new mineral from Quebec. *Am. Mineral.* 56: 395-410.
- MILNE, I.H. & NUFFIELD, E.W., 1951.- Studies of radioactive compounds: I. Vandenbrandite. *Am. Mineral.* 36: 394-410.
- MOKEEVA, V.I., 1959.- [The crystal structure of sklodowskite.] *C.R. Acad. Sci. USSR*, 124: 578-580.
- MROSE, M.E., 1950.- Studies of uranium minerals (III): Saleeite from Schneeberg, Saxony. *Am. Mineral.* 35: 525-530.
- NEKRASOV, I.Ya., NEKRASOVA, R.A., TSEPIN, A.I., SIPAVINA, L.V. & REMEZ, K.V., 1982.- [Thoreaulite from rare metal pegmatites in Siberia.] *Mineral. Zh.* 4: 11-20. [Russian with English abstr.].

- NEUMANN, H., 1939.- Armenite, a new mineral. Preliminary note. *Norsk. Geol. Tidsskr.* 19: 312-313.
- NEUMANN, H., 1962.- Contributions to the mineralogy of Norway: No. 13. Rosenbuschite and its relation to götzenite. *Norsk. Geol. Tidsskr.* 42: 179-186.
- NICKEL, E.H. & MANDARINO, J.A., 1988.- Procedures involving the IMA Commission on New Minerals and Mineral Names, and guidelines on mineral nomenclature. *Mineral. Mag.* 53: 275-292.
- NIGGLI, E., 1953.- Untersuchungen aus Varlamoffit. *Leid. Geol. Meded.* 17: 207-214.
- NIGGLI, E. & JAGER, E., 1957.- Untersuchungen an Anthoinit. *Neues Jahrb. Mineral. Abh.* 91: 35-40.
- OLMI, F., SABELLI, C. & BRIZZI, G., 1988.- Agardite-(Y), gysinite-(Nd) and other rare minerals from Sardinia. *Mineral. Rec.* 19: 305-310.
- OLSEN, T., ROST, E. & GRONVOLD, F., 1979.- Phase relationships of palladium selenides. *Acta Chem. Scandinavica*, A33: 251-256.
- ORCEL, J., HENIN, S. & CAILLERE, S., 1958.- Propriétés de la stainerite. *Bull. Soc. fr. Minéral. Cristallogr.* 81: 189-194.
- OOSTERWYCK-GASTUCHE van, M.C., 1974.- Nomenclature et structure des silicates de cuivre, connus sous les noms: shattuckite, plancheite, bisbeeite, katangite et chrysocolle. *Mémoire présenté pour l'obtention du titre d'agréé de l'Enseignement Supérieur. Ed. Xerox, Bruxelles.* 160 p. + XXIX pp.
- OOSTERWYCK-GASTUCHE van, M.C., 1977.- Sur une querelle de nomenclature: celle des noms à donner aux silicates de cuivre shattuckite, plancheite, bisbeeite et katangite. *Ann. Soc. géol. Belg.* 100: 207-221.
- OSTWALD, J., 1980.- Notes on a Co-Ni disulphide and a Co-Ni thiospinel from the Kalgoorlie district, Western Australia. *Mineral. Mag.* 43: 950-951.
- PAGOAGA, M.K., APPLEMAN, D.E. & STEWART, J.M., 1986.- A new barium uranyl oxide hydrate mineral, protasite. *Mineral. Mag.* 50: 125-128.
- PAGOAGA, M.K., APPLEMAN, D.E. & STEWART, J.M., 1987.- Crystal structure and crystal chemistry of the uranyl oxide hydrates becquerelite, billietite and protasite. *Am. Mineral.* 72: 1230-1238.
- PALACHE, C., BERMAN, H. & FRONDEL, C., 1944.- *The System of Mineralogy of James Dwight Dana and Edward Salisbury Dana, Yale University 1837-1892.* vol. 1, 834 p. Wiley, New York.
- PEACOR, D.R., DUNN, P.J., RAMIK, R.A., STURMAN, B.D. & ZEIHEN, L.G., 1985.- Philipsburgite, a new copper, zinc arsenate hydrate related to kipushite, from Montana. *Can. Mineral.* 23: 255
- PIERROT, R., TOUSSAINT, J. & VERBEEK, T., 1965.- La guilleminite, une nouvelle espèce minérale. *Bull. Soc. fr. Minéral. Cristallogr.* 88: 132-135.
- PIRET, P. & DECLERQ, J.P., 1983.- [Crystal structure of upalite $\text{Al}[(\text{UO}_2)_3\text{O}(\text{OH})(\text{PO}_4)_2] \cdot 7\text{H}_2\text{O}$. An example of mimetic twin.] *Bull. Minéral.* 106: 383-389 [in French].
- PIRET, P. & DELIENS, M., 1980a.- La combainite, $\text{Ni}^{2+}\text{Co}^{3+}_{1-x}(\text{OH})_2(\text{CO}_3)_x[\text{OH}]_{1-x/2} \cdot \gamma\text{H}_2\text{O}$, nouveau minéral du groupe de la pyroaurite. *Bull. Minéral.* 103: 113-117.
- PIRET, P. & DELIENS, M., 1980b.- Nouvelles données sur la saléeite holotype de Shinkolobwe. *Bull. Minéral.* 103: 630-632.
- PIRET, P. & DELIENS, M., 1982a.- La vanmeersscheite $\text{U}(\text{UO}_2)_3(\text{PO}_4)_2(\text{OH})_6 \cdot 4\text{H}_2\text{O}$ et la métavanmeersscheite. *Bull. Minéral.* 105: 125-128.
- PIRET, P. & DELIENS, M., 1982b.- Nouvelles données sur la schuilingite, carbonate hydraté de terres rares, de plomb et de cuivre. *Bull. Minéral.* 105: 225-228.
- PIRET, P. & DELIENS, M., 1984.- Nouvelles données sur la richetite $\text{PbO} \cdot 4\text{UO}_3 \cdot 4\text{H}_2\text{O}$. *Bull. Minéral.* 107: 581-585.
- PIRET, P. & DELIENS, M., 1987.- Les phosphates d'uranyle et d'aluminium de Kobokobo IX. L'althupite $\text{AlTh}(\text{UO}_2)[(\text{UO}_2)_3\text{O}(\text{OH})(\text{PO}_4)_2](\text{OH})_3 \cdot 15\text{H}_2\text{O}$, nouveau minéral; propriétés et structure cristalline. *Bull. Minéral.* 110: 65-72.
- PIRET, P. & DELIENS, M., 1988.- Description de la ludjibaite, un polymorphe de la pseudomalachite, $\text{Cu}_5(\text{PO}_4)_2(\text{OH})_4$. *Bull. Minéral.* 111: 167-171.
- PIRET, P. & PIRET-MEUNIER, J., 1988.- New crystal structure determination of dumontite $\text{Pb}_2[(\text{UO}_2)_3\text{O}_2(\text{PO}_4)_2] \cdot 5\text{H}_2\text{O}$. *Bull. Minéral.* 111: 439-442.
- PIRET, P., DECLERQ, J.P. & WATERS-STROOP, D., 1979b.- Structure of threadgoldite. *Acta Crystallogr.* B35: 3017-3020.
- PIRET, P., DECLERQ, J.P. & WATERS-STROOP, D., 1980.- Structure cristalline de la sengierite. *Bull. Minéral.* 103: 176-178.
- PIRET, P., DELIENS, M. & PIRET-MEUNIER, J., 1985.- Occurrence and crystal structure of kipushite, a new copper-zinc phosphate from Kipushi, Zaire. *Can. Mineral.* 23: 35-42.
- PIRET, P., DELIENS, M. & PIRET-MEUNIER, J., 1988.- La francoisite-(Nd), nouveau phosphate d'uranyle et de terres rares; propriétés et structure cristalline. *Bull. Minéral.* 111: 443-449.
- PIRET, P., DELIENS, M. & PIRET-MEUNIER, J. & GERMAIN, G., 1983.- La sayrite, $\text{Pb}_2[(\text{UO}_2)_5\text{O}_6(\text{OH})_2] \cdot 4\text{H}_2\text{O}$, nouveau minéral; propriétés et structure cristalline. *Bull. Minéral.* 106: 299-304.
- PIRET, P., PIRET-MEUNIER, J. & WATERS-STROOP, D., 1979a.- Structure of phuralumite. *Acta Crystallogr.* B35: 1880-1882.
- PIRET-MEUNIER, J. & PIRET, P., 1982.- Nouvelle détermination de la structure cristalline de la becquerelite. *Bull. Minéral.* 105: 606-610.
- POEVERLAIN, R., 1986.- Erzmineraleien vom Hopffeldboden. *Lapis*, 11: 19-20.
- POTDEVIN, H. & BRASSEUR, H., 1958.- Etude d'uranates minéraux et synthétiques. *Bull. Cl. Sci. Acad. roy. Belg.* 44: 874-912.
- PRATT, J.L. & BAYLISS, P., 1979.- Crystal-structure refinement of cattierite. *Z. Kristallogr.* 150: 160-167.
- PRINZ, M., KEIL, K., HLAVA, P.F., BERKLEY, J.F., GOMES, C.B. & CURVELLO, W.S., 1967.- Studies of Brazilian meteorites III. Origin and history of the Angra dos Reis achondrite. *Earth Planet. Sci. & Lett.* 35: 317-330.-
- PROTAS, J., 1957.- Propriétés et synthèse d'un oxyde hydraté d'uranium et de calcium de Shinkolobwe, Katanga. *C.R. Acad. Sci. Paris*, 244: 91-93.
- RAMDOHR, P., 1956.- Stilleit, ein neues Mineral, natürliches Zinkselenid von Shinkolobwe. *Geotekton. Symp.* 1956, 481-483.
- RAMDOHR, P., 1980.- *The Ore Minerals and their Intergrowths.* 2nd ed., 2 volumes, 1205 p. International Series in Earth Sciences 35, Pergamon Press, Toronto.
- RAZIN, L.B., RUDASHEVSKII, N.S. & VYAL'SOV, L.N., 1985.- [New metallic intermetallic compounds - khatyrkite CuAl_2 and cupalite CuAl and aluminides of zinc - from ultrabasic dunite-harzburgite formation.] *Zap. Vses. Minerlaog. Obshch.* 114: 90-100. [in Russian]
- REEVE, W.H., 1963.- The geology and mineral resources of Northern Rhodesia. *Bull. geol. Surv. N. Rhod.* 3: 1-213.
- RICE, C.M., 1955.- *Dictionary of Geological Terms (Exclusive of stratigraphic formations and paleontologic general and species).* 465 p. Edwards Bro., Ann Arbor.
- RILEY, J.F., 1980.- Ferroan carrollites, cobaltian violarites and other members of the linnæite group: $(\text{Co}, \text{Ni}, \text{Fe}, \text{Cu})_3\text{S}_4$. *Mineral. Mag.* 43
- ROBERTS, W.L., RAPP Jnr., G.R. & WEBER, J., 1990.- *Encyclopedia of Minerals.* 2nd edn. Van Nostrand Reinhold, New York, 979 p.
- ROSENZWEIG, A. & RYAN, R.R., 1975.- Refinement of the crystal structure of cuprosklodowskite $\text{Cu}[(\text{UO}_2)_2(\text{SiO}_3) \cdot (\text{OH})_2] \cdot 6\text{H}_2\text{O}$. *Am. Mineral.* 60: 448-453.

- ROSS, V., 1956.- Studies of uranium minerals (XXII): Synthetic calcium and lead uranyl phosphate minerals. *Am. Mineral.* 41: 915-926.
- ROUSE, R.C., DUNN, P.J. & PEACOR, D.R., 1982.- Mercury amidonitrate crystals from Colorado. *Mineral. Rec.* 13: 233-234.
- SAFIANNIKOFF, A., 1959.- Un nouveau minéral de niobium. *Bull. Acad. roy. Sci. d'Outre-mer (Bruxelles)* 5: 1251-1255.
- SAFIANNIKOFF, A. & Van WAMBEKE, L., 1961.- Sur un terme plombifère du groupe pyrochlore-microlite. *Bull. Soc. fr. Minéral. Cristallogr.* 84: 382-384.
- SAFIANNIKOFF, A. & Van WAMBEKE, L., 1961.- La pegmatite radioactive à beryl de Kobokobo et les autres venues pegmatitiques et filoniennes de la région de Kamituga, Rép. de Congo. *Mineral. Depos.* 2: 119-130.
- SAHAMA, Th. G., 1960.- Identity of calcium rinkite and götzenite. *Am. Mineral.* 45: 221-224.
- SAHAMA, Th. G. & HYTONEN, K., 1957a.- Götzenite and combeite, two new silicates from the Belgian Congo. *Mineral. Mag.* 31: 503-510.
- SAHAMA, Th. G. & HYTONEN, K., 1957b.- Kirschsteinite, a natural analogue of synthetic iron monticellite, from the Belgian Congo. *Mineral. Mag.* 31: 698-699.
- SAHAMA, Th. G. & HYTONEN, K., 1959.- Delhayelite, a new silicate from the Belgian Congo. *Mineral. Mag.* 32: 6-9.
- SAHAMA, Th. G. & SMITH, J.V., 1957c.- Tri-kalsilite, a new mineral. *Am. Mineral.* 42: 286.
- SAHAMA, Th. G., SAARI, E. & HYTONEN, K., 1966.- Relationship between götzenite and rosenbuschite. *C.R. Geol. Soc. Finland*, 38: 135-144.
- SAHAMA, Th. G., SIIVOLA, J. & REHTIJARVI, P., 1973.- Andremeyerite, a new barium iron silicate from Nyiragongo, Zaïre. *Bull. Geol. Soc. Finland*, 45: 1-8.
- SARP, H. & BERTRAND, J., 1985.- Gysinite, $Pb(Nd,La)(CO_3)_2(OH) \cdot H_2O$, a new lead, rare earth carbonate from Shinkolobwe and its relation to ancylite. *Am. Mineral.* 70: 1314-1317.
- SARP, H., BERTRAND, J. & DEFERNE, J., 1983.- New data on the lead, copper rare earth carbonate hydrate schuilingite from Shinkolobwe, Shaba, Zaïre. *Schweiz. Mineral. Petrogr. Mitt.* 63: 1-6 [in French].
- SAYAD EID, A. & KNORRING von, O., 1976.- Geochemical aspects of the tantalum mineral microlite from African pegmatites. *20th ann. Rep. res. Inst. afr. Geol., Univ. Leeds*: 56-68.
- SCHEBESTA, K., 1986.- Neue Mineralien vom Hopffeldboden im Obersulzbachtal. *Lapis*, 11: 9-18.
- SCHNEIDERHOHN, H., 1920.- Die erzlagerstätten des Otavi-berglandes, Deutsch-Sudwestafrika. *Metall und Erz, Halle a.d. S.* 17: 13-24.
- SCHOEP, A., 1921a.- La «curite» nouveau minéral radioactif de Kasolo, Katanga, Congo Belge. *C.R. Acad. Sci.* 173: 1186-1187.
- SCHOEP, A., 1921b.- Sur la kasolite, nouveau minéral radioactif. *C.R. Acad. Sci. Paris*, 173: 1476-1477.
- SCHOEP, A., 1922a.- Sur la dewindtite, nouveau minéral radioactif. *C.R. Acad. Sci. Paris*, 174: 623-625.
- SCHOEP, A., 1922b.- Sur la stasite, un minéral nouveau, dimorphe de la dewindtite. *C.R. Acad. Sci. Paris*, 174: 875-877.
- SCHOEP, A., 1922c.- Sur la soddite, nouveau minéral radioactif. *C.R. Acad. Sci.* 174: 1066-1067.
- SCHOEP, A., 1922d.- Sur la becquerelite, nouveau minéral radioactif. *C.R. Acad. Sci.* 174: 1240-1242.
- SCHOEP, A., 1923a.- Sur la parsonsite, nouveau minéral radioactif. *C.R. Acad. Sci.* 176: 171-173.
- SCHOEP, A., 1923b.- Sur la chinkolobwite, nouveau minéral uranifère. *Bull. Soc. belge Géol. Paléontol. Hydrol.* 33: 87-88.
- SCHOEP, A., 1923c.- Les minéraux uranifères (radioactifs) du Congo Belge: becquerelite, curite, soddyite, chinkolobwite, kasolite, dewindtite et parsonsite. *Bull. Soc. belge Géol. Paléontol. Hydrol.* 33: 169-197.
- SCHOEP, A., 1924a.- Sur la forme cristalline de la becquerelite et de la schoepite; sur leur composition chimique et sur le polymorphisme de l'hydroxyde d'uranium $UO_3 \cdot 2H_2O$. *Bull. Soc. chim. Belg.* 33: 88-95.
- SCHOEP, A., 1924b.- Becquerelite et schoepite. *Ann. Soc. géol. Belg.* 47: 147-157.
- SCHOEP, A., 1924c.- Recherches sur la becquerelite et sur la schoepite; mesures de cristaux, analyse chimique déshydratation. *Bull. Soc. minéral. France.* 47: 147-157.
- SCHOEP, A., 1924d.- Sur la composition chimique de la fourmarierite. *Bull. Soc. minéral. France.* 47: 157-162.
- SCHOEP, A., 1924e.- Sur la sklodowskite, nouveau minéral uranifère, ses analogies avec l'uranotile. *Bull. Soc. minéral. France.* 47: 162-172.
- SCHOEP, A., 1924f.- La sklodowskite, nouveau minéral radioactif. *C.R. Acad. Sci.* 179: 413-415.
- SCHOEP, A., 1924g.- La dumontite, nouveau minéral radioactif. *C.R. Acad. Sci.* 179: 693-695.
- SCHOEP, A., 1925a.- Sur la buttgenbachite, nouveau minéral (Congo belge). *C.R. Acad. Sci.* 181: 421-422.
- SCHOEP, A., 1925b.- Nouvelles recherches sur la dewindtite: birefringence, composition chimique et déshydratation de ce minéral. Comparaison avec la dumontite. *Bull. Soc. minéral. France.* 48: 77-85.
- SCHOEP, A., 1925c.- Over janthiniet, een nieuw uranium mineraal uit Katanga. *Natuurwet. Tijdschr.* 7: 97-99.
- SCHOEP, A., 1925d.- Sur la plancheite du Congo français et sur la shattuckite du Congo belge. Identité de composition chimique des deux minéraux. *Ann. Soc. géol. Belg.* 48: B178-B185.
- SCHOEP, A., 1925e.- Sur l'identité entre la chinkolobwite et la sklodowskite. *Ann. Soc. géol. Belg.* 48: B303-B306.
- SCHOEP, A., 1926a.- Sur l'ianthinite, nouveau minéral uranifère de Kasolo (Katanga). *Ann. Soc. géol. Belg.* 49: B188-B192.
- SCHOEP, A., 1926b.- Buttgenbachite et connellite. *Ann. Soc. géol. Belg.* 49: B308-B310.
- SCHOEP, A., 1926c.- Nouvelle observation sur l'ianthinite. *Ann. Soc. géol. Belg.* 49: B310-B312.
- SCHOEP, A., 1927.- Isomorfie van Sklodowskiet met Uranofaan. *Natuurwet. Tijdschr.* 9: 125-128.
- SCHOEP, A., 1928a.- La renardite, nouveau minéral uranifère provenant de la mine de Kasolo (Chinkolobwe, province du Katanga, Congo belge). *Bull. Soc. minéral. France.* 51: 247-252.
- SCHOEP, A., 1928b.- Over Julieniet, een nieuw mineraal. *Natuurwet. Tijdschr.* 10: 58-59.
- SCHOEP, A., 1930a.- Les minéraux du gîte uranifère du Katanga. *Ann. Mus. Congo belge*, 1: 1-42.
- SCHOEP, A., 1930b.- Sur la stainerite et sur un nouveau gisement de ce minéral. *Ann. Serv. Mines Com. Spec. Katanga* 1(2): 55-58.
- SCHOEP, A., 1930c.- Nouvelles recherches sur la plancheite et sur la schattuckite. Identité de ces deux minéraux. Remarques sur la bisbeeite et sur la katangite. *Soc. géol. Belg. (Livre jubilaire 1878-1928)* 1930: 375-393.
- SCHOEP, A., 1931.- Over kristallen van Julieniet. *Natuurwet. Tijdschr.* 13: 147-149.
- SCHOEP, A., 1932.- La vandenbrandeite, un nouveau minéral uranifère. *Ann. Mus. Congo belge.* 1(3): 25-31.
- SCHOEP, A. & BILLIET, V., 1934a.- Nouvelles recherches sur la julienite. *Bull. Soc. belge Géol. Paléontol. Hydrol.* 44: 300-302.
- SCHOEP, A. & BILLIET, V., 1934b.- Onderzoekingen over julieniet. *Natuurwet. Tijdschr.* 16: 41.
- SCHOEP, A. & CUVELIER, V. 1929.- Sur la stainerite (un hydroxyde cobaltique), nouveau minéral. *Bull. Soc. belge Géol. Paléontol. Hydrol.* 39: 74-82.
- SCHOEP, A. & STRADIOT, S., 1947.- Paraschoepite and epianthinite, two new uranium minerals from shinkolobwe, Belgian Congo. *Am. Mineral.* 32: 344-350.

- SCHOEP, A. & STRADIOT, S., 1948.- Additional data on the properties of becquerelite and billietite. *Am. Mineral.* 33: 503-507.
- SCHOEP, A., BORCHERT, W. & KOHLER, K., 1955.- La likasite, $Cu_{12}(OH)_{14}(NO_3)_4(PO_4)_2$, nouveau minéral. *Bull. Soc. fr. Minéral. Cristallogr.* 78: 83-88.
- SIDORENKO, G.A., MOROZ, I.Kh. & ZHIL'TSOVA, I.G., 1975.- [Crystal chemistry of uranyl silicates.] *Zap. Vses. Mineral. Obshch.* 104: 559-567. [in Russian]
- SIMPSON, E.S., 1910.- Pilbarite, a new mineral from the Pilbara goldfields, W.A., *Chem. News*, 102: 283-284.
- SOKOLOVA, P.B., GORSKAYA, M.G. & KRESTER, Yu.L., 1988.- [Zinc-bearing tourmaline from rare-metal pegmatites.] *Zap. Vses. Mineral. Obshch.* 117: 70-74. [in Russian]
- SPENCER, L.J., 1937. Fourteenth list of new mineral names. *Mineral. Mag.* 24: 601-628.
- STEPANOV, V.I., BUKANOV, V.V. & BYKOVA, V., 1982.- [Plumbomicrolite from amazonite pegmatite on Mount Ploskaya, a first find in the USSR.] *Dokl. Acad. Sci., USSR, Earth Sci. Sect.* 263: 130-132. [in Russian]
- STOHL, F.V. & SMITH, D.K., 1981.- The crystal chemistry of the uranyl silicate minerals. *Am. Mineral.* 66: 610-625.
- STRUNZ, B.H., SOHNKE, G. & GEIER, B.H., 1958a.- Stottit, ein neues Germaniummineral, und seine paragenes in Tsumeb. *Neues Jahrb. Mineral. Mh.* 85-96.
- STRUNZ, B.H., GEIER, B.H. & SEELIGER, E., 1958b.- Gallit, $CuGaS_2$, das erste selbständige Galliummineral, und seine verbreitung in den erzen der Tsumeb - und Kipushi mine. *Neues Jahrb. Mineral. Mh.* 241-264.
- SWEENER de, A., 1933.- Het stelsel $NaSCNCo(SCN)_2 \cdot 2H_2O$ in verband met Julieniet. *Natuurwet. Tijdschr.* 15: 14-17.
- THOREAU, J., 1928.- Le gisement Prince Léopold (Kipushi, Katanga). Etude des minéralisations de profondeur. *Mem. Inst. Géol. Univ. Louvain*, 4: 263-285.
- THOREAU, J., 1932.- L'uranolepidite, nouveau minéral uranifère de Shinkolobwe (Katanga). *Ann. Soc. géol. Belg.* Liège, 60: C3-C5.
- THOREAU, J., 1933.- L'uranolepidite, nouveau minéral uranifère de Shinkolobwe (Katanga). *Ann. Soc. géol. Belg.* 55: C3-C5.
- THOREAU, J., 1948.- Caractères cristallographiques de la billietite et la vandendriesscheite. *Bull. Soc. géol. Belg.* 71: 76-78.
- THOREAU, J., 1957.- Sur un minéral de la famille des 'dufenites' dans la pegmatite de Kobokobo (Congo belge). *Bull. Cl. Sci. Acad. roy. Belg.* 43: 705-710.
- THOREAU, J. & VAES, J.F., 1932.- La saléeite, nouveau minéral uranifère. *Bull. Soc. belge Géol. Paléontol. Hydrol.* 42: 96-99.
- THOREAU, J., MEERSSCHE van, M. & PROTAS, J., 1958.- Sur la dumontite de Shinkolobwe (Katanga). *Bull. Soc. fr. Minéral. Cristallogr.* 81: 63-65.
- TOUSSAINT, J. & BRASSEUR, H., 1959.- Sur la structure de quelques composés uranifères hydratés. *Bull. Cl. Sci. Acad. roy. Belg.* 45: 501-506.
- UNGEMACH, H., 1929.- Précisions cristallographiques sur quelques minéraux du Congo belge. *Ann. Soc. géol. Belg.* 52: C75-C85.
- VAES, J.F., 1947a.- Six nouveaux minéraux d'urane provenant de Shinkolobwe (Katanga). *Ann. Soc. géol. Belg.* 70: B212-B226.
- VAES, J.F., 1947b.- Quelques sulfures de Shinkolobwe. *Ann. Soc. géol. Belg.* 70: B227-B232.
- VAES, J.F., 1947c.- Description d'un nouveau minéral 'la schuilingite'. *Ann. Soc. géol. Belg.* 70: B233-B236.
- VAES, J.F., 1948a.- La renierite (anciennement appelée 'bornite orange'). Un sulfure germanifère provenant de la Mine Prince Léopold, Kipushi (Congo belge). *Ann. Soc. géol. Belg.* 72: B19-B32.
- VAES, J.F., 1948b.- Becquerelite ou billietite (A propos d'un article de M.M. Schoep et Stradiot). *Ann. Soc. géol. Belg.* 72: B793-B804.
- VAES, J.F., 1958.- Cousiniet, een nieuw uranmineraal. *Geol. en Mijnbouw*, 20: 449.
- VAES, J.F. & KERR, P.H., 1949.- Sengierite: a preliminary description. *Am. Mineral.* 34: 109-120.
- VARLAMOFF, N., 1947.- Anthoinite, nouveau tungstate hydrate d'alumine. *Ann. Soc. géol. Belg.* 70: B153-B166.
- VARLAMOFF, N., 1964.- Présence d'un minéral du groupe goyazite-gorceixite dans les concentrés des alluvions de certains affluents de la rivière Lowa, Maniema, Congo (ex-belge). *Bull. Acad. roy. Sci. Outre-Mer, Brussels*, 1964, 904-912.
- VERNADSKY, W. & CHAMIE, C., 1924.- Sur une pseudomorphose de la curite. *C.R. Acad. Sci.* 179: 1724.
- VOLOSHIN, A.V., MEN'SHIKOV, Yu.P. & PAKHOMOVSKY, Ya.A. 1984.- Sosedkoite, $(K,Na)_5Al_2(Ta,Nb,Sb)_{22}O_{60}$, a new mineral from granite pegmatite. *Dokl. Akad. Sci. USSR*, 264: 133-137.
- VOLOSHIN, A.V., MEN'SHIKOV, Yu.P., BAKHCHISARAITSEV, A.Yu. & DEVNINA, N.N., 1986.- [Cesplumtantite, a new caesium-lead tantalate from granite pegmatites]. *Mineral. Zh.* 8: 92-98. [in Russian with English abstr.].
- VUORELAINEN, Y. & HAKLI, A., 1964.- [On some new nickel minerals.] *Geologi (Helsinki)* 5: 53-56. [Finnish with English summary].
- WALENTA, K., 1974.- On studtite and its composition. *Am. Mineral.* 59: 166-171.
- WALENTA, K. & WIMMENAUER, W., 1961.- Der Mineralbestand des Michaelganges in Weiler bei Lahr (Schwarzwald). *Jahres. Geol. Landesamt. Baden-Wurtemberg*, 4: 7-37.
- WALKER, T.L., 1923.- Schoepite, a new uranium mineral from Kasolo, Belgian Congo. *Am. Mineral.* 8: 67-69.
- WAMBEKE van, L., 1957.- Etude préliminaire de la zone d'altération radioactive de la pegmatite de Kobokobo (Kivu). *Bull. Soc. belge Géol.* 66: 268-276.
- WAMBEKE van, L., 1958a.- Une nouvelle espèce minérale: la lusungite en provenance de la pegmatite de Kobokobo (Kivu - Congo belge). *Bull. Soc. belge Géol.* 67: 162-169.
- WAMBEKE van, L., 1958b.- Contribution à l'étude de la minéralisation radioactive de la pegmatite de Kobokobo et description d'une nouvelle espèce minérale radioactive de la série phosphuranylite-renardite: la kivuite. *Bull. Soc. belge Géol.* 67: 383-403.
- WAMBEKE van, L., 1958c.- Application of X-rays to the investigation of radioactive mineralizations. *Proc. 2nd. U.N. Intern. Conf. Peaceful Uses of Atomic Energy*, 3: 541-549.
- WAMBEKE van, L., 1965.- A study of some niobium-bearing minerals of the Lueshe carbonatite (Kivu, Republic of Congo). *Eurotom. Rep.* 2110e: 9-16.
- WAMBEKE van, L., 1967.- Etude de quelques venues radioactives des pegmatites du Congo et du Rwanda. *Bull. Soc. belge Géol.* 76: 7-26.
- WAMBEKE van, L., 1970.- Alteration processes of some of the complex titano-niobo-tantalates and their consequences. *Neues Jahrb. Mineral. Abh.* 112: 117-149.
- WAMBEKE van, L., 1971.- The problem of cation deficiencies in some phosphates due to alteration processes. *Am. Mineral.* 56: 1366-1384.
- WAMBEKE van, L., 1972.- Eylettersite, un nouveau phosphate de thorium appartenant à la série de la crandellite. *Bull. Soc. fr. minéral. Cristallogr.* 95: 98-105.
- WAMBEKE van, L., 1972.- Eylettersite, un nouveau phosphate de thorium appartenant à la série de la crandallite. *Bull. Soc. fr. minéral. Cristallogr.* 95: 98-105.
- WAMBEKE van, L., 1978.- Kalipyrochlore, a new mineral of the pyrochlore group. *Am. Mineral.* 63: 528-530.

WELLS, E.H. & PENFIELD, S.L., 1885.- Gerhardtite and artificial basic cupric nitrates. *Am. J.Sci.* 30: 50-57.

WILLIAMS, S.A., 1963.- Anthonyite and calumetite, two new minerals from the Michigan copper district. *Am. Mineral.* 48: 614-619.

WILLIAMS, S.A., 1982.- Theisite, a new mineral from Colorado. *Mineral. Mag.* 46: 49-50.

WILLIAMS, S.A., 1977.- Luethite, $\text{Cu}_2\text{Al}_2(\text{AsO}_4)_2(\text{OH})_4 \cdot \text{H}_2\text{O}$, a new mineral from Arizona, compared with chenevixite. *Mineral. Mag.* 41: 27-32.

YAKHONTOVA, L.K. & GRUDEV, A.P., 1980.- The problems of classifying natural cobalt hydroxides. *Mineral. Zh.* 2: 69-78.