

# Catalogue of Type Mineral Specimens (CTMS)

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The Catalogue of the Type Mineral Specimens (=CTMS) is an ongoing project of the IMA-Commission on Museums (CM). The idea to establish such a catalogue is relatively old, but it was on the M+M2 Meeting in Toronto 1992 when the CM decided to realize the present form of the CTMS, which now includes all valid mineral names, described before the year 2000. But also the new minerals described after 1999 will be included, approximately 60 per year.

## 1. Formal Definitions of Type Mineral Specimens

A fundamental problem is the designation of the type mineral specimens. There are 4 different definitions which must be known to understand the CTMS in the present form.

### 1.1. P.J. Dunn and J.A. Mandarino in: *Americ. Mineral.* (1987) 72, 1269-1270

**Holotype:** a single specimen (designated by the author) from which all the data for the original description were obtained. Where portions of such a specimen have been sent to other museums for preservation, the author will designate each of these as „part of the holotype“.

**Cotype:** specimens (designated by the author) as those used to obtain quantitative data for the original descriptions. Specimens examined only visually should not be considered cotypes.

**Neotype:** a specimen chosen by the author of a redefinition or re-examination of a species to represent the species when the holotype or cotypes can not be found. It must be shown that every attempt has been made to locate the originally described material. Neotypes can also be designated when examination of all holotypes and cotypes has shown that the definitive unitcell parameters and chemical composition can not be experimentally determined. All neotypes require the approval of the CNMMN of the IMA.

Both holotypes and cotypes are possible, and even advantageous, for a mineral species. The use of „holo“ here is to indicate that all the necessary data were obtained from the holotype specimen. If the author of a new mineral description chooses to designate additional samples as cotypes, this is permissible. Such cotypes are designated only if they were used to obtain quantitative, but not necessary, data. Thus, a mineral species may be represented by a holotype and one or more cotypes and/or neotypes.

**Comment** These formal definitions have been accepted 1987 by two IMA-Commissions, the CNMMN and the CM. They are valid for all new mineral descriptions after 1987 (and if possible also for descriptions before this time).

### 1.2. P.G. Embrey and M.H. Hey in: *Mineralogical Record* (1970) 1, 102-104.

**Holotype:** a single specimen selected by the author of a species as its type, or the only specimen known at the time of description.

**Cotypes** (more than one): specimens other than the type used in making the original description. Ideally, cotypes should be from the same locality.

**Metatype(s):** specimen(s) compared with the type by the author, and **determined** as co-specific with it.

**Ideotypes:** metatypes from a different locality.

**Plesiotype(s):** specimen(s) upon which subsequent or additional description is based. This may, in some instances, be a neotype.

**Neotype:** a plesiotype selected to represent the holotype when the holotype is lost or destroyed.

**Topotype:** a specimen from the original locality, and corresponding to the original description.

**Comment:** These definitions have been accepted by many curators after their publication. But the CM decided 1987 to use the terms no more in the sens of Embrey and Hey, especially the terms ideotype and topotype. On the other hand the terms metatype and plesiotype can or must be used sometimes discussing „old type specimens“.

**1.3. Pragmatic Definitions of I V Pekov** (1998, used for the type mineral specimens deposited in Russia). Published in: Igor V. Pekov: Minerals first discovered on the Territory of the former Soviet Union. - Lomonosov Moscow State University / Ocean Pictures, Moscow (1998). 369 pages.

**A Type specimen** is meant to be a studied specimen (piece, grain, polished section, etc.) of a new mineral from its Type Locality presented to a museum by the discoverer.

**Type specimens** may also include the material of revisional studies that confirms (Neotypes) or discredits (Nekrotype) the individuality of a mineral species in doubt.

**1.4. Pragmatic Definitions used for CTMS** (since 1990)

**Holo-, Co-, and Neotype:** based on the formal definitions of Dunn and Mandarino (1987). Abbreviations: HT, CT and NT.

**Cotype (cryst) and Cotype (chem.):** Cotypes for old, but good defined CT concerning the goniometrical measurements of a crystal (or crystals) or concerning a chemical analysis.

**Plesiotype:** based on the definition of Embrey and Hey (1970) with a designation before 1986 will accept for the CTMS.

**Type:** the „Type“ specimen is (only) very probably a „real“ type specimen (HT, CT or NT after Dunn and Mandarino, 1987), but at least it is a Metatype (MT, after Embrey and Hey, 1970). This definition includes also all designated type specimens by Pekov.

## 2. The Form of the CTMS

Fife „lines“ with fife different informations are foreseen for each mineral species in the CTMS. The significations of the fife lines will be explained by the following exemple.

1	4.FB.190	<b>Bernalite</b>	1992
2	Birch W D, Pring A, Reller A, Schmalte H W in: Naturwiss. (1992) 79, 509-511		
3	<b>Australia</b> - New South Wales, Broken Hill, Proprietary mine (upper levels) 31°58'S, 141°28'E		
4	AUS	SAM - Adelaide	CT
	MOV	- Melbourne	CT M40597
5	REM	Compare the same authors in: Am. Mineral. (1993) 78, 827-834	

- It begins with the **systematic chemical code** of the database of Hölzel: 4.FB means the mineral group „Trihydroxides“ [Bernalite = Fe(OH)<sub>3</sub>], 190 is a reference number
  - The **mineral name** and
  - the **year of the first publication** of this mineral name.
- The **bibliography** of the first description: the names of all authors and the reference in the scientific newspaper (or in a Textbook).
- The **Typelocality**: First the country, then the state, the area, the mine (and the geographical coordinates if possible).
- The **depositories** of the type specimens. There are two museums in Australia: the South Australian Museum (SAM) in Adelaide and the Museum of Victoria (MOV) in

Melbourne.

b. In both Museums are stored a Cotype-specimen of the new species.

c. From the Melbourne specimen is also recorded the register number of the species.

- 5 **Remark.** Here is a more detailed publication concerning the new mineral species recorded, which appeared a short time after the first one.

### Comments

The **typelocality** (=TL) is the finding place (point) of the new mineral species. Unfortunately it is rather impossible to define this place correctly (even the geographical coordinates, recorded in degrees and minutes correspond only approximately). For this reason it is desirable and conventional to designate the TL with a geographical terme, which includes the real finding place: an area, a village, a mountain, a mine, a quarry. We try to help the reader to find this TL on a map with the systematical notation of topographical terms, which correspond with the most important administrative areas, hierarchically ordered, around the TL. Exemples (succession of the geographical termes):

Argentina: Province, Department, village or town (or a bigger area), TL

France: Région, Département, etc., TL

Japan: Island, Prefecture, etc., TL

Sweden: Län (region), Kommun (area), village or town, TL

USA: State, County, then a bigger area (or a town nearby etc.), TL

### 3. The Collecting and Working up of the Basic Data

The collecting of basic data for the CTMS began in the 1980ies years by **Prof. H.J. Rösler** of the Mining Institute of Freiberg in the former German Democratic Republic. He sent about 2000 questionnaires in form of a postcard to the members of the „IMA-Commission on Museums“. The feed back of this inquiry (which was once repeated) was not bad but not sufficient. In 1986 H.J. Roesler presented a database with the first version of the CTMS.

For several reasons the CM decided 1992 in Toronto at the M+M2-Meeting to restart a **second version** of a CTMS, and decided to confer this duties upon the new created CM-Subcommission „CTMS“ (chairman: H.A. Stalder). Sporadically the Subcommission got back new filled out questionnaires. But in the meantime more and more curators began to catalogue systematically the type minerals of their own museums or institutes and they sent in their lists. These catalogues (today approx. 40) comprise the data from about ten to more than 600 type specimens (John S. White, NMNH, Washington). It was then possible and allowed from the author to use the book of I.V. Pekov („Minerals first discovered on the territory of the former Soviet Union“, 1998) with many useful informations for the CTMS.

- Later on the subcommission got from several institutes a second (or a third) revised list. A lot of corrections were and are necessary to do. Still today we get sometimes informations concerning new revised lists which will be send in - in a short time.
- In the newer publications concerning new mineral species are often - unfortunately not always - data concerning the stored type specimens. We try to pick them up all!

#### 3.1. The Country Lists of the Subcommission CTMS

The collected basic data were going first into the PC of H.A. Stalder, for each country separately, ordered alphabetically. We tried to write the names from the autors, the minerals, also the geographical terms correctly with all the necessary diacritics, what needed careful checks from the colleagues in the concerning countries (Scandinavia, Czech Republic, Romania etc.). In an additional list we accepted also minerals, which are not (or no more ) listed in Fleischer's Glossary of Mineral Species 1999 by J.A. Mandarino: discredited

minerals documented by type specimens, or varieties of petrographically signification as members of a solid solution. All the minerals, which were described first from a meteorite are recorded on an own list as well as in the appendix of the country lists, corresponding with the finding place of the respective meteorites. - This work is now complet in the main parts (an exception is the „CTMS of China“, which is only a first draft) - and it is the source of the statistical results given below.

### **3.2. MDAT-Lite of Alex Hölzel**

Since 10 years Alex. Hölzel, Ober-Olm near Mainz, Germany, the author of a „Systematics of Minerals“ and of the mineral database „MDAT-Lite“ is helping the Commission on Museums to establish the CTMS as a database. He printed 1994 some 100 copies of the first part of the CTMS; it was the list for Italy. The partnership with A. Hölzel was accepted and confirmed 1994 at the IMA-Meeting in Pisa by the members of the Commission on Museums. In his newest updated „MDAT-Lite 4.0“ (2002) with much possibilities for searching, is now for the first time the CTMS included: Here the minerals are ordered alphabetically from „Abelsonite to Zyaite“; but it is an older version than the one described above and it is a version with very few diacritics. For technical reasons it is not possible to introduce most of the diacritics in the database! (The members of the IMA-CM can order the „MDAT-Lite 4.0“ for 70 Euro by „MatIdent, Ulmenring 11, D-55270 Ober-Olm, Germany; normal price for commercial use = 176 Euro. E-mail address: [www.matident.com](http://www.matident.com)).

### **3.3. The published CTMS on the Web**

A very short time after the IMA-meeting 2002 in Edinburgh Anthony R. Kampf has designed a Web site for the IMA-Commission on Museums. It is currently posted as a subsite of the Society of Mineral Professionals Web site, to find at the E-mail address: [www.smmp.net/CM](http://www.smmp.net/CM). From „MDAT-Lite 4.0“ (2002) he took out the specific informations corresponding with the CTMS of the CM concerning the minerals, which are documented by type specimens,.

## **4. The Results**

### **4.1. Publications**

Early publications independently to the CM-project:

- 1983 Anonymous: Catalogue des espèces types et d'auteur du Musée de Minéralogie de l'Ecole Nationale Supérieure des Mines de Paris. BRGM, Orléans. 56 p. (incl. many „type specimens“ which have a lower status than HT, CT, or NT)
- 1983 Robert I Gait: Mineral Species from Canadian Type Localities, an annotated list. *Can. Min.* 21, 145-157
- 1989 E.W. Claffy and J.S. White: Described mineral specimens from Mexico in the U.S. National Museum of Natural History. *Boletín de Mineralogía* (1989) 4/1, 55-75
- 1992 H.J. Schubnel: Les types d'espèces minérales des premiers cristallographes. *Revue de Gemmologie*. Numéro hors série. 12 p.

Publications in connection with the CM-project:

- 1994 H.A. Stalder, C. Cipriani, A. Hölzel: Mineral Species first described from Italy and their Type Mineral Specimens. A.R. Hölzel, Ulmenring 11, D-55270 Ober-Olm, Germany). 57 p.
- 1995 M. Deliens and H.A. Stalder: Mineral species first described from Zaire and their Type Mineral Specimens. L'institut royal des Sciences naturelles de Belgique, Rue Vautier 29, B-1040 Bruxelles, Belgique. 29 p.
- 1996 G. Raade: Minerals originally described from Norway. Including notes on type material. *Bergwerksmuseum, Skrift nr. 11, Kongsberg* 1996. 107 p.
- 1998 I.V. Pekov: Minerals first discovered on the Territory of the former Soviet

- Union. Ocean Pictures, Moscow. 369 p. (independently publication)
- 2000 F.L. Sutherland, R.E Pogson, W.D. Birch, D.A. Henry, A. Pring, A.W.R. Bevan, H.A. Stalder, I.T. Graham. Mineral species first described from Australia and their type specimens. Austral. J. Mineral. 6, 104-128.
- 2002 Several other publications are in press or in preparation: Carpathian Region (by Gabor Papp), Canada, etc.

#### 4.2. The first described minerals

From where have been described the 3850 (approx.) valid mineral species known at the end of the last century, how much from all the countries, how many from each continent? The CTMS is able to give the answer.

#### Legend (for the two following tables)

1 = Amount of the descriptions of new mineral species

2 = The amount of the new species, documented by type specimens

3 = the same as 2 in percentage (%)

4 = total amount of type mineral specimens from the respective country

The statistics concern the valid mineral names at the end of 1999. In the case of a description of a new mineral species from two different countries, the mineral has been counted twice.

#### The continents

The origine of the new described minerals (end of 1999)

Continents	1	2	3
Europe (without Russia etc.)	1227	806	65.9 %
Russia and the former States of the Soviet Union	632	525	83.1 %
Africa	318	243	76.4 %
Asia (without Russia etc.)	250	171	68.4 %
Australia - Antarctica – Oceania	127	116	91.3 %
USA - Canada – Greenland	878	682	77.7 %
Latino-America	287	205	71.4 %
<i>Extraterrestrial Minerals (Meteorites, Moon)</i>	55	29	52.7 %
<i>Minerals without a defined Typelocality</i>	160	-	0 %
Total	3934	2777	

## The countries

The origine of the new described minerals (end of 1999)

Country	1	2	3	4	Country	1	2	3	4
USA	642	485	75.5	791	Bolivia	32	26	81.3	42
Russia	481	408	84.8	748	Finland	29	17	58.6	19
Germany	266	151	56.8	206	Tajikistan	27	18	66.7	31
Italy	199	136	68.3	203	Argentina	27	20	77.8	33
Canada	171	155	90.6	268	Greece	25	18	72.0	23
Sweden	157	115	73.2	181	Peru	21	15	71.4	21
Great Britain	108	63	58.3	104	Spain	20	14	70.0	32
Australia	106	90	84.9	153	Kyrgyzstan	20	16	80.0	31
Zaire	93	71	76.3	102	Uzbekistan	19	16	84.2	16
France	91	77	84.6	97	Belgium	16	15	93.8	20
China	86	36	41.9	41	India	16	8	50.0	13
Japan	81	71	87.7	116	Morocco	15	13	86.7	26
Czech Republic	76	46	60.5	64	Turkey	13	9	69.2	18
Chile	74	42	56.8	52	Ukraine	13	7	53.8	8
Namibia	70	58	82.9	120	Macedonia	12	11	91.7	27
Greenland	65	42	64.6	64	New Zealand	12	11	91.7	27
Mexico	65	53	81.5	99	Slovakia	12	2	18.2	2
Kasakhstan	62	53	85.5	82	Sri Lanka	10	8	80.0	16
South Africa	62	44	71.0	65	Antarctica	10	9	90.0	11
Norway	56	39	69.6	52	Portugal	9	7	77.8	14
Meteorites	49	22	44.9	25	Gabon	9	9	100.0	21
Switzerland	49	42	85.7	65	Madagascar	9	9	100.0	16
Brazil	40	30	75.0	55	El Salvador	8	7	87.5	12
Austria	36	16	44.4	39	Polen	8	8	100.0	9
Romania	33	15	45.5	24	Bulgaria	7	6	85.7	8

etc.

## Who was working on the CTMS ?

### Australia

F.L. Sutherland, R.E. Pogson and I.T. Graham, TAM, Sydney  
 W.D. Birch and D.A. Henry, MV, Melbourne  
 A. Pring, SAM, Adelaide  
 A.W.R. Bevan, WAM, Perth

### Austria

Gerhard Niedermayr and Vera Hammer, NHMW, Wien

### Belgium

M. Deliens, IRSNB - KBIN, Bruxelles

### Brazil

D. Atencio, Instituto de Geociências, Universidade de São Paulo

### Bulgaria

S. Petrussenko, NHMSo, Sofia

### Canada

Robert I. Gait and Robert A. Ramik, ROM, Toronto  
 Joel D. Grice, CMN, Ottawa  
 Geological Survey of Canada, GSC, Ottawa

**Czech Republic** J. Sejkora, NMCR, Praha  
**Denmark** Ole V. Petersen, GMK, Copenhagen  
**France** H-J. Schubnel and P.I. Chiappero, MNHN „Museum“, Paris  
 Ecole Nationale supérieure des Mines, ENSM, Paris  
**Germany** Susanne Herting-Agthe, IMK-TU, Berlin  
 Olaf Medenbach, MI-RU, Bochum  
 H.M. Hamm (†), MPIM, Bonn  
 H.J. Rösler, Fritz Hofmann and Andreas Massanek, TU-BA, Freiberg  
 Werner Quellmalz and Klaus Thalmann, MMG, Dresden  
 Kay U. Schürmann, MMM, Marburg  
 J. Keller, IMKU, Stuttgart  
**Great Britain** A.M. Clark, D.A. Smith, R.F. Symes, P.C. Tandy, A.D. Hart, and  
 J.P. Fuller (†). NHM, London  
 R.E. Bevins, NMW, Cardiff  
 S. Laurie, SM-UC, Cambridge  
 A. Livingston, NMS, Edinburgh  
**Hungary** Gabor Papp, HNHM, Buapest  
**Israel** S. Rothmann, DGHU, Jerusalem  
**Italy** Curcio Cipriani, MMUFI, Firenze  
 A. Guastoni and F. Pezzotta, MCSN, Milano  
**Japan** S. Matsubara, NSM, Tokyo  
**Netherlands** Peter Zwaan, National Museum of Natural History, Leiden  
**Norway** Gunnar Raade, MGMU, Oslo  
**Polen** Michail Sachanbinski and J. Bogdański, MMUWr, Wrocław  
**Portugal** A.M. Galopim de Carvalho, National Natural History Museum,  
 Lisboa  
**Romania** G. Udubasa and M. Jordan, MDUB, Budapest  
**Russia** Igor V. Pekov, Lomonosov Moscow State University, Moscow  
 Evgeny I. Semenov and Aleksandr A. Evseev, FMM, Moscow  
 Elena L. Minina, VGM, Moscow  
**South African Rep.** Museum of the Geological Survey, GSM, Pretoria  
**Spain** Rafael Arana, University of Murcia, Murcia  
 David Hospital Auladel, Barcelona  
**Sweden** Bengt Lindqvist, Dan Holtstam and Jörgen Langhof, SMNH,  
 Stockholm  
**Switzerland** Per Nysten, University of Uppsala, Uppsala  
 Stefan Graeser, NMBA and MPI, Basel  
 Hans Anton Stalder, NMBE, Bern  
 Halil Sarp, MHN, Genève  
 Nicolas Meisser, MGL, Lausanne  
 Walter Oberholzer, ETH, Zürich  
**USA** John S. White and X.X., NMNH, Washington  
 Carl Francis, HMM, Cambridge, Massachusetts  
 Anthony R. Kampf, LACMNH, Los Angeles  
  
 Alexander R. Hölzel, Ober-Olm, Germany  
**and many other curators and private persons**