

EMPIRICAL TYPES  
OF ORE MINERALIZATIONS  
IN THE BOHEMIAN MASSIF

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# Contents

Introduction . . . . .	11
Character of empirical types of ore mineralization in the Bohemian Massif . . . . .	15
Metamorphic stratiform Cu-Fe-(Pb-Zn) sulfide mineralization in the Monotonous Group of the Moldanubicum (type Bodenmais) . . . . .	15
Metamorphic W mineralization of greisen stockworks in orthogneisses and their mantle in the Moldanubicum (type Cetoraz) . . . . .	17
Metamorphic Fe deposits of the skarn type, associated with amphibolite and marble, or at the contact of marble with orthogneiss in the Moldanubicum (type Vlastějovice n. Sázavou) . . . . .	17
Metamorphic stratiform Pb-Zn sulfide mineralization in the Moldanubicum (type Český Šternberk-Malovidy) . . . . .	19
Metamorphic stratiform scheelite mineralization of the Moldanubian erlans (type Deštná) . . . . .	20
Metamorphic skarn Fe oxide and Cu sulfide mineralization in various crystalline rock series of the Bohemian Massif outside the region of the Moldanubicum proper (type Měděnec) . . . . .	21
Upper Proterozoic partly metamorphic stratiform pyrite mineralization of "black shales" (iron sulfide shales or alum shales) (type Hromnice) . . . . .	23
Upper Proterozoic partly metamorphic stratiform Mn carbonate and pyrite mineralization of "black shales" (type Chvaletice) . . . . .	26
Upper Proterozoic partly metamorphic stratiform Fe-Cu-Zn-Pb sulfide mineralization (type Újezd) . . . . .	28
Upper Proterozoic metamorphic stratiform barite mineralization (type Krhanice) . . . . .	30
Upper Proterozoic metamorphic stratiform Fe-V-U mineralization (Fe-U-V-Zn-Cu-Mo formation of Mrázek - Poucha 1976) (type Struhadlo) . . . . .	30
Upper Proterozoic metamorphic stratiform Fe silicites (type Blovice) . . . . .	32
Upper Proterozoic metamorphic stratiform scheelite mineralization in metatuffs (type Čelina - Mokrsko) . . . . .	32
Upper Proterozoic metamorphic stratiform Fe-Pb-Zn sulfide mineralization of the Lucicum (type Hrančičná) . . . . .	33
Intramagmatic ilmenite-magnetite and sulfide mineralization of basic and ultrabasic intrusive rocks (type Pocinovice) . . . . .	34
Upper Proterozoic to early Paleozoic metamorphic stratiform Fe oxide-sulfide and Cu sulfide mineralization of the Varied Group (type Čerčany) . . . . .	35
Upper Proterozoic or early Paleozoic metamorphic stratiform banded magnetite mineralization (type Švagrov) . . . . .	36
Disseminated and stockwork Mo sulfide mineralization of the Upper Proterozoic (?) (type Věstary) . . . . .	36
Disseminated Cu sulfide mineralization of Upper Proterozoic to early Paleozoic keratophyres (Maršovický vrch hill) . . . . .	37
Upper Proterozoic (?) stratiform or impregnated Sn oxide mineralization (type Nové Město pod Smrkem) . . . . .	37

Fissure-bound up to impregnated Mo sulfide mineralization of the Upper Proterozoic to Cambrian Brno massif (type Černá Hora) . . . . .	38
Cambrian magmatic liquidation Ni-Cu sulfide mineralization of basic-ultrabasic rocks (type Staré Ransko) . . . . .	39
Ni-Cu sulfide mineralization of altered pre-Devonian diabase dykes (type Sohland) . . . . .	41
Cambro—Lower Ordovician metamorphic stratiform Fe oxide mineralization (type Vráť) . . . . .	41
Cambro—Lower Ordovician metamorphic stratiform Fe-Cu sulfide mineralization (type Tisová) . . . . .	42
Ordovician stratiform Fe-Cu-Zn sulfide mineralization (type Kupferberg) . . . . .	44
Ordovician unmetamorphosed stratiform oolitic Fe oxide, carbonate, and silicate mineralization (type Ejovice) . . . . .	45
Impregnated to vein Hg sulfide mineralization in mostly Ordovician (volcanic) sedimentary rocks (type Dědova hora hill) . . . . .	47
Silurian or Devonian (?) metamorphic stratiform Fe-Cu sulfide mineralization (type Wieściszowice) . . . . .	48
Early Paleozoic stratiform or disseminated pyrite mineralization of porphyroids (type Lukavice) . . . . .	49
Early Paleozoic disseminated Fe-Cu-Zn sulfide mineralization in mylonites, or stratiform mineralization of xenoliths (type Včelákov) . . . . .	49
Devonian metamorphic stratiform Fe-Cu-Zn-Pb-(Au) sulfide mineralization (type Zlaté Hory) . . . . .	50
Devonian metamorphic stratiform Fe-Zn-Pb-(Ag) sulfide mineralization (type Horní Město) . . . . .	54
Middle to Upper Devonian stratiform Fe oxide and silicate mineralization of the Lahn-Dill type (type Medlov) . . . . .	56
Devonian to Carboniferous vein or strata-bound Fe-Zn sulfide mineralization in the altered spilite and tuff zone (type Hlásnice) . . . . .	57
Devonian to Carboniferous metamorphic stockwork or vein Au mineralization, partly overlapping the Devonian metamorphic stratiform Fe-Zn-Pb-Cu sulfide mineralization (type Zlaté Hory-West) . . . . .	58
Devonian to Lower Carboniferous (?) stratiform or disseminated Fe-Cu-Mo sulfide mineralization (type Vidly) . . . . .	59
Post-Silurian or pre-Upper Permian stratiform Fe oxide skarn mineralization (boreholes at Ryczów) . . . . .	60
Post-Silurian or pre-Upper Permian Au-Te mineralization in skarns (boreholes at Ryczów) . . . . .	61
Post-Silurian or pre-Upper Permian contact metasomatic or vein Fe-Zn-Cu-Pb-Bi-Ag-Te mineralization (boreholes at Zawiercie) . . . . .	62
Devonian to Lower Carboniferous metamorphogenic Au mineralization in the Moldanubicum (type Kašperské Hory) . . . . .	62
Devonian or Carboniferous bedded or vein siderite mineralization of Upper Proterozoic carbonate rocks (type Arzberg) . . . . .	64
Upper Devonian to Lower Carboniferous Au vein or stockwork mineralization (type Hřlové u Prahy) . . . . .	64
Lower Carboniferous Au vein and stockwork mineralization of "black shales" (type Suchá Rudná) . . . . .	68
Lower Carboniferous (?) metamorphogenic Au stockwork mineralization in pre-Devonian metamorphic rocks (type Zlatý Chlum) . . . . .	69

Lower Carboniferous (?) disseminated Au and As sulfide mineralization (type Zloty Stok) . . . . .	70
Lower Carboniferous (?) Sb sulfide vein mineralization in the Saxo-Thuringicum (type Schleiz) . . . . .	71
Massive partly metamorphic Zn-(Cu) sulfide mineralization in basic intrusives (type Staré Ransko) . . . . .	73
Carboniferous metamorphic stratiform barite Fe-Zn-Pb sulfide mineralization of a mylonite zone (type Křižanovice) . . . . .	74
Disseminated Mo-Cu sulfide mineralization in Upper Devonian to Lower Carboniferous intrusive rocks (type Dolní Heřmánky) . . . . .	75
Au-(Pd, Ag) mineralization of fault zones in metamorphosed Paleozoic rocks (type Svoboda nad Úpou) . . . . .	76
Carboniferous (?) polymetallic sulfide vein mineralization, mostly transecting stratiform sulfide deposits (type deposit Bayerland) . . . . .	77
Upper Carboniferous or Permian disseminated or stockwork porphyry Cu-Mo sulfide mineralization (type Myszków) . . . . .	78
Upper Carboniferous skarn Fe oxide mineralization, in part with Cu sulfides (type Pöhl) . . . . .	78
Upper Carboniferous W-Sn oxide vein mineralization (type Pechtelsgrün) . . . . .	79
Upper Carboniferous Mo sulfide greisen mineralization (type Nebelstein Mt.) . . . . .	81
Upper Carboniferous erlan (or skarn) scheelite mineralization (type Göpfersgrün) . . . . .	81
Upper Carboniferous Mo sulfide vein or stockwork mineralization (type Hürky near Čistá) . . . . .	82
Upper Carboniferous (?) Au vein or stockwork mineralization (type Roudný) . . . . .	93
Upper Carboniferous or Permian limnic strata-bound Cu sulfide and carbonate mineralization (type Horní Verneřovice) . . . . .	85
Upper Carboniferous to Lower Permian stratiform U mineralization of coal basins (type Jedomělice) . . . . .	86
Upper Carboniferous stratiform bauxite mineralization (type Nowa Ruda) . . . . .	87
Upper Carboniferous to Permian strata-bound Au mineralization (type Křivce) . . . . .	88
Upper Carboniferous or Permian strata-bound up to stockwork skarn Fe-Sn-Pb-Zn-Cu oxide and sulfide mineralization (type Breitenbrunn) . . . . .	88
Upper-Carboniferous or Permian pseudo-stratiform Sn oxide mineralization in melanomylonite of the "felsite horizon" (type Grossschirma) . . . . .	90
Lower Permian Sn-W oxide stockwork and greisen mineralization (type Cfnovec - Altenberg) . . . . .	92
Lower Permian vein to vein zone Fe-Zn-Pb-Ag-(Cu) sulfide mineralization (type Kutná Hora and the kb+eb Erzformation of Freiberg) . . . . .	96
Lower Permian (?) vein quartz-fluorite mineralization of the Moldanubicum (type Kožlí) . . . . .	98
Lower Permian vein, exceptionally metasomatic, Fe sulfide-poor Pb-Zn-Cu-Ag sulfide mineralization (type Ratibořské Hory) . . . . .	99
Lower Permian (?) Sb sulfide vein mineralization (type Milešov) . . . . .	102
Lower Permian vein, exceptionally stockwork uraninite mineralization (Příbram - Jáchymov) . . . . .	104
Lower Permian post-uranium vein mineralization with selenides, sulfides, arsenides, etc. (type Bukov) . . . . .	107
Permian (?) Fe-Mn oxide vein mineralization (type Ilmenau) . . . . .	108
Upper Permian fluorite-paradoxite-illite-quartz vein mineralization (type Schönbrunn) . . . . .	109

Permian or Triassic (?) coffinite-uraninite-brannerite mineralization of tectonic zones associated with silicate metasomatism (type Zadní Chodov - Höhensteinweg) . . . . .	111
Lower Permian limnic strata-bound Cu-sulfide mineralization of "black shales" (type Okrzeszyn) . . . . .	113
Upper Permian strata-bound Cu sulfide mineralization of "black shales" of marine environment (type Lubín) . . . . .	113
Pre-Cretaceous lateritic Fe-Al oxide mineralization (type Lukavice) . . . . .	115
Triassic (?) Pb-Zn sulfide vein mineralization (type Střbro) . . . . .	115
Triassic (?) hematite-barite vein mineralization (type Ruhla) . . . . .	118
Triassic to Jurassic fluorite-barite vein mineralization (type Harrachov - Halsbrücke - Nabburg) . . . . .	119
Triassic to Tertiary stratiform Zn-Pb sulfide mineralization of Middle Triassic dolomites of Upper Silesia (type Olkusz) . . . . .	125
Post-Permian (?) Cu sulfide vein mineralization (type Mutěňín) . . . . .	127
Upper Cretaceous to Oligocene U mineralization of weathered rocks of the crystalline complex (type Fojtov) . . . . .	128
Upper Cretaceous to Oligocene Fe hydroxide-Ni hydrosilicate mineralization of weathered ultrabasic rocks (type Szklary) . . . . .	129
Upper Cretaceous to Miocene peneconcordant U-Zr oxide mineralization of basal Upper Cretaceous psammites (type Hamr) . . . . .	130
Tertiary strata-bound U mineralization of the Tertiary North Bohemian Basins (type Hroznětín) . . . . .	132
Tertiary strata-bound Ti-Al oxide mineralization in Tertiary basins (type Most-Bílina) . . . . .	133
Mesozoic or Tertiary vein Ag-As-Bi-Co-Ni mineralization (type Jáchymov - Schneeberg) . . . . .	134
Mesozoic or Tertiary vein Ag-Sb-As sulfide mineralization (type Jáchymov - Aue) . . . . .	136
Tertiary to subrecent metasomatic and vein fluorite-barite mineralization (type Jílové near Děčín and Teplice) . . . . .	137
Tertiary vein Pb-Zn-Cu mineralization (type Roztoky nad Labem) . . . . .	138
Tertiary clastic Sn oxide mineralization of lacustrine and fluvial sediments (type Ryžovna near Boží Dar) . . . . .	139
Quaternary clastic Sn-W oxide mineralization of fluvial sediments (type river Ohře) . . . . .	140
Quaternary clastic Au mineralization of fluvial sediments and of glacial and glaciofluvial sediments (type Zlaté Hory) . . . . .	141
Less important ore mineralizations of the Bohemian Massif . . . . .	142
References . . . . .	149
Index . . . . .	173

## Introduction

The Bohemian Massif as a structural geological unit of Central Europe has an intricate metallogeny ensuing from an extremely varied development of the ore mineralizations in dependence on the geologic and metallogenic processes since the Proterozoic till the Quaternary.

This variety of the mineralizations and their wealth has attracted since long ago not only the interest of prospectors and miners, but also of professional geologists striving for the answer to questions about the regularities controlling the distribution of these varied mineralization types and their history.

Already since Agricola, man has endeavoured to gain a deeper knowledge of the character of the ore mineralizations and attempts were made at their classification. These include the classification of the ore formations ("Niederlagen") of the Freiberg ore veins by Werner (1791) and later by Müller (1901), of the parageneses of the Krušné hory-Erzgebirge mineralizations by Breithaupt (1849), of the paragenetic generations of the Pířbram veins by Reuss (1861) and Babánek (1875). These attempts have continued even later on and they have been based on the results of modern methods, such as detailed knowledge of the chemical and isotopic composition of the minerals, of the character of fluid in inclusions, and of the geochronological model age of the mineralizations. Of the main modern formational and paragenetic classifications in the Bohemian Massif, mention must be made in particular of the works by Oelsner (1952) and Baumann (1958, 1965 and subsequent) in relation to Saxony, Bernard (1967) and Bernard et al. (1981) for the Czech part of the Bohemian Massif, Harańczyk (1980, 1985) for the Polish part of the Bohemian Massif, and by Dill (1985) for the Bavarian part. The manner of classification differs according to the approach of the individual authors to the given problem.

Such classifications of ore deposits are lately in the main rejected by many economic geologists, often even of renowned names, who emphasize the individuality of each ore deposit, of each ore district. This approach characterizes in particular the Anglo-Saxon literature and workers all over the world, who are influenced by this literature. They emphasize the local effects which control the zonality of the individual deposits in actual sections, in which often only a part of the deposit not



affected by erosion is preserved. The diversity of the neighbouring rocks affects a varied development of the deposits from identical fluids. Moreover, a certain specialization of magmatic sources, from one massif to another, may also partly change the character of the deposits of one and the same provenience.

Yet their arguments are only partly valid. If in this kind of works not one, but a great many deposits are treated, then such authors are either compelled to make a classification (which is often rather primitive), or the result are chaotic works full of vaguenesses.

It can, however, not be denied that the grouping of stratiform or strata-bound deposits and deposits of irregular mineralizations into clearly defined types is rather difficult owing to the changing geoenvironment which differs lithologically, stratigraphically, and in the grade of metamorphism. For this reason, the deposits of a given characteristic are in this work often treated separately, even though in many instances they presumably represent a product of an identical or similar process. The polymetallic stratiform metamorphic deposits of the Silesicum may serve as an example.

Of a contrary character are some types of epigenetic, especially vein mineralizations; thus, e.g., the Lower Permian vein or stockwork Fe-Zn-Pb-Ag-(Cu) sulfide mineralization of the Kutná Hora type, regardless of the geological environment in which it is developed, has a very close character of form and material composition as well as temporal and spatial relationship to the middle Variscan granites in the whole Bohemian Massif; the assignment of all localities to a single genetic type of mineralization is without any problem since the mineralization is little dependent on the immediate geoenvironment.

On presenting the characteristics of the individual types of the ore mineralizations occurring in the Bohemian Massif, the author's aim has been to achieve the maximal possible objectivity — the separation of facts from interpretations and models. Thus the characteristics of the mineralizations include first the following data:

*Designation:* The seemingly unpractical long names of the types of ore mineralizations include the age of the mineralization, its morphological form, and designation according to the main metal (metals) or mineral, and the form of their bond (oxidic, sulfidic, etc.). The most dubious is the question of the age of the mineralization which has been specified according to the accuracy of determination. The age of the mineralization has been determined either on the basis of geochronological methods, or according to biostratigraphy, lithostratigraphy, or by analogy, yet it is often problematic. For metallogenic purposes, however, the age, even within a wide range, cannot be omitted in the designation of any

mineralization. Where the protore to the respective mineralization is known or presumed, it is given under the genetic conceptions.

*Geology:* It includes the description of the immediate geological environment around the deposit, the metamorphic grade of the rocks as well as the spatial relations of the mineralization to magmatic bodies even in wider surroundings, or to geophysical anomalies.

*Deposits:* It includes the description of the character of the ore deposits and indices, i.e. the shape and size of the ore bodies, the mode of emplacement, the main ore and gangue components, the metal content; some of the most significant ore districts or deposits are more closely characterized. Finally, the existing formational, paragenetic, and other assignments are mentioned.

*Characteristic minerals:* include also typical accessories.

*Genetic conception:* It includes data on the genetic conception of the mineralization types. The individual, often contradictory genetic conceptions and models are very briefly explained, and/or the author's view on their validity is presented in some cases.

*Practical significance:* It includes data on the economic significance of the mineralization type, the period of exploitation, prospecting, the present state of works, the prospectivity of the mineralization type, or future possibilities of mining, and on the ore reserves.

The paper is supplemented by a list of the works cited, which should also include the most important literary data. The main purpose of this list is to quote papers which can be utilized in the presented classification of the ore mineralizations. Unpublished or publicly inaccessible reports are limited to an inevitable minimum.

The relatively long designations of the individual ore mineralizations lead to considerations on the suitability of a system of symbols. Such systems proved useful in the designations of the ore formations in Saxony, of the isogenic mineral associations in the Czech part of the Bohemian Massif, and similar systems in the French literature [Vosges, Massif Central, Massif Armoricaín], and in the Spanish literature [Hesperical Massif].

The presented proposal of the classification of all types of ore mineralizations occurring on the territory of the whole of the Bohemian Massif is the first of its kind. It is intended for the purposes of correlation of identical or similar mineralizations occurring on the territory of five states, where the Bohemian Massif is located.

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