BANSKÁ ŠTIAVNICA MOUNTAINS: A CLASSICAL EUROPEAN MINING AND MINERALOGICAL REGION

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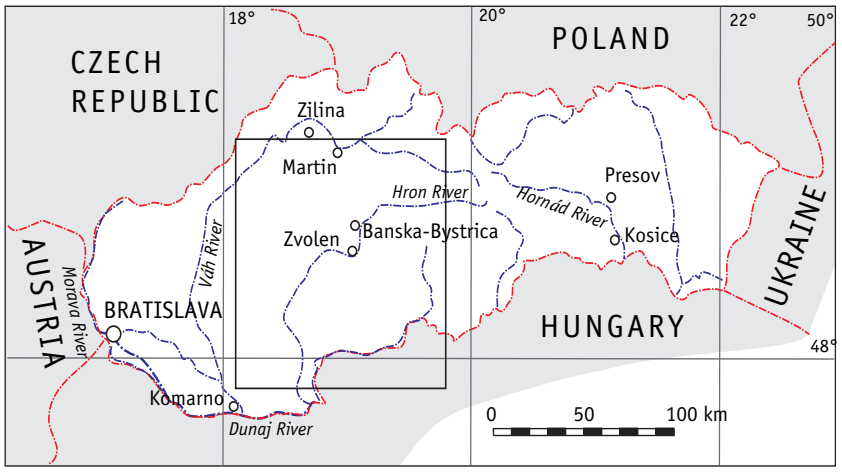
Photo: Albert Russ.

What was once an important mining region in Europe, today remains a legendary geological and historic attraction for many people. Banská Štiavnica certainly holds something special for everyone. For most tourists and casual collectors Banská Štiavnica is an attractive tourist destination with a monastery and a historic town center surrounded by relatively anonymous mountains. However, these surrounding mountains, natural vistas and underground systems of which some are still rich in minerals, offer much more than what one can find in a general guide book. Admittedly the vast majority of these secret spots and localities remain inaccessible to the general public but like elsewhere in the world but there is always room for some additional exploration. Of course many would disagree. There are dubious local laws which officially prohibit mineral collecting and there are obvious safety and legal issues regarding mine exploration. The aim of this article is to provide a brief overview of the famous Banská Štiavnica region and to suggest that despite many obstacles and challenges, the region is still capable of producing fine mineral specimens.

Regional Overview

The Banská Štiavnica Mountains are the inner part of the Western Carpathians, located in the south-central portion of Slovakia. They stretch about 30 km from the Hron River to the west to the neighboring Javorie in the east and almost 40 km from the Hron River near Žiar nad Hronom to the south of Pukanec. The highest peak in the region is Sitno (1009 m). The Banská Štiavnica town center is about 170 km



1. The Banská Štiavnica settings.

7. **Calcite** from Banská Štiavnica.
The specimen is 9 cm tall.
Collection: Michal Krupa.

8. The largest known **amethyst** crystal ever found in the former Czechoslovakia. The 17 cm tall crystal was found in the Rozália mine, Hodruša.
Collection: Miroslav Zeman.

9. **Aragonite** *var. flos ferri* from a medieval shaft in Hodruša. The specimen is 7 cm tall.
Private collection.

Mineralogy

In total, there are approximately 140 mineral species and varieties confirmed. Only some of these mineral species and varieties develop crystals of sufficient size and aesthetics to be considered interesting for most collectors. Some species available only in microscopic forms are still significant to scientists. Among the most important classical ones are the common ore minerals which include chalcopyrite, galena, sphalerite and pyrite, common carbonates including calcite, manganoan calcite and rhodochrosite. An association of ore minerals with quartz, calcite or manganoan calcite is typical for the region. Because the hydrothermal mineral paragenesis is similar to the well-known localities of Baia Sprie and Cavnic in Romania, many mineral associations and specimens are rather similar and sometimes difficult to distinguish.

Although Banská Štiavnica has never mined minerals officially or on a commercial scale, the occurrence of minerals was a subject of study of many researchers in the past. G.A. Scopoli, in his work "*Crystallographia Hungarica"* (dating to 1776), used sketches to describe crystal forms with the most emphasis on scepter quartz. His scepter sketches are of significant precision and are among the first documentation of minerals found in Slovakia.

Quartz is the most common non-ore mineral and perhaps also the most common mineral throughout the district. It is the most frequent mineral in the ore veins of the Banská Štiavnica and Hodruša mining district. Various quartz varieties and subtypes are often associated with crystals of dolomite, calcite, gypsum, barite, sphalerite, galena, chalcopyrite and pyrite. As a species it used to be regarded as waste material except for the dark purple amethyst, which was greatly valued since Medieval times. In fact amethyst and scepter quartz are the most famous and iconic mineral varieties of the region.

There are many forms, varieties and crystallization habits of quartz within the region. One of the most famous varieties is ***amethyst***, which can be dark purple, sometimes with a reddish overtone and usually with a skeletal habit. Before the great discoveries in Brazil and Uruguay, Banská Štiavnica amethyst was highly valued in Europe due to its intense color saturation. Even today its value and demand among collectors is very high and finer specimens fetch very high prices. Most historical amethyst specimens with labels originate from the Emil shaft. Sources for beautiful amethyst included the Michal, Maximillian and Pacher shafts. Historical mines presumably still guard some amethyst but these mines are currently inaccessible and flooded.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14. The most famous Banská Štiavnica specimen featuring well developed pale **amethyst** sceptered crystals on matrix. The two scepters are 6 cm tall. Collection: National Museum of Prague.

15. **Quartz** (*var. rock crystal)* from the Šobov quarry. Crystals are up to 5 cm long. The specimen was collected by the Hesoun brothers in 2007. Private collection.

13. A classical **amethyst** specimen of deep purple with reddish overtones from the Emil shaft, Banská Štiavnica. The specimen is 12 x 10 cm. Private collection.

16. **Quartz** crystal on matrix from the Terézia adit. The crystal is 10 cm long. Collection: Radoslav Drexler.

17. Skeletal **quartz** crystal found in the Bieber vein in 2014. The crystal is 8 cm long. Collection: Norman Kališek.

23. "Rainbow" **calcite** from the 12th Level of the Nová shaft. The specimen is 6 cm across. Collection: Albert Russ.

24. A very unusual specimen of greenish blue **calcite** and **siderite** on quartz from Banská Štiavnica. Field of view: 5 cm. Collection: Albert Russ.

25. **Aragonite** *var. mine/cave pearls*. From a shaft in Hodruša. Field of view: 7 cm. Private collection.

26. Typical **calcite** from the 8th Level of the Michal shaft. The specimen is 8 cm across. Private collection.

27. Classical botryoidal **calcite** on contrasting matrix. The specimen is 8 cm across. Private collection.

28. **Rhodochrosite** on quartz from Banská Štiavnica. The orange-brown shade is likely due to the presence of iron.
The specimen is 8 cm high.
Private collection.

29. A fine **rhodochrosite** from Banská Štiavnica. The specimen is 10 cm across. Collection: Ladislav Turecký.

Dolomite consists of characteristic crystalline crusts or botryoidally combined rhombs of a pearl color on quartz or other minerals. Some of the most aesthetic dolomite specimens came from the Terezia vein but nice dolomites were also found in Vyhne in the Anton adit where they grew on amethyst, quartz as well as calcite.

Rhodochrosite is a relatively common mineral in Banská Štiavnica and Hodruša. It forms pink crystalline aggregates or tiny rhombohedral crystals together with other carbonates.
Rhodochrosite is typical, especially in upper parts of the Terézia vein. Most often it was associated with barite, dolomite and calcite but it also formed crusts on amethyst crystals.

Barite is one of the most known and abundant mineral species in the region. Thin or thick tabular crystals and aggregates of barite from the Banská Štiavnica ore veins are considered the best in Slovakia. In aggregates, barite crystals form structures resem-

30. **Barite** cluster from Banská Štiavnica.
The specimen is 30 cm across.
Collection: Martin Števko.

crystals up to 1.3 cm were found in quartz cavities sometimes associated with carbonates and sulphides. The associated native silver was found in the form of hair or wire aggregates, however rarely in collectible sizes. Very nice aggregates of silver wires were found in the Terézia vein in 1854. Sulphosalts of silver such as polybasite, pearceite, stephanite, pyrargyrite and proustite were common in porous vein-bearing near-surface areas of the following Hodruša veins: Finsterort, Schöpfer, Colloredo, Brenner, Mikuláš and Alžbeta. These sulphosalts were associated with chalcopyrite, pyrite, rhodochrosite and sometimes with argentite and sphalerite. **Stromeyerite**, **mckinstryite** and further deeper silver selenide **naumannite**. The tellurides **hessite** and **petzite** were identified more recently.

Gold, or electrum, was found mostly in the form of microscopic inclusions in sulphides and in quartz. Fibrous and wire gold was found associated with sphalerite in the Špitaler vein in the Pacher adit in the 19th century. Recently, gold was found by Radoslav Drexler in microscopic wires in greenish-yellow sphalerite in the village Štiavnické Bane. **Tennantite**, **Ag-tetrahedrite** and **freibergite** (only in microscopic grains in sulphides) were less common. On rare occasions there were finds of **cinnabarite**, **realgar**, **bournonite**, **plumosite**, **jamesonite**, **arsenopyrite**, **hemimorphite**, **pyrrhotite** and others.

Occasional uranium mineralization was represented mostly by **coffinite**; a **uraninite** has also been documented.

Secondary Minerals in Mines

The oxidation zone is only slightly developed in most veins and is inaccessible. **Limonite** was the most common oxide, while **cerusite**, **anglesite**, **wulfenite**, **pyromorphite**, **malachite** and others were also found. Limonite, **gypsum** and, rarely, **chalcantite**, **melanterite**, **goslarite**, **diadochite** and **jarosite** are found on mine walls. Gypsum is relatively common as a secondary mineral on mine walls but is not collectible in this form. Several finds of columnar gypsum crystals were made in the Spitaler vein in the Pacher adit, with crystals up to 15 cm in length. Specimens of gypsum with collectible crystals were also found in the Klinger adit several years ago.

An association of the oxy-hydroxides **Mn-** and **Fe-todorokite**, **cryptomelane**, **pyrolusite** and **coronadite** was recently found in these southern near-surface parts of the Terézia vein

42. **Pyrargyrite** crystals on matrix from Banská Štiavnica. The specimen is 9 cm tall. Collection: Martin Števko.

43. **Epsomite*** from the Schopfer mine, Hodruša. The aggregates are up to 4 cm long. Collection: Peter Cagáň.

* – Diagnostics of this mineral as epsomite is doubtful – *Editor's note*.

44. **Gypsum** crystals photographed *in situ*. The aggregates were found in the Starovšechsvätých mine, Hodruša. Field of view: 3 cm.

(Piarg) which represent the oxidation zone. These minerals were created from the decomposition of primary Mn minerals (rhodochrosite, manganoan calcite, rhodonite) with a likely participation of microorganisms. These mineral aggregates consist of silvery gray crusts up to 3 cm thick and they fill vacant space between skeletal quartz crystals. The crusts found associated with skeletal quartz from the Bieber vein occasionally resembled silver wires. Specimens were often treated with hydrochloric acid in order to remove these crusts which resulted in the liberation of chlorine gas due to the presence of Mn^{4+}. A varied association of water soluble sulphates of Fe, Al and Mg evolved on the Grüner vein with the influence of a hotspring. Several exotic mineral species were described, such as **voltaite**, **copiapite**, **coquimbite** and **quenstedtite**, before the adit was flooded. The vast Banská Štiavnica system consists of some areas where even aesthetic minerals develop under the right conditions. Most frequently these areas can be found in the Hodruša mines but also elsewhere in the Banská Štiavnica mining district. The most aesthetic secondary minerals of Hodruša but also Štiavnica include **gypsum**, **aragonite** (aragonite aggregates, varieties flos ferri and mine/cave pearls) and **epsomite**. Mines which were untouched for hundreds of years had enough time for collector quality aragonite var. flos ferri to form. The largest flos ferri formations may be up to a few cm in thickness and cover larger areas. Unfortunately, almost all accessible flos ferri formations of any aesthetics were already removed by (not only) local collectors. Pools with mine/cave pearls are still possible to see but are also attracting the attention of collectors. Unlike flos ferri, these formations develop in a shorter time.

Gypsum crystals on the walls of many mines grow in small crystals, rarely exceeding 1 cm and are sometimes associated with epsomite.

Epsomite can grow in fibers up to 10 cm long but is very unstable and vulnerable to slight moisture/temperature changes. Some of the most spectacular epsomite formations were found in the Starovšechsvätých mine in Hodruša. Because there were some changes made in the mine ventilation, the wind direction switched and epsomite disappeared from the most abundant areas.

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