From the Dark Forest to the Ore Mountains, the Geology and History of the Erzgebirge

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The symposium is organized each year by the Mineral Museum at the New Mexico Bureau of Geology & Mineral Resources.

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From the Dark Forest to the Ore Mountains, the Geology and History of the Erzgebirge

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From 1156 to 1162, Markgraf Otto von Meißen had areas of the Mircwidu (Dark Forest) cleared in order to establish the Altzelle Monastery and several farming villages. According to legend, not long after this, members of a trading caravan noticed a shiny rock had been turned over by one of their wagon wheels. When this proved to be silver, the news spread quickly and a rush of people flooded the region in what is known as the First Berggeschrey (or Berggeschrei), roughly translated as “mining shout” or “mining clamor”. Silver proved to be one of the many important minerals mined from what would become known as the Erzgebirge, or Ore Mountains.

Wire silver, calcite, and acanthite, Freiberg, Saxony, Erzgebirgskreis, Germany. 9.4 cm tall. Irv Brown specimen. Jeff Scovil photo.

The Erzgebirge stretch for about 150 km along the border between Germany and the Czech Republic, where they are called Krušné hory. Covering a total area of around 5400 km^2, they rise to their highest point of 1244 m at Keilberg. Prior to deforestation due to the growth of the mining industry, the mountains were covered by a dense forest of Fir, Beech, and Pine. Today, after reforestation efforts, stands of spruce trees dot the mountains.

Fluorapatite (FAP), fluorite and quartz, Sauberg Mine, Ehrenfriedersdorf, Erzgebirgskreis, Saxony, Germany. 11.3 cm. Type locality for FAP. John Rakovan specimen. Jeff Scovil photo.

The basement rocks of the Erzgebirge were formed in the Neoproterozoic during the Cadomian Orogeny along the margin of Gondwana. There is still debate concerning how long the orogeny continued, but by the early Paleozoic, localized basins and bimodal volcanics indicate rifting had begun in the region. Rifting continued through the Ordovician as passive margin sedimentary rocks were deposited, which are overlain by Silurian to Devonian pelagic sedimentary rocks. During the Carboniferous, the Variscan Orogeny affected the region as Pangaea assembled. Eclogite, coesite, and microdiamond inclusions indicate the rocks of the Erzgebirge were subducted to very high pressures. Additionally, compressional tectonics thrust rocks overtop one another to create a complicated stack of units with different metamorphic grades. Peak metamorphism occurred between 350 and 340 Ma, followed by rapid uplift. During the Late Carboniferous into the Permian, extensional tectonics once again affected the region, and several granite intrusions were emplaced. The Altenberg-Teplice Caldera, approximately 35 km long and 10 km wide with a ring dyke of microgranite, erupted around 312 Ma.

Fluorite (FL), Barbora shaft, Jáchymov, Karlovy Vary Region, Erzgebirgskreis, Czech Republic. 2022 find. 12 cm. Type locality for FL. J. Soukup specimen Bohuslav Bures photo.

Mesozoic rocks are rare in the Erzgebirge with only localized outcroppings of Cretaceous-aged sedimentary rock layers. During the Tertiary, tectonic stresses related to the Alpine Orogeny and the opening of the Atlantic Ocean caused block-faulting and the development of the Erzgebirge Block that tilts to the northwest. Some sedimentary and volcanic rocks from the early to mid-Cenozoic are found in parts of the Erzgebirge.

Rocks in the Erzgebirge host several different types of ore deposits. Tin and tungsten-bearing minerals are found in the greisen of the Late Carboniferous and Permian granitic intrusions. Topaz, commonly wine-yellow, is also associated with granites. Polymetallic silver-bearing veins were deposited during the Variscan Orogeny and throughout the Mesozoic. Veins rich in uranium minerals are likely derived from uranium-rich granites.

During the Early to Middle Bronze Age (approximately 2000 to 1300 B.C.), mining and processing of cassiterite for tin occurred in the Erzgebirge, but was later forgotten as other tin-producing areas like Cornwall rose to prominence. No significant mining occurred during the Early Middle Ages, and few settlements were found in the inhospitable Mircwidu. The Berggeshrey of 1168 changed that dramatically. Markgraf Otto von Meißen decreed that anyone could dig for silver on his lands for a fee, and then sell it to his mint. These miners were not serfs and enjoyed personal freedom as well as other privileges. Thus Christiansdorf, where the mining rush began, became Freiberg in reference to the rights of the free miners.

The Erzgebirge experienced several boom and bust cycles following the first mining rush. After a decline in mining in the late 1300s, new silver discoveries set off the Second

Berggeschrey around 1470. Old mines were reopened and new ones established, including one in famed locations like Joachimsthal, Schneeberg, and Annaberg. It was during this time that the mountains became known as the Erzgebirge. The Thirty Years War, from 1618-1648, left much of the region devastated, but industry returned around 1650 with the establishment of a blue dye works that used cobalt to create smalt, a vibrant blue pigment. The third mining cycle boomed in the latter part of the 1700s with the advent of new mining technologies. By the end of the 1850s, however, mining was once again in decline, with the exception of uranium, which was used to color glass at the time. Uranium mining continued until the fall of the Soviet Union in 1990.

The centuries of mining led to numerous scientific advances. Georgius Agricola, often recognized as the Father of Mineralogy, lived in Joachimsthal in the 1500s and wrote numerous ground-breaking scientific texts concerning minerals, mining, metallurgy, and geology based on his observations from the mines. The oldest mining school in the world, the Bergakademie at Freiberg, was established in 1765. Principles of forest sustainability were outlined by Carl von Carlowitz in 1713 in response to a timber shortage and in 1811 the world's first school of forestry, the Königliche-Sächsische Forestakademie, was established. René Just Haüy, a pioneer of crystallography, used topaz from the Erzgebirge for his studies. Lastly, several elements were discovered from ore and mining waste, including wolfram (in 1783), rubidium (in 1861), indium (in 1863), germanium (in 1886), polonium (in 1898), and radium (in 1898).

Because of its rich history, the Erzgebirge was declared a World Heritage Site in 2019.

Physical map of the Erzgebirgskreis. Wikipedia (https://en.wikipedia.org/wiki/Ore_Mountains#/media/File: Erzgebirge_phys_map_de.png Creative Commons "CC-BY-SA 2.0" licensed)