# DISCOVERY, OPENING AND PRELIMINARY RESULTS OF INVESTIGATIONS OF SILVER MINE IN SREBRNA GÓRA (FORMER SILBERBERG; LOWER SILESIA, POLAND)

On 13.11.2015 an independent research team under the leadership of Jan Duerschlag (underground works were carried out by, among others: Kacper Turko, Brandon, Jarosław and Krzysztof Nietrzpiel) opened the entrance to the historical post-mining facility in Srebrna Góra (former Silberberg in Sowie Mts., SW Poland). This text is a preliminary (editorial) elaboration of materials submitted by a number of researchers involved in the re-opening and initial scientific recognition of this mine. They are: Jan Duerschlag – the location of the mine and description of actions leading to reach it, Nike Nietrzpiel – current progress of a reconnaissance works, Izabela and Jarosław Nietrzpiel – photographic documentation, Tomasz Stolarczyk (Copper Museum in Legnica) and Tomasz Przerwa (Institute of History of the University of Wrocław) – historical data and archives, Szymon Kostka and Michał Jóźków – plan of a mine, Michał Stysz – historical data and dendrochronological sampling, Katarzyna Grudzińska – methodology of mine air analysis, Katarzyna Zagożdżon and Paweł Zagożdżon – geological survey, analysis of mine water in situ, air sampling (the last three persons – Faculty of Geoengineering, Mining and Geology of Wrocław University of Technology). The preliminary results of micromycological investigations, carried out by Wojciech Pusz, Włodzimierz Kita and Jakub Grzeszczuk were shown in another communication (Pusz et al., 2015).

The mine is located in the uppermost part of Srebrna Góra, about 150 m NE of the Srebrna Pass (geographical location according to geoportal.gov.pl: 50° 34' 23.5" N, 16° 38' 56"). Mining workings are situated on two levels. Most of them form the upper level of the mine, this is an adit and sidewalks running to the east and west (fig. 1). Lower level is limited to one short excavation. In the mine there are also two small shafts (fig. 2). The total length of explored mining workings can currently be estimated at 230 m.

Search of a mine have been conducted since 2009. Archival maps from the mid-nineteenth century, obtained by Dariusz Wójcik and Krzysztof Krzyżanowski in the State Archives in Katowice (signatures: OBB III 4730, OBB III 4658), were analyzed. Excavation works lasted from the turn of the years 2013/14. (J.D.)

Oxygen content in the mine air, measured after the opening of mine was 19.8%, however in deeper workings it decreased to 16%. The smell of hydrogen sulfide was slightly perceptible. Therefore the induced ventilation of mine was carried out with use of system of improvised air pipes. (J.D.)

The next stages of intensive research took place on 21–22.11.2015 (i.a. drawing of preliminary plan of mine) and 28.11.2015 (penetration of lower level) (fig. 1). Workings of the upper and lower levels differ in their appearance (size, height of sidewalks), suggesting that they may have originated in another time periods (fig. 3, 4). (N.N.)

Form of significant parts of the excavation is typical for old mining, drifts are relatively narrow and high, they present a characteristic trapezoidal cross-section (fig. 3). On some fragments of workings the traces after use of hand tools to smooth the roofs and walls are clearly visible. There are also the remains of manual drilling of blasting holes.

According to archival data in 1911 in Srebrna Góra, there were conducted works aimed to adapt the "old silver adit" for tourism. By another information this adit was still available in the year 1928. This so-called Amali adit was to be drived in the years 1350, 1710 and 1858–1861. (T.P.)

In historic and archaeological community this facility is known as site Srebrna Góra 3 (AZP 91-25, site 9 in documentation of the Regional Office for the Protection of Monuments). Although until recently was not available, since 15.02.1971 it is listed in the register of monuments (pursuant to decision No. 537/Arch/71). In the literature the object is considered to be remnants of the mine Amalie or Xaver, and the time of its creation/functioning is determined on the Middle Ages or the sixteenth to eighteenth centuries. (T.S.)

According to a separate opinion this object is located on the mining field of nineteenth-century Amalie mine, but is a result of much earlier mining activities. During the inventory of the workings numerous traces of hand mining and traces of blasting using black powder have been found. This

kind of mixed technique of mining, also confirmed by the shape and size of drifts, corresponds to the technique of mining operations at the beginning of the eighteenth century. (M.S.)

Preserved elements of wooden roof protection were sampled for dendrochronological testing (larger fragments of wood and cores from Pressler drill were taken). The laboratory research will be carried out in the Faculty of Geology, Geophysics and Environmental Protection of AGH University of Science and Technology. Results of invesigation will allow to specify the types of wood used in a mine and their absolute dating. (M.S.)

Bsed on detailed geological map (Oberc et. al., 1994) it can be stated that the mine is located in the area of "cataclasites, brecciac and gneiss mylonites". About 100 meters south there is a boundary of large tectonic unit called Sowie Mts. metamorphic block. In the mine dominate gneisses differing with regard to their petrographic characteristics. These are thin-blastic or medium-blastic rocks, their structure is streaky, lamellar in some cases you can observe the faint visible augen-structure. One of the samples has the characteristics of granite gneiss. (fig. 5) In some places, within gneiss, the occurrence of quartz nests sized several dozen centimeters in diameter can be observed. (K.Z., P.Z.)

In this gneiss complex there is a group of shear zones, which were targes of exploitation. The zones are filled with highly crumbly rock (gneiss) or rock meal. The width of the zones is in the range of 0.2–2.0 m, the direction of their strike varies between 106° and 120°, the dip is typically steep 85–90° (in one case – 65 °) to the south. During the field work we identified six such zones. Locally there are signs of ore mineralization. In one of the samples taken near the fault zone, within the calcite vein, chalcopyrite and galena have been macroscopically identified (sprinklings sized 2–10 mm). A sample taken from one of tectonic zones includes considerable amounts of secondary mineral with an intense green color in form of insets and incrustations. Macroscopically visible physical characteristics correspond to malachite or chrysocolla. (K.Z., P.Z.)

In the mine was taken a basic analysis of water, which temperature was determined on about 8°C, pH – 8 and conductivity – 440–575 μS/cm. In three points the mine air was sampled. By means of a stationary gas chromatograph (Arnel Clarus 500) will be determined a content of all natural atmospheric gases, primarily O2, N2, CO2, CO, H2, CH4, NH4, H2S, He. Measurements taken by Gamma-Scout device have shown a very low γ radiation level. (K.Z., P.Z., K.G.)

Preliminary speleomycological studies carried out by staff of the Wrocław University of Environmental and Life Sciences, concerned the evaluation of microbiological pollution, ie. the content of fungal spores in the air. Laboratory tests have shown that the dominant component are fungi of the genus Penicillium. In addition, insecticidal fungi, growing on the dead bodies of insects were sought in a mine. It revealed the presence of a few live colonies of fungi of this kind, but also a significant amount of dead colonies, what may indicate a sudden change of environmental conditions in the mine that took place recently (Pusz i in., 2015).