Bohdanowiczite $AgBiSe_2$

Crystal Data: Hexagonal. *Point Group:* $\overline{3}\ 2/m$. Anhedral grains, to 200 by 600 μm. *Twinning:* Polysynthetic.

Physical Properties: Hardness = 3.2 VHN = 63–96 D(meas.) = n.d. D(calc.) = 7.72

Optical Properties: Opaque. *Color:* Pale creamy yellow, pale yellow, pink, tarnishing more golden. *Anisotropism:* Noticeable, distinctly stronger in oil, in yellowish gray tones. R_1–R_2: (470) 51.2–52.9, (546) 49.8–51.5, (589) 50.1–51.5, (650) 50.1–51.6

Cell Data: *Space Group:* $P\overline{3}m1$ (most probable). $a = 8.412(6)$ $c = 19.63(3)$ Z = [6]

X-ray Powder Pattern: Kletno, Poland.
2.91 (100), 2.03 (30), 6.54 (20), 3.40 (20), 3.26 (18), 2.09 (18), 1.630 (6)

Chemistry:

	(1)	(2)	(3)	(4)
Ag	22.31	22.6	22.9	22.7
Pb	1.34		0.0	
Cu	0.25		0.2	
Co	0.01			
Ni	0.02			
Bi	44.89	43.2	44.7	44.0
Se	28.46	32.8	30.8	33.3
S	2.47		1.2	
Total	99.75	98.6	99.8	100.0

(1) Kletno, Poland; by electron microprobe, average of three analyses, corresponding to $(Ag_{0.98}Cu_{0.02})_{\Sigma=1.00}(Bi_{0.97}Pb_{0.03})_{\Sigma=1.00}(Se_{1.66}S_{0.34})_{\Sigma=2.00}$. (2) Near Julianehåb, Greenland; by electron microprobe, corresponding to $(Ag_{1.01}Bi_{1.00}Se_{2.00}$. (3) Kidd Creek mine, Canada; by electron microprobe, coresponding to $(Ag_{0.99}Cu_{0.02})_{\Sigma=1.01}Bi_{1.00}(Se_{1.83}S_{0.17})_{\Sigma=2.00}$. (4) $AgBiSe_2$.

Occurrence: In fluorite and quartz in a strongly cracked zone formed in crystalline limestone adjacent to magnetite-bearing skarns (Kletno, Poland); in reduction halos in red beds (near Zurich, Switzerland).

Association: Clausthalite, tiemannite, umangite, klockmannite, wittichenite, silver, naumannite, bornite, chalcopyrite, chalcocite, uraninite, fluorite, quartz (Kletno, Poland); tennantite, carrollite, cobaltite, bornite, chalcopyrite, chalcocite, naumannite, eucairite, clausthalite (Kidd Creek mine, Canada); hessite, chalcocite, digenite, umangite, naumannite, eucairite, bornite, chalcopyrite, clausthalite, covellite, magnetite, hematite, goethite, malachite, azurite (Julianehåb, Greenland).

Distribution: From Kletno, Sudetes Mountains, Poland [TL]. In the Clara mine, near Oberwolfach, and the Mullenbach uranium deposit, Black Forest, Germany. Found northwest of Zurich, Switzerland. From Ocna de Fier (Morávicza; Vaskő), Romania. At the Kidd Creek mine, near Timmins, Ontario, Canada. In the Frederik VII's mine, 5 km east of Julianehåb, southern Greenland. From near Vanos, Chihuahua, Mexico. At the Iron Monarch quarry, Iron Knob, South Australia.

Name: Honors Professor Karol Bohdanowicz (1864–1947), Polish economic geologist, of Cracow, Poland.

Type Material: Academy of Mining and Metallurgy, Cracow, Poland.

References: (1) Banaś, M., D. Atkin, J.F.W. Bowles, and P.R. Simpson (1979) Definitive data on bohdanowiczite, a new silver bismuth selenide. Mineral. Mag., 43, 131–133. (2) (1979) Amer. Mineral., 64, 1333 (abs. ref. 1). (3) Pringle, G.J. and R.I. Thorpe (1980) Bohdanowiczite, junoite and laitakarite from the Kidd Creek mine, Timmins, Ontario. Can. Mineral., 18, 353–360. (4) Schonwandt, H.K. (1983) Interpretation of ore microstructures from a seleneous Cu-mineralization in South Greenland. Neues Jahrb. Mineral., Abh., 146, 302–332. (5) Geller, S. and J.H. Wernick (1959) Ternary semiconducting compounds with sodium chloride-like structure: $AgSbSe_2$, $AgSbTe_2$, $AgBiS_2$, $AgBiSe_2$. Acta Cryst., 12, 46–54.