Paganoite $NiBi^{3+}O(AsO_4)$

Crystal Data: Triclinic. *Point Group*: $\bar{1}$. As crystals, to 1 mm, and as crystal aggregates. Crystals elongated along [010], showing {100} and minor {010} and {001}.

Physical Properties: Cleavage: None. *Tenacity*: Brittle. *Fracture*: Uneven. Hardness = Soft. D(meas.) = n.d. D(calc.) = 6.715 Nonfluorescent.

Optical Properties: Transparent to translucent. *Color*: Orange-brown to deep golden brown, gray in reflected light. *Streak*: Pale orange-brown. *Luster*: Adamantine.
Optical Class: *n*(calc.) = 2.07, 2.09. No bireflectance, nonpleochroic.
R_1-R_2: (470) 12.85-13.1, (546) 12.35-12.6, (589) 12.15-12.5, (650) 12.0-12.35

Cell Data: *Space Group*: $P\bar{1}$. $a = 6.7127(8)$ $b = 6.8293(8)$ $c = 5.2345(6)$ $\alpha = 107.625(2)°$ $\beta = 95.409(2)°$ $\gamma = 111.158(2)°$ Z = 2

X-ray Powder Pattern: Johanngeorgenstadt, Saxony, Germany.
5.943 (100), 3.233 (100), 3.067 (60), 3.047 (50), 2.116 (50), 2.095 (40), 1.659 (40)

Chemistry:

	(1)	(2)
NiO	15.37	17.67
CoO	2.05	
Bi_2O_3	55.06	55.13
As_2O_5	28.00	27.19
Total	100.48	100.00

(1) Johanngeorgenstadt, Saxony, Germany; electron microprobe analysis; corresponds to $(Ni_{0.86}Co_{0.11})_{\Sigma=0.97}Bi_{0.99}As_{1.02}O_5$. (2) $NiBiAsO_5$.

Occurrence: Formed from the breakdown of primary nickeline and native bismuth.

Association: Aerugite, xanthiosite, rooseveltite, quartz, nickeline, bismuth, bunsenite.

Distribution: At Johanngeorgenstadt, Saxony, Germany.

Name: Honors amateur mineralogists Renato (b. 1938) and Adriana (b. 1939) *Pagano* of Cinisello, Milan, Italy, for their long-standing service to the European mineralogical community.

Type Material: National Mineral Collection of Canada, Geological Survey of Canada, Ottawa, Ontario, Canada (NMCC 68083) and at The Natural History Museum, London, England.

References: (1) Roberts, A.C., P.C. Burns, R.A. Gault, A.J. Criddle, Mark N. Feinglos, and J.A.R. Stirling (2001) Paganoite, $NiBi^{3+}As^{5+}O_5$, a new mineral from Johanngeorgenstadt, Saxony, Germany: description and crystal structure. Eur. J. Mineral., 13(1), 167-175. (2) (2000) Amer. Mineral., 85, 939 (abs. ref. 1).