Hedleyite $\mathbf{Bi_{2+x}Te_{1-x}}$ (x = 0.13 to 0.19)

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Crystal Data: Hexagonal. *Point Group:* $\overline{3}\ 2/m$. As foliated platy masses, to 6 mm.

Physical Properties: *Cleavage:* Perfect on {0001}, warped. *Tenacity:* Flexible lamellae. Hardness = 2 VHN = 31–42 (25 g load). D(meas.) = 8.81–8.91 D(calc.) = 8.91

Optical Properties: Opaque. *Color:* Tin-white, tarnishing iron-black; in polished section, white, between that of galena and silver. *Luster:* Metallic. *Anisotropism:* Slight, pale gray to dark gray.
R_1–R_2: (400) 59.0–61.8, (420) 59.3–62.5, (440) 59.9–63.3, (460) 60.5–64.0, (480) 61.0–64.6, (500) 61.3–65.0, (520) 61.6–65.7, (540) 61.7–66.2, (560) 61.8–66.7, (580) 62.0–67.3, (600) 62.3–67.7, (620) 62.6–68.1, (640) 62.9–68.5, (660) 63.1–68.6, (680) 63.4–68.7, (700) 63.6–68.9

Cell Data: *Space Group:* $P\overline{3}m1$. $a = 4.4733(20)$ $c = 17.805(11)$ Z = 3

X-ray Powder Pattern: Good Hope claim, Hedley, Canada.
3.25 (10), 2.36 (5), 2.23 (4), 1.621 (4), 1.480 (4), 1.984 (3), 1.849 (3)

Chemistry:

	(1)	(2)	(3)	(4)
Bi	81.08	81.6	81.3	76.61
Te	18.06	17.5	19.2	23.39
Se		0.3	0.6	
S	0.08	0.1		
Total	99.22	99.5	101.1	100.00

(1) Good Hope claim, Hedley, Canada; average of two analyses, corresponds to $Bi_{2.19}(Te_{0.80}S_{0.01})_{\Sigma=0.81}$. (2) Millapaya, Bolivia; by electron microprobe, corresponds to $Bi_{2.19}(Te_{0.77}Se_{0.02}S_{0.02})_{\Sigma=0.81}$. (3) Vostok-2 deposit, Russia; by electron microprobe, corresponds to $Bi_{2.12}(Te_{0.82}Se_{0.04})_{\Sigma=0.86}$. (4) Bi_2Te.

Occurrence: Typically a late-stage hydrothermal mineral in quartz veins and massive sulfides associated with skarns and breccias; less commonly in pegmatites.

Association: Bismuth, bismuthinite, tellurobismuthite, tsumoite, joséite, hessite, maldonite, gold, arsenopyrite, pyrrhotite, chalcopyrite, galena, sphalerite, pyrite.

Distribution: In Canada, in British Columbia, from the Good Hope mineral claim, about six km southeast of Hedley, Osoyoos mining division [TL]; also at the Oregon mine, near Hedley; in the Upper Burwash Creek placer, Kluane Lake district, Yukon Territory; from the Bannockburn gold deposit, Eldorado, Ontario. In the McCoy mine, McCoy district, Lander Co., Nevada, USA. From Millapaya, Sorata, La Paz, Bolivia. In the Kumbel' skarn deposit, northern Kyrgyzstan. From Ugat, western Uzbekistan. At the Vostok-2 deposit, Lukkulaisvaara layered intrusion, Karelia, Russia. From the Osikonmaki gold deposit, Rantasalmi, at Ramepuro, and in Fe-Co-Au deposits of the Kuusamo schist belt, Finland. At the Radzimowice and Bardo Slaskie deposits, Silesia, Poland. From the Rifugio Borromeo deposit, Martello Valley, Trentino-Alto Adige, Italy. In the Ortosa Au–Bi–Te deposit, Asturias, Spain. From the Carrock mine, Caldbeck Fells, Cumbria, England. In the Kolar Gold Fields, Karnataka, India. A few other occurrences have been noted.

Name: For the locality being near Hedley, Canada.

Type Material: Royal Ontario Museum, Toronto, Canada, M37250.

References: (1) Warren, H.V. and M.A. Peacock (1945) Hedleyite, a new bismuth telluride from British Columbia, with notes on wehrlite and some bismuth–tellurium alloys. Univ. of Toronto Studies, Geol. Ser., 49, 55–69. (2) (1945) Amer. Mineral., 30, 644 (abs. ref. 1). (3) Zav'ylov, E.N., V.D. Begizov, and G.N. Nechelyustov (1976) New data on hedleyite. Doklady Acad. Nauk SSSR, 230, 1439–1441 (in Russian). (4) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 227.

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