

**Crystal Data:** Cubic. *Point Group:* 23. Typically as minute grains.

**Physical Properties:** *Fracture:* Conchoidal. *Tenacity:* Brittle. Hardness = 2.5  
VHN = 306–317 (25 g load). D(meas.) = ~9.5 D(calc.) = ~10.0

**Optical Properties:** Opaque. *Color:* Silver-white to grayish white; in polished section, cream-white with a tinge of gray. *Streak:* Black. *Luster:* Metallic.  
R: (400) 52.6, (420) 53.6, (440) 54.4, (460) 55.3, (480) 55.8, (500) 56.1, (520) 56.4, (540) 56.5, (560) 56.7, (580) 56.9, (600) 57.1, (620) 57.1, (640) 57.9, (660) 58.4, (680) 58.8, (700) 59.3

**Cell Data:** *Space Group:*  $P2_13$ .  $a = 6.646$   $Z = 4$

**X-ray Powder Pattern:** Synthetic PdBiTe.

2.974 (100), 2.000 (90), 2.715 (80), 1.773 (80), 1.451 (70), 1.234 (70), 0.8668 (70)

<b>Chemistry:</b>	(1)	(2)	(3)		(1)	(2)	(3)
Pd	24.0	24.1	24.02	Bi	46.5	36.6	47.18
Pt	n.d.	1.1		Sb	0.4	5.3	
Ag		0.2		Te	28.8	32.4	28.80
Ni		0.1					
				Total	99.7	99.8	100.00

(1) Vermilion mine, Sudbury, Canada; by electron microprobe, corresponding to  $\text{Pd}_{1.00}(\text{Bi}_{0.99}\text{Sb}_{0.01})_{\Sigma=1.00}\text{Te}_{1.00}$ . (2) Kambalda, Australia; by electron microprobe, corresponding to  $(\text{Pd}_{0.96}\text{Pt}_{0.02})_{\Sigma=0.98}(\text{Bi}_{0.74}\text{Sb}_{0.18})_{\Sigma=0.92}\text{Te}_{1.08}$ . (3) PdBiTe.

**Mineral Group:** Pyrite group.

**Occurrence:** A principal palladium mineral in Cu–Ni sulfide deposits.

**Association:** Testibiopalladite, froodite, merenskyite, moncheite, kotulskite, melonite, sobolevskite, hollingworthite, sperrylite, hessite, chalcopyrite, pentlandite, cubanite, pyrrhotite.

**Distribution:** In Canada, in Ontario, from the Frood [TL] and other mines in the Sudbury district; at the Pipe mine, Manitoba; in the Wellgreen deposit, Yukon Territory. In the USA, from the New Rambler Cu–Ni mine, Medicine Bow Mountains, east of Encampment, Albany Co., Wyoming; and in the Stillwater complex, Montana. From the Las Aguilas deposit, San Luis Province, Argentina. In Russia, at the Oktyabr mine, Noril'sk region, western Siberia; from the Monchegorsk deposit, Kola Peninsula; in the Bissersk placers, Ural Mountains; at the Vostok deposit, Lukkulaivaara layered intrusion, Karelia. From Hitura, Finland. At the Gabbro Akarem, Eastern Desert, Egypt. In the Ban Phuc deposit, northwest Vietnam. At Kambalda, 56 km south of Kalgoorlie, Western Australia. From the Rustenburg mine, in the Merensky Reef, Bushveld complex, Transvaal, South Africa. At Danba, Sichuan Province, China. Known in trace amounts from a few other localities.

**Name:** In honor of Dr. Charles Edward Michener (1907– ), Canadian geologist for the Canadian Nickel Company, who discovered the mineral.

**Type Material:** All original material consumed by analysis; redefined, Canadian Geological Survey, Ottawa; Royal Ontario Museum, Toronto, Canada, M31189 and M29438.

**References:** (1) Hawley, J.E. and L.G. Berry (1958) Michenerite and froodite, palladium bismuth minerals. *Can. Mineral.*, 6, 200–209. (2) Cabri, L.J., D.C. Harris, and R.I. Gait (1973) Michenerite (PdBiTe) redefined and froodite (PdBi<sub>2</sub>) confirmed from the Sudbury area. *Can. Mineral.*, 11, 903–912. (3) Genkin, A.D., N.N. Zhuravlev, and E.M. Smirnova (1963) Moncheite and kotulskite—new minerals—and the composition of michenerite. *Zap. Vses. Mineral. Obshch.*, 92, 33–50 (in Russian). (4) Childs, J.D. and S.R. Hall (1973) The crystal structure of michenerite, PdBiTe. *Can. Mineral.*, 12, 61–65. (5) Hudson, D.R., B.W. Robinson, R.B.W. Vigers, and G.A. Travis (1978) Zoned michenerite–testibiopalladite from Kambalda, Western Australia. *Can. Mineral.*, 16, 121–126. (6) Cabri, L.J., Ed. (1981) Platinum group elements: mineralogy, geology, recovery. *Can. Inst. Min. & Met.*, 120–121, 155. (7) Criddle, A.J. and C.J. Stanley, Eds. (1993) Quantitative data file for ore minerals, 3rd ed. Chapman & Hall, London, 371.

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