Bobdownsite, a Relatively New Mineral from Canada, Faceted as a Gemstone

Bobdownsite, ideally $Ca_9Mg(PO_4)_6(PO_3F)$, was first discovered in 2001 on a ridge on the west side of Big Fish River (Figure 2), Yukon, Canada, at coordinates of approximately 68°28'N, 136°30'W, by Rod Tyson of Tysons' Fine Minerals (Parrsboro, Nova Scotia, Canada). It was initially misidentified as another phosphate, whitlockite, before being correctly described by Tait et al. (2011), who named it for Dr Robert Downs (University of Arizona, Tucson, USA). The mineral is hosted by narrow veins cutting bedded ironstones and shales, and is associated with siderite, quartz and various phosphates (lazulite, an arrojadite-group mineral, kulanite, gormanite and collinsite). It forms colourless tabular crystals up to 27 mm wide and 4 mm thick, and has a Mohs hardness of ~5 with no cleavage observed.

Three faceted bobdownsite samples from the collection of Brad Wilson (Alpine Gems, Kingston, Ontario, Canada) were loaned to the Royal Ontario Museum (ROM) for examination (Figure 3). The stones ranged from 0.05 to 0.23 ct, and the following properties were recorded: colour—colourless; lustre—vitreous; diaphaneity—transparent to semi-transparent; RI—n_o = 1.625 and n_e = 1.622; optic character—uniaxial negative; Chelsea colour filter reaction—none; fluorescence—weak red-purple to long-wave and inert to short-wave UV radiation. In addition, a weak orange phosphorescence was noted. A density value of 3.14 g/cm^3 was measured by Tait et al. (2011), and Raman and IR spectra for bobdownsite are available at http://rruff.info/bobdownsite/display=default/R050109, along with XRD data.

Figure 3: These bobdownsite gemstones were faceted by Brad Wilson and weigh 0.23 ct (left), 0.13 ct (centre) and 0.05 ct (right). Photo courtesy of the Royal Ontario Museum, © ROM; photo by Brian Boyle, MPA, FPPO.

ROM personnel visited the bobdownsite locality in the summer of 2012, but no more material was found in situ. However, several small pieces were recovered from the talus slope and reside in the ROM collection. To this author's knowledge, this is the first time that faceted bobdownsite has been characterized in the literature. With only a few such gems in existence, this is certainly a very rare collectors' gemstone.

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Reference

Tait K.T., Barkley M.C., Thompson R.M., Origlieri M.J., Evans S.H., Prewitt C.T. and Yang H., 2011. Bobdownsite, a new mineral species from Big Fish River, Yukon, Canada, and its structural relationship with whitlockite-type compounds. *Canadian Mineralogist,* **49**, 1065–1078, http://dx.doi.org/10.3749/canmin.49.4.1065.

Figure 2: Bobdownsite is known only from this steep terrain on the west side of the Big Fish River in Canada's Yukon territory. Photo by K. Tait.