Blue omphacite "jade" from Guatemala. A small number of rough and polished specimens of a new dark blue omphacite "jade" were displayed by Ventana Mining Co. (Los Altos, California) at the Pueblo Inn and by Leher Designs (San Rafael, California) at the GJX show and at the Westward Look Resort. Omphacite, like jadeite, is a member of the pyroxene group. The material was first recovered by one of these contributors (WRR) in June 2003, and so far it has been found in a relatively restricted small part of a claim held by Ventana Mining Co. of Los Altos, California. The deposit is located in the Quebrada Seca area, near Carrizal Grande in Jalapa Department, Guatemala. (For information on recent jadeite discoveries in this area, see Winter 2002 Gem News International, pp. 352-353.) The blue omphacite occurs as fine veins that cross-cut large alluvial boulders of greenish blue jadeite that were situated near outcrop consisting of blueschist, eclogite and jadeite. Because the veins are rather narrow (i.e., from 2 to 20 mm thick), the material lends itself to small cabochons and carvings.

Three of the four oval cabochons shown in figure 1 were loaned to GIA for examination, and the following properties were determined by one of us (EPQ): color—mottled grayish greenish blue to mottled dark grayish greenish blue; diaphaneity—translucent; R.I.—spot readings of 1.67 to 1.68; S.G.—3.33-3.41; no Chelsea filter reaction; fluorescence—inert to long- and short-wave UV radiation; and no absorption features were observed with the desk-model spectroscope. Microscopic examination revealed that the stones had an aggregate structure with a mottled granular texture, irregular fractures, and nondescript white globular masses. In one of the cabochons, small transparent near-colorless crystals were observed. FTIR spectroscopy did not detect any polymer impregnation. Although not identified in these particular cabochons, the blue omphacite from Guatemala has been reported to contain minor amounts of phengite and sphene, and traces of zircon, monazite, allanite, and rutile (G. E. Harlow, "Blue omphacite in jadeitites from Guatemala and Japan: Crystal chemistry and color origin," Geological Society of America Annual Meeting, Seattle, Washington, November 2–5, 2003, http://gsa.confex.com/gsa/2003AM/finalprogram/abstract_65497.htm).

Electron-microprobe analyses of a fourth blue cabochon by one of us (GEH) revealed that it was composed predominantly of omphacite. Backscattered-electron imagery of the cabochon and of another blue vein sample (figure 2) showed strong compositional zoning within the individual omphacite grains. Expressed in terms of jadeite and diopside components, the average composition of the omphacite in the cabochon was $Jd_{55}Di_{39}$ (range $Jd_{30\text{-}87}Di_{9\text{-}62}$; see figure 3). The compositional range of another sample of the same type of blue omphacite was $Jd_{38\text{-}77}Di_{22\text{-}47}$. In both cases, small amounts of hedenbergite and acmite components of pyroxene also were present. In the cabochon, total iron (reported as FeO) averaged 1.23 wt.%, with a range of 0.4-1.9 wt.%; titanium averaged 0.29 wt.% TiO_2, with a range of 0.03-1.5 wt.%.

Vis-NIR spectroscopy of another sample of the blue omphacite by one of these contributors (GRR) showed a transmission window in the visible region centered near 500 nm (figure 4). This feature was defined by a sharp absorption band at 438 nm—superimposed on a tail that rises in intensity towards shorter wavelengths—and a broader band system that reaches its maximum at about 712 nm. The 438 nm feature arises from Fe^{3+}, and the broad band system correlates to the interaction of Fe^{2+} and Fe^{3+}. The broad features at longer wavelengths arise from Fe^{2+}. In contrast, a sample of green jade from Guatemala showed absorption bands due to Cr^{3+} that define the transmission window near 530 nm (again, see figure 4). The absorption was modified by features from both Fe^{3+} (sharp feature at 437 nm) and broader features below 900 nm from Fe^{2+}.

The absorption spectra show that the color of the green jade is due primarily to Cr^{3+}, whereas the blue omphacite is colored by iron—at least in part. Since the depth of the blue color showed a direct relation to titanium content in the samples analyzed, it appears that Ti^{4+} may also play a role in the coloration. The exact cause of the unusual blue color in this omphacite will remain unknown until further work is done to characterize the absorption features in pure synthetic samples that are separately doped with iron (as Fe^{2+} or Fe^{3+}) and titanium.

Although blue omphacite also has been found in Japan and Canada (Harlow, 2003), this new material from Guatemalan represents the first occurrence of a gem-quality variety.

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Figure 1. These cabochons (approximately 0.35 ct each) of omphacite “jade” show the distinct blue color of this new material from Guatemala. Courtesy of Ventana Mining Co.; photo © Lee-Carraher Photography, San Francisco, California.

Figure 2. This backscattered-electron image is of a vein of blue omphacite cutting bluish green jadeite. The omphacite is visible as the lighter area in the center, whereas the surrounding jadeite appears much darker. The minute bright spots are zircon grains, and the black spots are quartz. Note the compositional zonation shown by individual pyroxene grains of the omphacite; the lighter areas correspond to more Fe and the darker areas have more Ti. [blue-KT03]

Figure 3. The blue omphacite was composed of strongly zoned grains of the jadeite-diopside series, as revealed by electron microprobe analysis. [blue-comp.tif]**[Note to KM: All dots should be the same color.]**

Figure 4. These Vis-NIR absorption spectra show that the blue omphacite is dominated by iron-related features, whereas the green Guatemalan jade has absorptions related to chromium and subordinate iron. [grr-both.jpg]

Figure 1 (This is not the image in the actual article but a close facsimile from Ventana)

Figure 2

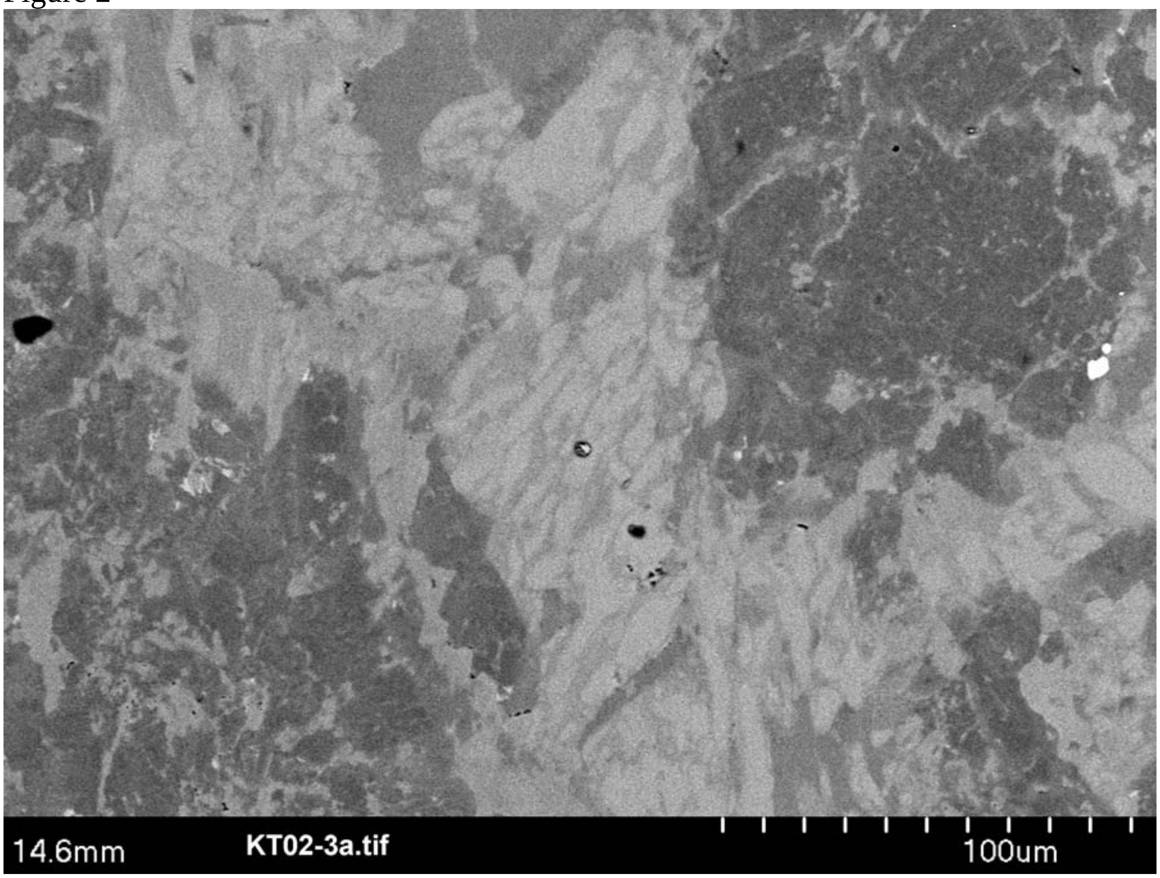

Figure 3.

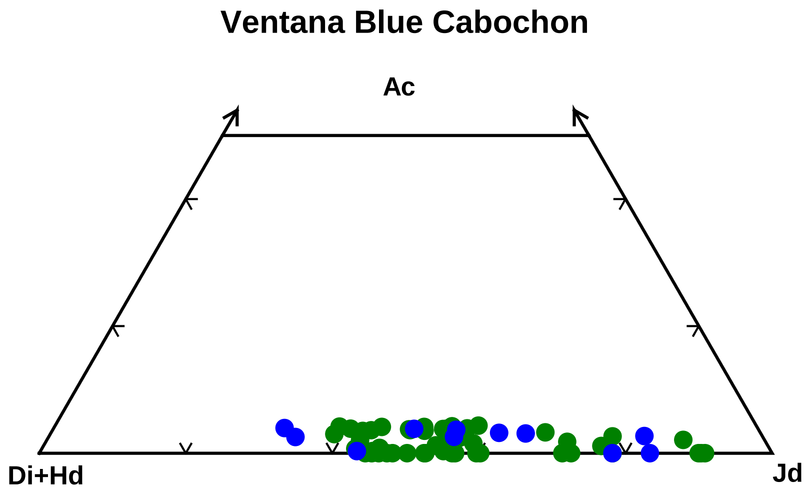

Figure 4.