Significant deposits of gem-quality peridot have been found in the People’s Republic of China. This Chinese peridot has geologic origins and gemological properties almost identical to the peridot found on the San Carlos Apache Reservation in Arizona, and cannot be distinguished gemologically, at this time, from peridots from other known localities.

In 1979, geologists from the Ministry of Geology and Mineral Resources discovered gemologically important peridot deposits in the Zhangjikou-Xuanhua area of Hebei Province, about 150 km northwest of Beijing (Peking), in the People’s Republic of China. The peridot is found as gemmy nodules in extrusive vesicular alkali basalt lava flows (Keller and Wang, 1986). Like the peridot found in San Carlos, Arizona, which also occurs in basalt (Koivula, 1981), no well-formed single crystals of rough peridot have been found in the Chinese deposits. Gem-quality peridot nodules and fragments 2 cm in diameter and up to 25 ct in weight were examined by the authors (figure 1). Excellent gems (figure 2) can be cut from this rough.

**GEMOLOGICAL PROPERTIES**

Of a total of six rough nodules, three were selected for faceting so that they could be tested gemologically along with two other previously faceted stones. The faceted gems ranged in weight from 0.70 to 10.51 ct. A triangular mixed-cut 2.87-ct stone (figure 2) had the best clarity. The samples examined ranged in color from a light yellow-green...
The Chinese peridot shows great promise as a gemstone. Unlike peridot from Arizona, the Chinese material exhibits no directional hardness variations during either cutting or polishing. Both processes took slightly longer than is typical for peridot, which suggests a slightly higher hardness. Transparency is excellent, and material free of all but the smallest inclusions could produce fine gems in the larger sizes.

William C. Kerr, G.G.

Refractive index readings on the five faceted gems were identical: biaxial positive with indices of \( \alpha = 1.653, \beta = 1.670, \) and \( \gamma = 1.689. \) The corresponding birefringence was 0.036.

The visible-light absorption spectra of the Chinese peridots were studied using a Beck prism spectroscopic. All of the stones showed the same pattern, typical for peridot: A band between 493.0 and 481.0 nm had its strongest absorption at 492.0 nm; the strongest single absorption line was visible at approximately 471.0 nm; another broad band, situated in the blue, covered the spectrum from 460.0 to 450.0 and was strongest at 453.0 nm.

Using the Voland double-pan balance, we determined the specific gravity hydrostatically to be 3.36. The Chinese gems are inert to both long-wave and short-wave ultraviolet radiation.

Using standard hardness points, we determined hardness to be between 6.5 and 7 on the Mohs scale, although observations about the hardness of these peridots made during faceting [see box] suggest that this material might be slightly harder than the 6.5 normally attributed in gemological texts to peridot. It may be very near 7, the hardness assigned to forsterite, the magnesium-rich end member of the olivine series.

INCLUSIONS

The inclusions in this new material are typical of peridot formed in an alkali basalt. All of the inclusions observed in the Chinese peridots studied have also been noted in peridot from Arizona [Koivula, 1981]. For example, in figure 3, the black opaque grain surrounded by a tension halo is a crystal of chromite, the transparent brown crystals are probably biotite mica, and a circular cleavage disc ("lily pad") is also visible edge-on. Partially healed secondary fractures, as shown in figure 4, were observed in all of the Chinese stones. In figure 5, a partially healed cleavage is pictured. The iridescent portion shows few signs of repair. The round white dot is the negative crystal that ruptured, producing the original separation. A dark "emerald-green" chrome diopside crystal [figure 6] was observed in only one of the Chinese peridots. Growth undulations were observed through the table of the triangular mixed cut. These growth undulations are the result of incomplete solid solution and visibly strained dislocations in the

Figure 3. This photo shows characteristic peridot inclusions of black chromite, brown biotite, and a "lily pad" cleavage as observed in a Chinese peridot. Dark-field and oblique illumination, magnified 25×.

ABOUT THE AUTHORS

Mr. Koivula is senior gemologist, and Mr. Fryer is chief gemologist, in the Research Department at the Gemological Institute of America, Santa Monica, California.

Acknowledgments: The authors would like to thank the following individuals for their help with this manuscript. Dr. Peter Keller and Mrs. Alice Keller provided the peridot samples, kindly supplied by Mrs. Fan Shuhua of the Chinese Gem and Mineral Development Co. (Beijing), and much useful information which made this study possible. William C. Kerr faceted the gems for optical testing. Cindi Yantzer and Ruth Patrich typed the manuscript.

All photomicrographs in this article were taken by John I. Koivula.

© 1986 Gemological Institute of America
A dark green chrome diopside crystal is surrounded by dark tension cracks in a Chinese peridot. Diffused transmitted and oblique illumination, magnified 40X.

CONCLUSION

Because of the limited sample of stones available for study, only a narrow range could be determined for the gemological properties of the Chinese material, although a wider range of properties is known to exist for other peridot from similar geologic environments (Koivula, 1981). However, the Chinese peridots examined show gemological characteristics similar to and within the range noted for peridot from any other known locality. Thus, on the basis of the samples examined, we do not feel that the Chinese stones can be separated from peridots from other localities by means of their gemological properties.

The Chinese government and specifically the Chinese Gem and Mineral Development Company, headquartered in Beijing, are now actively mining and cutting the peridot for commercial purposes (Keller and Fuquan, 1986). Therefore, it should not be surprising if significant amounts of Chinese peridot begin to appear on the world gem market in the near future.

REFERENCES