Figure 21. This bluish green cat's-eye cabochon (36.63 ct) proved to be serpentine. Photo by G. Choudhary.

from Sichuan Province of China," *Journal of Shanghai University*, Vol. 9, No. 4, 2005, pp. 365–368).

When the cabochon was examined with a microscope, thin parallel planes were visible. These appeared to be composed of fine films oriented perpendicular to the chatoyant band (figure 22, left), and were thus responsible for the cat's-eye effect. In addition, a few scattered brown dendritic crystals (figure 22, right) and white cloudy patches were present; this contributor has previously observed such inclusions in serpentine.

Because serpentine is a hydrous material, the FTIR spectrum in the 6000–400 cm^{-1} range exhibited complete absorption from 4500 to 400 cm^{-1} and there were two bands around 5000 and 4700 cm^{-1}. This pattern was similar to those of serpentine samples in our reference database. EDXRF analyses revealed the presence of Mg, Si, Cr, Fe, and Ni, which is consistent with the elements expected to be detected in serpentine.

This was the first time this contributor has encountered this rare variety of serpentine. The origin of this specimen is not known.

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Zircon mining in Cambodia. In April 2009, these contributors visited Ratanakiri (or Rattanakiri, Rotanah Kiri) Province, Cambodia, ~600 km by road northeast of Phnom Penh. Ratanakiri is the world's major source of fine heated blue zircon. Blue is not known to occur naturally in zircon, but heat treatment of brown to reddish brown material from Indochina will produce light blue stones, and many gem enthusiasts believe that the finest blue colors are produced by heating the dark brown material from Ratanakiri (e.g., figure 23). It is likely that these deposits were not exploited until the early 20th century, when the potential for this heat treatment was discovered.

The zircon is found in an area of extensive volcanism consisting of flood basalts and scattered volcanic cones. Zircon-bearing alkaline basalts are confined to the intersection of brittle crustal structures, so the occurrences are small and discontinuous. We were told by a local zircon dealer that there are more than 100 deposits in Ratanakiri, but because the gem-bearing areas are small and remote, and many are worked seasonally, it is difficult to determine the number of miners or the annual production of zircon. We saw about 70 active shafts in the four small mining areas we visited, each employing two to four people. We estimate that those four mining areas produced about 500 g of gem-grade material per day during our visit.

Mining is performed by sinking a shaft through the overburden to the zircon-bearing horizon, which lies 2–15 m below the surface (figure 24, left). In some mines, the basalt has decomposed to loose red soil, and the gems can be separated by combing through the excavated earth by hand. In others, basalt cobbles remain as gravel, and the material must be washed (figure 24, right).

In addition, since 2005, the Cambodian government has granted three large concessions—totaling 19 km^2—in Ratanakiri: Ultra Marine Kiri Co. Ltd., Seoul Digem (Cambodia) Co. Ltd., and Ratanak Chhorpoan (Cambodia) Ltd. We visited the first two, but both were inactive.

The gems we saw during our visit consisted almost exclusively of zircon that ranged from nearly colorless to dark brown, and was occasionally reddish brown. Many crystals showed remnants of their tetragonal shape, and

Figure 22. Parallel planes consisting of fine films were responsible for the chatoyancy of the stone in figure 21 (left). Brownish dendritic crystalline inclusions were also present (right); these are commonly seen in serpentine. Photomicrographs by G. Choudhary; magnified 30× and 45×.

most had a shiny "melted" surface (again, see figure 23) from partial resorption during transport in the basalt. A significant portion also exhibited tenebrescence: After being kept in darkness for several days, they were a bright orange to red that changed to brown with several minutes' exposure to sunlight. This photochromism is reversible and repeatable. The rough generally weighed 0.1–5 g, although we saw non-gem-grade specimens up to 100 g. Rough that will produce clean gems in excess of 10 ct is unusual, although cut stones larger than 100 ct are known.

Most of the rough is sent to Phnom Penh or Thailand for heating and cutting, although some is processed in Ratanakiri. The stones are heated in a reducing atmosphere at 900–1000°C for ~1 hour. Almost all brown zircon from this source will turn blue with heating (e.g., figure 25); a light blue color can sometimes be produced from stones that were originally colorless.

Additional images from this expedition are available in the *G&G* Data Depository.

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Figure 23. These rough zircons were recovered from Ratanakiri Province, Cambodia. The blue rough (up to 7 g) was produced by heating brown stones such as those on the left (up to 24 g). Photo by Prasit Prachagool.

Figure 24. The best-known Cambodian zircon deposit is at Bo Keo (left), where there are ~30 active mines. The shafts in this region are typically about 15 m deep. At Bo Kalap (below), there are ~10 active pits; the excavated material contains basalt cobbles and requires washing to recover the zircon. Photos by M. H. Smith.

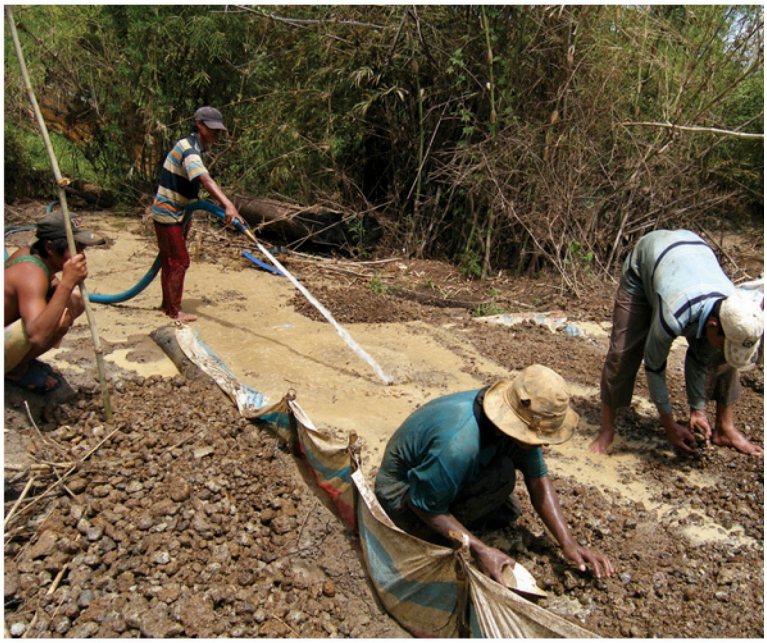

Figure 25. With heat treatment, most Ratanakiri zircon turns blue. The large emerald cut weighs 30.45 ct. Courtesy of Thai Lanka Trading.

CONFERENCE REPORTS

GIT 2008. After being postponed in December 2008 due to political unrest in Bangkok, the second Gem and Jewelry Institute of Thailand (GIT) conference, GIT 2008, was held March 9–12, 2009. Some 500 participants attended the two-day conference, which was followed by a two-day field trip to Kanchanaburi and the Bo Phloi sapphire mine. Parallel sessions saw 50 speakers, and there were approximately the same number of posters on display. Only selected oral presentations are mentioned in this report, since these authors were unable to attend all sessions. The conference proceedings (extended abstracts) are available in book or CD-ROM format by contacting the GIT at www.git.or.th.

After the opening ceremony, hosted by GIT Director **Dr. Wilawan Atichat** and Thai Deputy Minister of Commerce **Alongkorn Ponlaboot**, the conference started with three keynote speakers. **Vichai Assarasakorn**, president of the Thai Gem and Jewelry Traders Association, gave an impressive overview of the Thai gem and jewelry business. He was followed by **Massimo Zucchi** (Studio Zucchi Design, Milan, Italy), who discussed globalization and branding, and **Dr. Joerg Fischer-Buehner** (Legor Group SRL, Bressanvido, Italy), who lectured on palladium casting for jewelry.

Strategic marketing in emerging markets was discussed by **Dr. Krittinee Nuttavuthisit** (Chulalongkorn University, Bangkok), and the new era of jewelry design in Thailand was reviewed by **Dr. Veerawat Sirivesmas** (Silpakorn University, Bangkok). One of these contributors **(LK)** presented an overview of the Tom Lantos JADE Act, its implications for the trade, and possible alternative ruby sources.

Hyun Min Choi (Hanmi Lab, Seoul, Korea) examined photoluminescence characteristics of HPHT-processed natural type IIa diamonds. **Dr. Walter Balmer** (Chulalongkorn University) gave a presentation on behalf of Swiss gemologist **George Bosshart**, who was unable to attend. Mr. Bosshart's research focuses on distinguishing natural from artificially colored green diamonds; the presentation introduced the properties of untreated green diamonds and the natural radiation mechanisms that produce this color.

An interesting report on rubies from Fiskenæsset, Greenland, was given by **Pornsawat Wathanakul** of GIT (for **Greg Davison** of True North Gems, Vancouver, British Columbia, Canada, who could not attend). A pair of garnet lectures was given by **Dr. Karl Schmetzer** (Petershausen, Germany) and GIT's **Dr. Visut Pisutha-Arnond**. **Dr. Claudio Milisenda** (German Gemmological Association, Idar-Oberstein) reported on his study of red labradorite-andesine feldspars and offered some promising results based on FTIR data on the distinction of treated versus untreated stones. A thought-provoking talk about experimental heating of Cu-bearing tourmaline was given by **Thanong Leelawatanasuk** (GIT). **Boontawee Sriprasert** (Department of Mineral Resources, Bangkok) discussed heat-treatment experiments on red spinel from Myanmar. **Dr. Chakkaphan Sutthirat** (Chulalongkorn University) gave an introduction to heat-treatment experiments on sapphire from the Awissawella deposit in Sri Lanka. **Dr. Ahmadjan Abduriyim** (Gemmological Association of All Japan—Zenhokyo, Tokyo) presented his findings on treated green amber.

The SSEF Swiss Gemmological Institute's **Dr. Michael Krzemnicki** described modern, portable instruments for advanced testing in the gemological laboratory, including UV-Vis and laser-induced breakdown spectrometers. **Dominic Mok** (AGIL Ltd., Hong Kong) gave a controversial lecture on advanced testing of jadeite jade (called *Fei Cui* by the Chinese). After describing the different colors of jadeite, he mentioned that kosmochlor and omphacite are also called *Fei Cui* in the Chinese market. This brought strong reactions from some attendees, as these two materials are considered much less valuable than true jadeite.

Dr. Henry Hänni (SSEF) delivered an overview of the different types of cultured pearls, and **Kenneth Scarratt** (GIA Thailand) discussed nautilus pearls.

After the conference, the two-day field trip took approximately 80 participants to the Bo Phloi gem field about 170 km northwest of Bangkok. The field lies within Quaternary sediments and covers an area of about 1200 km^2. The largest sapphire deposit in Thailand's western region, it is operated by SAP Mining Co. Ltd. as an open-pit mine. The gem-bearing layers are 1–8 m thick at depths of 6–19 m. The gravel is brought to a washing site to concentrate the gem corundum before it is hand-sorted. In addition to sapphire, miners have recovered black spinel, black pyroxene, and red garnet.

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