COLORED STONES AND ORGANIC MATERIALS

Influence of the depth on the shape and thickness of nacre tablets of *Pinctada margaritifera* pearl oyster, and on oxygen isotopic composition. M. Rousseau (rousseam@gmx.net) and C. Rollion-Bard, *Minerals*, Vol. 2, No. 1, 2012, pp. 55–64, http://dx.doi.org/10.3390/min2010055.

The pearl oyster *Pinctada margaritifera* is farmed in French Polynesia. The quality of a pearl depends on the quality of its surface nacre, and iridescence is affected by the thickness of its nacre layers. In this study, pearl oysters were kept for one week at four different depths (7, 20, 30, and 39 m) to test the influence of water depth on the shape and thickness of the nacre tablets. Scanning electron microscopy was used to measure the tablets' thickness and image their final shape, which changed from hexagonal to rhomboid at a depth of 39 m. The change in shape was accompanied by a decrease in the thickness of the tablets by 16–30% on average. This could affect the nacre's optical properties by improving the luster and iridescent colors. The oxygen isotopic composition was measured using secondary ion mass spectroscopy. The authors demonstrated that water depth can modify the size, shape, and thickness of nacre tablets, but not the $\delta^{18}O$ value. *GL*

Micro-Raman investigations on inclusions of unusual habit in a commercial tanzanite gemstone. M. Giarola, G. Mariotto [gino.mariotto@univr.it], and D. Ajò, *Journal of Raman Spectroscopy*, Vol. 43, No. 4, pp. 556–558, http://dx.doi.org/10.1002/jrs.3059.

This study investigated the chemical nature and crystal structure of numerous red sub-millimeter-size inclusions of unusual habit located below the surface of a tanzanite. Spectral markers of hematite were observed.

This section is designed to provide as complete a record as practical of the recent literature on gems and gemology. Articles are selected for abstracting solely at the discretion of the section editors and their abstractors, and space limitations may require that we include only those articles that we feel will be of greatest interest to our readership.

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Hematite crystallizes in the rhombohedral system and is known to show different habits. On the basis of the experimental findings and data from the literature for single crystals of hematite or for other iron oxides and oxyhydroxides, the tanzanite inclusions consisted of polycrystalline hematite affected by a considerable degree of disorder, "probably related to peculiar ambient conditions of their nucleation and growth" in the host crystalline matrix. *ERB*

$^{18}O/^{16}O$ and V/Cr ratios in gem tsavorites from the Neoproterozoic Mozambique metamorphic belt: A clue towards their origins? G. Giuliani, A. E. Fallick, J. Feneyrol, D. Ohnenstetter, V. Pardieu, and M. Saul, *Mineralium Deposita*, Vol. 46, No. 7, 2011, pp. 671–676, http://dx.doi.org/10.1007/s00126-011-0355-6.

Green vanadium (± chromium)–bearing grossular, also known as tsavorite, occurs along the Neoproterozoic Mozambique metamorphic belt that extends from eastern Africa to Antarctica. Small amounts of tsavorite have been reported from Antarctica, Canada, Myanmar, and Pakistan. The most significant deposits are found in Kenya, Tanzania, and Madagascar, where the gem occurs in a sequence of metasedimentary rocks—graphitic gneiss or schist in particular, often associated with marble. It is found as nodules or euhedral crystals in primary deposits, and as rounded pebbles or broken crystals in alluvial placers.

In this study, the authors analyzed the chemical composition of 69 tsavorite samples from 24 localities to form the basis of both a geologic and geographic (country-of-origin) source determination. Based on analyses of oxygen isotopes and V-Cr-Mn trace-element concentrations, the authors could begin to distinguish samples—from the Lelatema fold belt in Tanzania, for example. Oxygen isotope data can act as a reliable tracer of the geologic environment of formation. As demonstrated here and in other studies of corundum and emerald, oxygen isotope data combined with other chemical analyses can provide a powerful tool for gemstone origin identification. *JES*

Opal—the craze for stability. B. Rondeau, E. Fritsch, F. Mazzero, and J. Gauthier, *InColor*, No. 18, Winter 2011, pp. 42–45.

The two types of opal destabilization phenomena, which may happen hours or months after mining, are called *cracking* and *whitening*. Both are irreversible. Cracking happens most often in amorphous opals, with fissures developing along the surface or throughout a specimen. With whitening, the effect ranges from a faintly milky appearance to banding to a solid white inner "egg."

Unfortunately, opals of all types from any geographic source can be affected, and stability predictions are nearly impossible. Many studies have theorized that destabilization results from some degree of water loss from the opal, though internal stress and chemical differences might also play a role. A 2004 doctoral thesis by B. O. Aguilar-Reyes found that most destabilized opals lose water and that a structural rearrangement, characterized by an additional Raman band around 2900 cm^{-1}, accompanies the whitening.

While there are significant testing and funding barriers that limit the research being conducted on opals, the potential for future discoveries is considerable. *AB*

Rough grading system for Zambian emeralds. A. Banks, *Gems & Jewellery*, Vol. 21, No. 1, 2012, pp. 14–15.

Gemfields PLC produces approximately 20% of the world's emerald supply at its Kagem mine in Zambia. Since the quality of this "type III" (i.e., almost always included) gem material varies, the company has developed a system for grading the rough. The emeralds are graded using four parameters: color, clarity, cut, and carat weight. Dividing the rough material into groups with similar characteristics allows cutters to manufacture in bulk with consistent quality. Uniformity in grading emeralds has been difficult in the past, and the Gemfields system has helped revolutionize emerald production. *MK*

Tsilaisite, $NaMn_3Al_6(Si_6O_{18})(BO_3)_3(OH)_3OH$, a new mineral species of the tourmaline supergroup from Grotta d'Oggi, San Pietro in Campo, island of Elba, Italy. F. Bosi [ferdinando.bosi@uniroma1.it], H. Skogby, G. Agrosi, and E. Scandale, *American Mineralogist*, Vol. 97, No. 5–6, 2012, pp. 989–994, http://dx.doi.org/10.2138/am.2012.4019.

This paper describes the chemical and gemological properties of a long-expected end-member of the tourmaline supergroup. This end-member, tsilaisite, is characterized by the presence of Na, Mn^{2+}, and Al.

Although the term *tsilaisite* has sometimes been used in gemology to refer to a yellow tourmaline without a brownish cast, and a tsilaisite component has been identified in some tourmaline from various localities, true tsilaisite had never been found in nature until now. The tourmaline supergroup is chemically complex, and the ideal formula of tsilaisite has been a matter of speculation in the literature. Relevant substitution mechanisms are discussed in this paper.

The tsilaisite crystals occur in an aplitic dike of an LCT (lithium cesium tantalum)–type pegmatite body in association with quartz, K-feldspar, plagioclase, and elbaite, and schorl on the Italian island of Elba. The gemological properties of the tsilaisite include a greenish yellow hue with a vitreous luster, a white streak, no UV fluorescence, and a Mohs hardness of about 7. It is brittle and has a sub-conchoidal fracture with calculated density of 3.133 g/cm^3. Tsilaisite is uniaxial negative, pleochroic (pale and very pale greenish yellow), and has RI values of 1.625–1.645. Samples were analyzed by a combination of

electron microprobe, secondary ion mass spectrometry, and optical absorption spectroscopy. The authors provide tables of chemical and X-ray powder diffraction data, as well as a discussion of tsilaisite's relationship to other species. The mineral chemistry findings and empirical ordered formula, described in detail in the paper, substantiate this new species.

The occurrence of tsilaisite is very rare in nature, owing to the extraordinary petrogenic conditions required and the limited structural stability. *ERB*

Topaz crystals from various geological settings. M. Duma ska-Slowik, J. Fijal, and L. Natkaniec-Nowak, *Gemmologie: Zeitschrift der Deutschen Gemmologischen Gesellschaft*, Vol. 60, No. 3–4, 2011, pp. 87–104.

Topaz is usually hosted by primary deposits consisting of granite, rhyolite, pegmatite, and greisen. It is also found in secondary deposits in detrital sediments. This study focused on topaz from different host rocks at important sources worldwide.

Europe's largest known topaz deposit is located in the Volodarsk-Volynski Massif of western Ukraine. Well-formed topaz crystals were found weighing up to 117 kg, in various colors. Blue topaz studied from this deposit contained inclusions of quartz, feldspar (mainly albite), and iron sulfide, as well as Ti-oxide needles and oval-shaped two-phase fluid inclusions with tails.

The Sherlovaya Gora granitoid massif in Russia contains numerous greisen veins that formed by metasomatic processes. While famous for topaz crystals, these greisens also hosted Russia's largest gem-quality beryl deposit. The authors found that colorless topaz samples with light yellow tips contained two-phase liquid and gas inclusions of up to 25 µm, solid inclusions (quartz and apatite), growth lines, and twin planes. The presence of hydrocarbons was confirmed by blue luminescence to UV radiation. These Russian samples contained fewer inclusions than their Ukrainian counterparts.

Topaz from Ouro Prêto in Minas Gerais, Brazil, formed in kaolinite-quartz-K-feldspar veins cutting phyllite, dolomite, and marble. The color variety of these topazes—"golden" yellow, orange, and orange-red—is due to chromophores such as Cr^{3+}, V^{4+}, Ti^{4+}, Mn^{3+}, and Fe^{3+}. Yellow-red samples examined by the authors contained crystalline inclusions, hematite, two-phase fluid inclusions, microfissures, growth lines, and twin planes.

The cavity-bearing rhyolites from the Thomas Range in Utah are known as *topaz rhyolites*. Topaz from these cavities is 1–10 cm long, and the color varies from pink to light brown. Pink topaz studied by the authors was colored by Mn^{3+} and Fe^{3+}, and contained microfissures and linearly formed fluid inclusions, in which dark inclusions were observed.

Chemical analyses showed that the Brazilian topaz had the highest Fe content, while the Ukrainian samples had the lowest. Brazilian topaz also contained the greatest amounts of Mn and OH (45 mol%). The IR spectra of all the samples were similar except in the region of OH-stretching at around 3645 cm^{-1}. After deconvolution and curve-fitting, a single band was observed at 3648 cm^{-1} in the Ukrainian samples. The Russian samples showed four bands at 3648, 3650, 3645, and 3638 cm^{-1}, while the Brazilian topaz had five bands at 3650, 3644, 3636, 3629, and 3615 cm^{-1}. *KSM*

DIAMONDS

Gem-quality diamonds: Source discrimination. L. Coney (louisec@mintek.co.za), A. V. Moila, A. G. Quadling, *South African Journal of Geology*, Vol. 115, No. 1, 2012, pp. 33–46, http://dx.doi.org/10.2113/gssajg.115.1.33.

In the late 1990s, "conflict diamonds" were notoriously used to fund violent insurgencies in Africa. Forensic fingerprinting would enable the industry to trace any future conflict diamonds. This work addresses whether scientific analysis can discriminate diamonds by geographic origin. Combined physical (morphological) and chemical studies on 10 parcels of gem-quality samples from African alluvial and kimberlitic sources are presented.

Nitrogen contents and aggregation states were determined from Fourier-transform infrared (FTIR) spectroscopy; laser ablation–inductively coupled plasma–mass spectrometry (LA-ICP-MS) was used for selected trace-element concentrations. The study showed that only a few elements are consistently enriched in significant quantities, and that certain elements not detected in the 10 parcels may form a more discriminatory tool. Although subtle differences between parcels (and areas of origin) are evident, the intrinsically heterogeneous nature of diamonds, particularly gem-quality diamonds, creates difficulties with scientific fingerprinting as a mechanism to discriminate them. *GL*

GEM LOCALITIES

Conditions of emerald formation at Davdar, China: Fluid inclusion, trace element and stable isotope studies. D. Marshall, V. Pardieu, L. Loughrey, P. Jones, and G. Xue, *Mineralogical Magazine*, Vol. 76, No. 1, 2012, pp. 213–226, http://dx.doi.org/10.1180/minmag.2012.076.1.213.

Emeralds were discovered at Davdar, in the western part of China's Xinjiang Province, in 2000. They form crystals (up to several centimeters long) in quartz-carbonate veins (up to 20 cm wide) hosted by metasedimentary rocks. These veins are associated with a major fault zone. Data obtained from fluid inclusions, stable isotopes, and petrographic studies indicate that the emeralds formed from highly

saline brines in greenschist facies metamorphic conditions at temperatures of ~350ºC and pressures up to 160 MPa. The geology of the deposit is not fully understood because geologic maps of the area are incomplete. The original source of the beryllium for emerald formation is unknown, but it appears likely that Be-bearing brines moved upward within the stratigraphic sequence of sedimentary rocks along the fault zone. There they interacted with Cr (±V)–bearing shales and other sediments to form emerald. Compared to other Central Asian deposits, the Davdar occurrence is most similar to those in Afghanistan's Panjshir Valley. *JES*

Geochemical and petrological characterization of gem opals from Wegel Tena, Wollo, Ethiopia: Opal formation in an Oligocene soil. B. Rondeau (benjamin.rondeau@univ-nantes.fr), B. Cenki-Tok, E. Fritsch, F. Mazzero, J.-P. Gauthier, Y. Bodeur, E. Bekele, E. Gaillou, and D. Ayalew, *Geochemistry: Exploration, Environment, Analysis*, Vol. 12, No. 3, 2012, pp. 93–104, http://dx.doi.org/10.1144/1467-7873/10-MINDEP-058.

Opal deposits at Wegel Tena, in the Wollo Province of Ethiopia, are hosted by a single horizontal layer of weathered ignimbrite interbedded within a thick series of unaltered Oligocene volcanic rocks. This work describes the textural and microscopic features of opals from the deposit and the petrography of their host rocks. The Wegel Tena opals display unusual geochemistry, with some samples yielding the highest Ba concentrations ever recorded in opal. Their geochemical fingerprints clearly distinguish them from opals mined anywhere else.

The concentration of chemical impurities in opal primarily reflects the host-rock composition. The crystallography of opal controls, at least in part, the incorporation of chemical impurities. The multimodal distributions of several chemical impurities suggest at least two origins of silica: weathering of feldspars and weathering of volcanic glass. The Wegel Tena opals contain very well-preserved plant fossils, and their host rock exhibits features typical of pedogenesis. The fossils indicate that the opal formed in a sedimentary environment, probably during a pause in a volcanic event, which allowed the weathering of ignimbrites and the liberation of silica. *GL*

The Jonas mine, Itatiaia, Minas Gerais, Brazil. W. E. Wilson, *Mineralogical Record*, Vol. 43, No. 3, 2012, pp. 289–317.

The Jonas mine is famous for the "cranberry" red tourmaline crystals discovered there in the late 1970s. The story of the geology, mineralogy, history, and production of this prolific Brazilian mine is told with the help of many stunning photos of crystals and the author's own beautiful rendering of the original pocket discovery.

Located near the village of Itatiaia in the state of Minas Gerais, it was initially named the Joao Pinto mine after the farmer who worked it in the 1940s and 1950s. At the nearby Itatiaia mine, an independent miner named Barbosa had discovered hundreds of kilos of highly color zoned "parrot" tourmaline. In the late 1970s his son Ailton Barbosa, a gem dealer and miner, went back to the site of the Joao Pinto mine to hunt for more tourmaline. After much disappointment, he located a pocket filled with mud and water that yielded pink-capped black crystals. The water led Barbosa to believe that a much larger pocket was directly overhead, and after careful digging he discovered what became known as the Bamburro ("Lucky Break" or "Jackpot") pocket. This famous pocket was more than 2.5 m wide and 3 m tall, with red tourmaline crystals lining the walls, lying on the floor, and suspended from the sides and ceiling. The specimens were so clean that they did not even require washing to display their beauty. Named rubellite specimens from this deposit include the Joninha, the Foguete ("Rocket"), Tarugo (a Portuguese term for a short, fat ugly man), and the Flor de Lis, all of spectacular size and quality, setting the standard for iconic mineral specimens.

Along with fame and fortune for the mine's investors, there were hazards tied to the discovery of such concentrated wealth. Gunmen were hired to guard the mine and the Governador Valaderes warehouse, where eventually several tonnes of crystals and mineral specimens were stored. Rumors were of wiring dynamite to the specimen tables and keeping poisonous snakes in the warehouse to protect the bounty from thieves. The total value of that single pocket is estimated at around $50 million.

Impressive finds were later made at the same mine and in others in the Itatiaia area, but none surpassed the 1977 discovery. *JEC*

Kingman turquoise. S. Wilson, *Rock & Gem*, Vol. 42, No. 5, 2012, pp. 34–37.

Kingman turquoise sets the standard for American Southwest turquoise. The Colbaugh family has been mining the Kingman claim intermittently since 1962. Since the family resumed operations nearly a decade ago, the production of turquoise has rivaled the quality that made the mine famous 50 years ago. The author relates his time spent at Kingman learning how turquoise is extracted and processed before reaching the market. He also notes that during their early days at the claim, the Colbaugh family found archeological evidence of mining activity some 1,500 years ago. *MK*

Mineralogy of jadeitite and related rocks from Myanmar: A review with new data. G. H. Shi, G. E. Harlow, J. Wang, J. Wang, E. Ng, X. Wang, S. M. Cao, and W. Cui, *European Journal of Mineralogy*, Vol. 24, No. 2, 2012, pp. 345–370, http://dx.doi.org/10.1127/0935-1221/2012/0024-2190.

Jadeitite is a rock composed almost entirely of jadeite and related pyroxenes. Geologically interpreted as a rare prod-

uct of crustal subduction processes, it is found in serpentinite mélange at a few localities in association with high-pressure, low-temperature metamorphosed rocks (eclogites and blueschists). The largest and most commercially important source of this rock is the so-called Jade Tract in Kachin State in northern Mynamar. In this region, more than 30 mineral species have been documented from jadeitites and related rocks. Two stages of jadeite and accompanying mineral formation have been identified in this area.

The variety of mineral replacement textures observed in jadeitites indicates that serpentinite mélanges were subjected to fluid infiltration and potential replacement by (or reaction with) jadeitite. A general mineralogical comparison can be used for provenance determination, particularly for archaeological jades. Jadeitites worldwide appear to share similarities in origin despite differences in formation age, mineral assemblages, and quality of the jadeite. *JES*

Past, present and future of Australian gem corundum. A. Abduriyim, F. Sutherland, and T. Coldham, *Australian Gemmologist*, Vol. 24, No. 10, 2012, pp. 234–242.

Australia's commercial corundum production dates back more than 100 years. Until the 1990s it was the world's largest producer, accounting for 70% of global output by weight and producing a wide variety of qualities, sizes, and colors. Australia now produces 25% of world's corundum output.

The authors visited Australia's main corundum sources—the eastern states of Queensland, New South Wales, and Victoria—to collect samples and investigate the geologic formation, corundum distribution, and mining capacities. Throughout eastern Australia, sapphire deposits are typically concentrated in the areas of weathered alkali basalts, where they form secondary deposits. Extraction methods include hand mining, small to medium mechanized operations, and large-scale machinery-based open pit operations.

New South Wales produces the highest quality and yield of Australian blue sapphires, and it contains the largest sapphire reserve in the world. The rough typically ranges from 1 to 4 ct. Secondary deposits, locally called "wash," occur in layers 1 to 3 m thick underneath dark clayey soil, a few meters below the surface. Stones are found in a wide range of colors (including particolored) with rough typically weighing 0.05–6 ct. The article discusses crystal morphology, size, and mineral inclusions across the mining regions, noting that Australia's sapphires are high in Fe, Ti, and Ga. Australia's ruby production is small compared to other major corundum localities.

The authors survey some factors that have contributed to a significant fall in sapphire exports, particularly higher operating costs and increased production from Thailand, Nigeria, China, and Madagascar. It also discusses how deceptive trade practices helped create the perception of Australian stones as dark, poor-quality "inky blue" material.

Despite the curtailment of demand and recent mine closures, some sites have remained open by employing innovative initiatives such as mining experience tours, campsites, and sales exhibits aimed at the local tourist market.

The authors conclude that encouraging foreign investment would give eastern Australia ample opportunity to redevelop its commercial reserves of gem corundum. *ERB*

Sapphire rush in Kataragama. G. Zoysa (mincraft@slt.lk) and S. Rahuman, *InColor*, No. 19, Spring 2012, pp. 56–61.

Since the late 1970s, Kataragama in Sri Lanka has been known for fine-quality gems such as hiddenite, hessonite, blue sapphire, green beryl, and aquamarine. During a recent road construction project in nearby Thammannawa, some transparent sapphires with vivid blue color and excellent crystal shapes were discovered by accident. The mining rush triggered by the discovery prompted the government to halt the partially completed road project. Although some very fine specimens have been found, production thus far has been rather disappointing, though miners remain hopeful. *MK*

SYNTHETICS AND SIMULANTS

Could developing technology create a bigger niche for laboratory-grown diamonds? *Israel Diamonds*, No. 242, 2012, pp. 18–22.

The market for synthetic diamonds has grown to $200 million yearly. The major producers have apparently resolved most of the technological barriers, so the market is expected to thrive in the coming years.

The article describes the production and marketing strategies of the major producers: Gemesis, Apollo, and Scio Diamond Technology Corp. Gemesis, which produces yellow synthetics by the high-pressure, high-temperature (HPHT) process and colorless products by the chemical vapor deposition (CVD) method, markets directly to U.S. consumers via online distributors. The company claims to provide grading reports for all of its goods, identifying them as synthetic. Apollo manufactures colorless CVD synthetics, while Scio has modified its CVD process to create type IIa synthetics in pink, blue, brown, and black colors, as well as colorless products.

The article also discusses whether consumers will accept synthetic diamonds as they have cultured pearls. The fact that the major gemological labs now issue grading reports for synthetic diamonds is described as a stride for consumer acceptance as well as a vehicle for disclosure. *RS*

High quality synthetic yellow orange diamond emerges in China. S. Zhonghua, L. Taijin, S. Meidong, S. Jun, and S. Jingjing, *Australian Gemmologist*, Vol. 24, No. 7, 2011, pp. 167–170.

In late 2010, the National Gemstone Testing Center (NGTC) in Beijing received a 1.57 ct fancy yellow-orange modified brilliant synthetic diamond for identification and grading. This was the first large gem-quality synthetic diamond the NGTC had encountered. Its source is not reported, though the authors discuss possible Chinese sources, including the HPHT diamond growth laboratory at Jilin University. The article summarizes the NGTC's methods of determining the characteristics and origin of the sample.

FTIR spectroscopic data showed that the synthetic diamond is of type Ib, containing "A" aggregated nitrogen; Vis-NIR spectroscopy data supported the type Ib designation. Clarity inspection using a gemological microscope revealed rectangular-patterned internal graining and clouds of dispersed pinpoint inclusions. The patterns of these clarity features, shown in a pair of photos, are described as indicative of a synthetic origin. Raman photoluminescence spectrum features revealed the presence of nickel, providing further evidence. While EDXRF analysis did not offer any conclusive data, images generated by the De Beers DiamondView strongly suggested a synthetic origin. The table-view image showed a luminescence pattern in the shape of a green cross, while the pavilion view displayed a zoned luminescence pattern. *JS-S*

TREATMENTS

Spinel and its treatments: A current status report. C. P. Smith, *InColor*, No. 19, Spring 2012, pp. 50–54.

Spinel is generally considered a treatment-free gemstone, but some treated goods are now being reported—an indication of spinel's strength in the gem market. The most common enhancement is the filling of fissures using oil. The oil's iridescence and high relief are easily recognizable under a gemological microscope.

Historically, spinel was never heat-treated to improve quality, but the American Gemological Laboratory has recently examined parcels of heated material. High-temperature heat treatment between 950° and 1150°C can improve transparency, but such material has not been widely encountered so far. Raman and PL spectra revealed features of such treatment—the broad Raman shift at ~405 cm^{-1} and a broad chromium emission band at ~687 nm, respectively. These broad bands were caused by disordered spinel lattice formed during heating. Inclusions related to low-temperature heat treatment were observed in these samples—atoll-like discoid stress fractures, low-relief secondary fractures extending from healed fissures, and stress fractures surrounding crystal inclusions. Surprisingly, the Raman and PL spectra were not broad. Instead, they were sharp bands, reflecting the ordered lattice structure. The temperature for this treatment was estimated at below ~750°C, with a heating time of less than six hours. The purpose of the heating was to improve color, not the transparency. The heat-related inclusions proved useful in identifying this treatment. Yet an inclusion-free spinel, treated by low-temperature heating, would pose a challenge. Research is under way to study samples before and after heating.

Today, major laboratories routinely test spinel for heat treatment, though only a small amount have been detected so far. It is believed that most spinels in the market are still free of treatments. *KSM*

MISCELLANEOUS

Conflicting treasures: Contrasting resource use governance in two artisanal gemstone mining sites in Madagascar. M. S. A. Baker-Médard, (mezbaker@berkeley.edu), *Journal of Political Ecology*, Vol. 19, 2012, pp. 221–237, http://jpe.library.arizona.edu/volume_19/Baker-Medard.pdf.

Using research gathered in Madagascar from 2004 to 2008, the author compares how claims were managed at two artisanal gemstone mining sites at opposite ends of the country during gemstone rushes and afterward.

With Madagascar's abundant gemstone discoveries since the 1990s and its unique biodiversity, the conflict over natural resource ownership and sustainable extraction is pronounced. A community-based natural resource management strategy was shown to have provided more structure and benefits to both local and migrant miners in Soabiby, in the southwest of the island. This contrasted with the uncontrolled extraction by miners flocking to a gem rush near Ambondromifehy in northern Madagascar, on the edge of a state-controlled national reserve. *EJ*

Disrupting the trade in illicit diamonds: A profile of enforcement efforts in the United States of America. U.S. Agency for International Development, January 2012, 30 pp., www.usaid.gov.

This paper overviews the U.S. government's efforts to keep illicitly mined and traded diamonds out of the legitimate supply chain. It describes the government's administration of the Kimberley Process and lists a number of suggestions to make enforcement more efficient. The paper also covers the USA PATRIOT Act and its companion Bank Secrecy Act, which regulate how and when gem dealers must report transactions, and reviews the sanctions against various governments and individuals, including Zimbabwe.

The second part of the paper describes various diamond smuggling avenues in producing nations. The final section analyzes the various means illicit diamond traders use to circumvent the laws and safeguards, as well as the measures taken to counteract them. *RS*

Geographical origin: Branding or science? H. A. Nguyen Bui and E. Fritsch, *InColor*, No. 19, Spring 2012, pp. 30–39.

This article examines why gemstones from certain locales are considered more desirable than others, noting that history can play a decisive role—historic sources are generally favored over new deposits. The article also discusses traditional means of origin identification, such as distinctive colors and inclusions, and follows with more scientific means of doing so. The final section of the report offers possible geographic characteristics for 11 gemstones, including diamond, but notes that such identifications are still inconsistent and much research remains to be done.

RS

Pearl farming as a sustainable development path. L. Cartier (laurent.cartier@unibas.ch) and S. Ali, *The Solutions Journal*, Vol. 3, No. 4, 2012, www.thesolutionsjournal.com/node/1139.

Declining marine biodiversity in the Pacific region can be resolved by expanding cultured pearl farming, this study suggests.

Evidence shows that for conservation to work, it needs to provide economic benefits for the communities involved. And cultured pearl farming is a rare business where effective environmental management and conservation do improve economic success. The healthier the oysters' growth environment, the more attractive and valuable the pearls produced. Estimates suggest that 95% of a pearl farm's income stems from 2% of its pearls.

Cultured pearls, it is argued, should be promoted to consumers as a sustainable gemstone, since their production promotes conservation and economic activity in communities with few opportunities. Other products derived from oyster shells are also in demand. Furthermore, pearl oysters are highly efficient water filters, making them effective in the removal of pollutants.

EJ

Pearl fishing in the ancient world: 7500 BP. V. Charpentier [vincent.charpentier@inrap.fr], C. Phillips, and S. Méry, *Arabian Archaeology and Epigraphy*, Vol. 23, No. 1, 2012, pp. 1–6, http://dx.doi.org/10.1111/j.1600-0471.2011.00351.x.

This paper discusses the origin, shape, and cultural significance of pearls of the sixth to fourth millennia BC recovered from archaeological excavations between Arabia and Mesopotamia. The discoveries reveal an ancient fishing tradition that no longer exists. Although ancient accounts provide little information about pearls, these goods were clearly part of the cultural and economic fabric of Neolithic southeast Arabia.

Fishermen of this time selected pearls according to their shape, preferring the rarer spherical specimens from either the large pearl oyster *Pinctada margaritifera* or the *Pinctada radiata*. The latter produces small but high-quality pearls that are easier to collect. The excavated pearls were often white, opaque, and matte—some also possessed pink, orange, and brownish tones—and retained their original luster (due to preservation in the low-pH shell layer). Moreover, the mother-of-pearl from the oysters was an important resource in the ancient Arabian economies, fashioned into fish hooks for large fish, including tuna and sharks.

Pearls constituted only a fraction of Arabian burial jewelry but occupied a particular place in funeral rites. They were deposited inside the face of the deceased; semi-perforated pearls were used for men and completely perforated ones for women. Pearls assembled with stone beads in bracelets have also been found.

It is popularly believed that the world's oldest known pearl is the 5,000-year-old Jomon pearl from Japan. This paper presents archaeological data on a newly documented specimen recovered with the burial remains of a male near the Straits of Hormuz in Umm al-Quwain, United Arab Emirates. It has been radiocarbon dated to 7500 BP, making it the oldest documented pearl. It measures about 4 mm in diameter and appears irregularly round. Although the bodycolor is not described, the accompanying photograph suggests a dark orangy yellow.

ERB