
GEMOLOGICAL ABSTRACTS

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COLORED STONES AND ORGANIC MATERIALS

'Arteries' in opal? R. K. Mitchell, *Journal of Gemmology*, Vol. 19, No. 7, 1985, pp. 584–585.

After reviewing the general appearance of Mexican opal and listing some of the inclusions noted in them to date, the author reports on an unusual specimen. This flat cabochon had a "blood-red" color with a reticulated pattern; Mr. Mitchell compares it to a medical picture of a circulatory system. He notes that whereas iron contamination is commonly assumed to cause such colors in porous gems, in this specimen the cellular patterning

may have been caused by colorant solutions penetrating and flowing in wisps during the opal's early stages of formation—when it was a somewhat plastic gel. *RCK*

Green phantoms. E. R. Swoboda, *Lapidary Journal*, Vol. 39, No. 11, 1986, p. 24.

The author provides a concise, well-written historical account of the early discovery of Brazilian quartz crystals containing phantoms of minerals such as pyrite and chlorite. Much of the information in this article is a recounting of the author's own experiences as a long-time explorer and dealer in Brazilian minerals. A number of descriptions of important specimens are given. Two of these specimens, one a crystal containing 26 pyrites and the other a beautiful chlorite phantom, influenced the author to locate and reopen the old mines that had yielded these two inclusion-filled pieces. Mr. Swoboda describes the reopening of the mines and the new discoveries made. Because the mine producing the chlorite phantoms is currently active, the author is able to provide a great amount of detail concerning this locality.

The minerals noted by the author as inclusions in these crystals are chiefly green chlorite phantoms, carbonate crystals, limonite, hematite, rutile as stubby needles, white phantoms of unknown mineral(s), and montmorillonite clay-like inclusions in shades of pink, orange, brown, red, and black.

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 editor and her reviewers, and space limitations may require that we include only those articles that will be of greatest interest to our readership.

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The reviewer of each article is identified by his or her initials at the end of each abstract. Guest reviewers are identified by their full names.

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The crystals and gems cut from them are quite striking and make excellent decorative specimens and jewelry. The article is illustrated with scenes from the mine, and with a color plate showing five phantom crystals and six faceted gems. *John I. Koivula*

The solid solution chemistry of vesuvianite. T. D. Hoisch, *Contributions to Mineralogy and Petrology*, Vol. 89, 1985, pp. 205–214.

Vesuvianite, or idocrase, is a lesser-known gem mineral that is typically brown or green, but is also found in a very broad range of colors. Faceted stones up to 15 ct have been reported. This material has a wide range of refractive-index and specific-gravity values that result from its complex chemistry and varied geologic occurrence. As with such gemstones as garnet and tourmaline, extensive solid solution, or the substitution of one chemical element for another, occurs in idocrase. This article is a detailed study of the crystal chemistry of idocrase, that is, the relationship between its physical properties, chemistry, and crystal structure. *JES*

The tourmaline group: a résumé. R. V. Dietrich, *Mineralogical Record*, Vol. 16, No. 5, 1985, pp. 339–351.

This article summarizes the mineralogical and gemological properties presented in Dietrich's new book, *The Tourmaline Group*. This group of minerals contains some of the most attractive and interesting species known, differing widely in their complex chemical compositions and occurring at a vast number of deposits worldwide. Tourmaline is today among the most popular of colored gemstones because of its availability in a wide range of color hues and saturations, including multicolored stones. This article provides information on the nomenclature, crystallography, chemical and physical properties, uses, and occurrence of tourmaline. Accompanied by a number of superb color photographs and other interesting illustrations, the article is an excellent introduction to Dietrich's more detailed book on the tourmaline mineral group. *JES*

DIAMONDS

Diamonds and the Holocaust. D. Federman, *Modern Jeweler*, Vol. 84, No. 5, 1985, pp. 39–46, and 72.

"For 300 years European Jews had been cutting and selling the bulk of the world's polished diamonds in Belgium and Holland. On May 10, 1940, when Nazi Germany invaded both these countries, the world stood to lose more than 80% of its supply of polished diamonds." This is the central premise of Federman's article, which outlines the history of the European diamond-cutting industry before World War II, and then tells the story, purportedly for the first time, of "how the diamond industry survived the Nazi nightmare."

Situated as they were in the Low Countries, Europe's diamond-cutting capitals—Amsterdam and Antwerp—were caught off guard by the Nazi invasion, and the Jewish-dominated industry was frozen at a standstill. Federman traces various escape routes that some diamond dealers used to flee the Nazis—routes that ultimately led to the establishment of interim cutting centers in London, Brazil, Palestine, and Cuba. These "refugee" cutting locations prevented the world's diamond supply from suffering from the far graver enormities of the Holocaust.

Though it runs the risk, ironically, of trivializing the Holocaust itself, Federman's article is an important historical contribution to the understanding of today's diamond-cutting industry. It tells us how, for example, some of the alternative cutting locations became viable centers in their own right—notably Israel, but also India, whose meager output of 700 ct in 1945 was, as Federman tells us, "a harbinger of post-war expansion and eventual Third World emergence" in the field. This was the true legacy of the Holocaust to the diamond-cutting industry, he concludes. *MB*

On the rocks? C. Cummings, *Canadian Jeweller*, Vol. 107, No. 1, 1986, pp. 30–35.

The author gives us a rare look into Antwerp's struggle to retain its preeminence as a diamond cutting and trading center.

Antwerp's woes are numerous: a decline of some 11,500 workers in the trade over the past decade, huge bad debts assumed by trade lending organizations, several bankruptcies among large diamond companies, and, most serious of all, the slump in worldwide diamond sales as a result of the recession of the early 1980s. Further problems include Russian "dumping" of polished goods (and perhaps some rough) whenever they need foreign currency and reduced Arab spending in the wake of the current oil glut.

Antwerp's four bourses are also discussed, revealing some interesting facts and historical perspectives. The Antwerp Bourse, for example, was the world's first, having been established in 1893. Over the years the ethnic makeup of the bourse membership (which had been predominantly Jewish) has shifted to a majority of members coming from eastern Mediterranean countries or from Belgium itself. The four Antwerp bourses together handle more diamond transactions than all the rest of the world's 15 bourses! About 70% of the world's rough diamonds pass through Antwerp. Belgian law gives final authority in some disciplinary decisions to the bourses—not the courts.

Leaders in the Antwerp market also note some bright spots, one of which is automation. Semiautomatic polishing machines have greatly reduced training time and increased productivity. Antwerp manufacturers also place considerable value on their excellent reputa-

tion for "old-world" craftsmanship. The Diamond High Council of Antwerp is promoting the Antwerp diamond industry worldwide and generally raising the profile of this most important diamond city. *James R. Lucey*

GEM LOCALITIES

Gem pegmatites of the Shingus-Dusso area, Gilgit, Pakistan. A. H. Kazmi, J. J. Peters, H. P. Obodda, *Mineralogical Record*, Vol. 16, No. 5, 1985, pp. 393–411.

Pegmatites in the Gilgit region of northern Pakistan have yielded exceptionally fine specimens of multicolored tourmaline as well as aquamarine, topaz, and almandine-spessartine garnet. This region lies in the rugged Karakoram range along the northern border of the Himalayas. The gem pegmatites occur in a series of regionally metamorphosed igneous and sedimentary rocks that represent the suture zone between the Indo-Pakistan and Asian crustal plates. In addition to the gem materials, the pegmatites contain a variety of other minerals such as feldspars, apatite, hambergite, micas, and zircon. Details of the geology and mineralogy of these pegmatites are accompanied by photographs of many aesthetic crystal specimens. *JES*

Maine tourmaline. C. A. Francis, *Mineralogical Record*, Vol. 16, No. 5, 1985, pp. 365–388.

Since their discovery in the early 1800s as some of the earliest known gem localities in North America, the gem pegmatites of Maine have produced an astonishing array of specimens of gem tourmaline and other minerals. This review article describes the occurrence of tourmaline and other pegmatite gem minerals in Maine, especially in Androscoggin, Oxford, and Sagadahoc counties. The history of mining at a number of famous localities, including Mount Mica, Mount Rubellite, Newry, Mount Apatite, and others, is summarized with interesting details on tourmaline specimens and on noted individuals who were associated with their discovery. Twelve color photographs of spectacular tourmaline crystals from this area highlight the article. *JES*

Minerals of the Elba pegmatites. P. Orlandi and P. B. Scortecci, *Mineralogical Record*, Vol. 16, No. 5, 1985, pp. 353–363.

The small island of Elba, lying between Italy and Corsica, has been mined (principally for iron ores) for the past two millennia. While long noted as a source of mineral specimens, the granitic pegmatites that dot the western half of the island have been worked for gem material only within the last hundred years.

This article briefly describes the geology and mineralogy of the Elba pegmatites. These pegmatites occur in narrow dikes or veins that are associated with the Monte Capanne granodiorite stock. They range up to 1

m in thickness and may exhibit well-developed internal zonation. Common minerals include quartz, orthoclase, albite, and schorl, while more interesting species (tourmaline, garnet, petalite, and beryl) are found in pockets in the cores of zoned pegmatites. Details of the minerals found in the pegmatites, along with attractive color photographs of many of them, are provided. This area is likely to remain best known for its mineral specimens rather than as a source of gem material. *JES*

Minerals of the Pikes Peak granite. B. L. Muntyan and J. R. Muntyan, *Mineralogical Record*, Vol. 16, No. 3, 1985, pp. 217–230.

Amazonite is an attractive blue-green variety of microcline feldspar that is commonly used as a gem material in cabochon form. One of the most important sources of gem-quality amazonite and smoky quartz are the granitic pegmatites in the vicinity of Pikes Peak, Colorado. This article summarizes the geology and mineralogy of this remarkable region. The pegmatites occur in granites of the Pikes Peak batholith, which covers an area of about 2,800 km² in central Colorado. Consisting mainly of quartz and microcline, the pegmatites are seen as small dikes running in all directions within the granite. Amazonite, smoky quartz, topaz, and a number of other minerals are found within small pockets in the granite.

Photographs of various minerals noted from this area are included in the article. The small size and random distribution of the pockets has limited most commercial mining for pegmatite minerals in this area. While a large number of pockets have been excavated over the years, it is likely that the pegmatites of the Pikes Peak region will continue to be a source of fine mineral specimens. *JES*

Move over Brazil, here comes East Africa. D. Federman, *Modern Jeweler*, Vol. 85, No. 1, 1986, pp. 40–45.

This is the most comprehensive article on East Africa since Campbell Bridges wrote "Gems of East Africa" for the *G.I.A. International Gemological Symposium Proceedings* in 1982. Federman emphasizes the marketing of East Africa's colored stones, concentrating on tanzanites and green grossular garnets (tsavorite). He argues that a new generation of dealers and retailers, many from California, created a niche with East African gems. As a result, a thriving gemstone industry has developed on the West Coast of the U.S.

Federman traces the involvement of Tiffany in promoting East African gems beginning in 1969, when Tiffany christened blue zoisite "tanzanite." Then, in 1974, Tiffany introduced the term *tsavorite* for green grossular garnet. He suggests that as a result of Tiffany's marketing efforts, gem dealers began to take Kenya and Tanzania more seriously as sources of fine gemstones.

Interviews with gem dealers who concentrate on East African stones are an interesting feature of the

article, as Federman touches on other gems including rubies, chrome tourmalines, fancy-colored sapphires, and change-of-color garnets. Many gemstones from this area have properties that are "breaking all the rules" and causing gemologists to re-examine established concepts.

Federman concludes with a discussion of how East Africa has changed the colored stone trade. DMD

Recent work at the Himalaya mine. C. R. Marcusson, *Mineralogical Record*, Vol. 16, No. 5, 1985, pp. 419–424.

The Himalaya pegmatite mine in the Mesa Grande district, San Diego County, California, was for a period the world's leading supplier of gem tourmaline. Prior to its closure in 1914, the Himalaya mine produced more than 100 metric tons of marketable tourmaline, valued at over \$750,000. In 1977, mining of this remarkable pegmatite was renewed with the excavation of new underground workings to reach lower, untapped portions of the pegmatite dike. During the past few years, mining has yielded some exceptional specimens of gem tourmaline and other minerals. This article summarizes the recent mining operations at this famous locality. JES

The tourmalines of Nepal. A. M. Bassett, *Mineralogical Record*, Vol. 16, No. 5, 1985, pp. 413–418.

Gem tourmaline has recently been mined from pegmatites at Hyakule and Phakuwa in the Sankhuwa Subha district of Nepal, 60 km south-southeast of Mount Everest. The pegmatite dikes outcrop at an altitude of 2,150 m in a metamorphic sequence of marbles, dolomites, and schists of the Khitya Khola formation. The geology of this region is not completely known. The gem tourmalines are predominantly pink with yellow, colorless, green, or orange bands, and are particularly dichroic. They are found as well-terminated crystals ranging up to 20 cm (8 in.). Details of the chemical and physical properties of these tourmalines are provided. JES

INSTRUMENTS AND TECHNIQUES

Colour filters and gemmological colorimetry. J. B. Nelson, *Journal of Gemmology*, Vol. 19, No. 7, 1985, pp. 597–624.

Dr. Nelson's article goes beyond the subject of its title and discusses current attitudes among gemologists toward color science and why the subject should be taught routinely as part of gemological curricula. The article then proceeds with the description of a set of color filters designed for use with a hand spectroscope and to assist the teaching of color science and spectroscopy in gemology.

The 38 filters included in the set are accompanied by spectrophotometer graphs of their transmission spectra so that the student can learn the relationship be-

tween a spectrum as seen with a hand spectroscope and that displayed graphically by a spectrophotometer. Also provided for each filter are its dominant wavelength, excitation purity, and metric luminance. Two of the filters fit on the light source of a spectroscope unit so that the resulting illumination approximates CIE source A. (Unfortunately, the light sources used with the spectroscopes vary somewhat in composition, so the illumination obtained by using these filters may or may not actually approach that of CIE illuminant A. The actual significance of this possibility needs to be tested.)

CIE diagrams that display the coordinates of the 38 color filters are provided, but these include a number of mysterious entries, with no key whatsoever provided to assist in the interpretation of the figures. Moreover, projections of the dominant wavelengths of various filters are shown as straight lines, where they should be curved lines in most cases. This suggests an incomplete knowledge of the CIE system on the author's part that undermines an otherwise convincing plea for adoption of CIE-based techniques in gemology.

A discussion follows of specific applications of several of the filters, to provide examples of their uses. Also included in the article is a brief description of a new "comparison prism spectroscope" that displays two spectra simultaneously. This aside seems out of place, and the potential value of such a spectroscope merits the attention of a separate paper. The article concludes with a general appeal for standardized color description and a peremptory mention of ongoing experiments in the field.

Perhaps the oddest thing about this article is the apparent omission of a section of the conclusions that must at least have mentioned the GIA's appreciable efforts at measuring and describing gemstone colors. This is apparent because the text is missing two references that are included in the numbered bibliography. Thirty references are cited, but numbers 27 and 28 (on the ColorMaster and on GIA's color description of gemstones, respectively) are nowhere to be found in the text or illustrations.

Although somewhat lengthy and wandering, this article manages to convey the very real need for education in color science in gemology, and the color filters—or some similar system—sound as if they could be of assistance in such an educational effort. Unfortunately, Dr. Nelson uses many terms throughout his article that may be unfamiliar to those not versed in color science. The time certainly has come for better understanding and description of gemstone color. CMS

JEWELRY ARTS

The amazing Mr. Evans. S. Hale, *Connoisseur*, Vol. 215, No. 887, 1985, pp. 116–119.

A profile of the noted British artist-goldsmith Edward Evans, this article focuses on one of Evans's most elabo-

rate productions—a “peacock” pistol encased in gold, enameled, and studded with sapphires and diamonds. The author relates how Evans, while employed by the eminent firm of Garrard in London (crown jewelers to the British monarchs since 1843), was asked to design a necklace to accommodate a 60-ct cushion-shaped diamond that Garrard’s jewelry director felt was too “chunky” for a ring. Evans, revered mainly for his necklace designs, surprised many by coming up with another vehicle for the diamond: a .38 special Smith & Wesson revolver.

With the diamond set in the butt of the gun, Evans built a golden case around it, set a pair of golden peacocks along the handle, and created an engine-turned barrel of blue enamel. Ironically, during the course of his work the very diamond that had inspired it was sold, so Evans perforce replaced the stone with a citrine of similar size (the gemmy firearm was subsequently sold to an Arab prince).

The peacock pistol is used to illustrate Evans’s range of talent and skills. Noting that most expensive jewelry is now produced by teams of specialized artisans, the author singles out Evans as a Renaissance man in the field of commercial jewelry, creating as he does “all of his pieces without assistance, from the first rough sketch to the final polish, using traditional hand tools.” The author goes on to cite recurrent motifs in Evans’s work, including peacocks, swans, dragonflies, and snakes, although he adds that the artist nonetheless avoids creating a definitive Evans “look.” Other trademarks of Evans’s craft are described, such as his “crisp and sweet” jeweled and enameled bow ties. The text includes a short but interesting biography of the artist, whose more select creations are brightly illustrated in the photographs by Kenro Izu. JMB

The golden art of El Dorado. S. Voynick, *Gems and Minerals*, No. 577, 1985, pp. 10–13 and 53.

Mr. Voynick reveals the abundant splendor of gold artifacts fashioned by pre-Columbian Indians of Central and South America. Although they possessed neither iron tools nor sophisticated smelting furnaces, these people created gold treasures that rival and even surpass those of the early Egyptians.

The Indians developed many ingenious goldworking processes and techniques. They created a refining process whereby common salt was added to the raw, molten gold in order to vaporize the undesirable metals, leaving behind a very pure form of gold. Ironically, this basic process may have prevented the art from reaching its full potential, because the best and most prolific artisans died prematurely as a result of poisoning and lung disease caused by the metal chloride vapors. Indian goldsmiths also used a basic molecular-fusion welding process and were experts at lost wax casting. Much of their work was actually done in *tumbaga*, a 2:1 copper-gold

alloy. The finished *tumbaga* piece was heated until it glowed, thus converting the surface copper content to copper oxide. The piece was then washed in acetic acid, which dissolved the copper oxide, leaving a surface of pure, bright, yellow gold.

The arrival of the Spanish in the 1500s triggered hundreds of years of ruthless exploitation. The conquistadors soon realized that the Indians had buried a wealth of golden objects with their dead. Between 1533 and 1537, about 655 lbs. of pure gold and 229 lbs. of *tumbaga* were taken from Indian graves. By the early 1800s, grave robbing had become a lucrative business: In 1859, half a ton of gold was dug from graves in the Chiriquí region alone.

Despite strict governmental prohibitions, grave robbing is still a serious problem in South and Central America. During the 1960s, a government bank made a bold, and desperate, move to keep Colombia’s gold artifacts inside the country by offering to buy them from the *huaqueros* (“tombers”) with no questions asked. The Museo de Oro in Bogotá now contains over 26,000 golden pieces; nearly all of them were acquired from *huaqueros*. Many modern grave robbers operate from organized fronts, probing the earth with advanced electronic underground utility locators. It is a dangerous but extremely profitable business, one with almost negligible penalties for the native *huaquero* but catastrophic consequences for foreigners. Anthropologists believe that far more gold than has yet been recovered remains hidden in jungle graves. It can only be hoped that some of these cultural treasures will remain inside their native lands. SAT

Italy’s dazzling city of gold. P. Dragadze, *Town & Country*, Vol. 139, No. 5059, 1985, pp. 114, 116, 119, and 121.

On the banks of the Po River in northern Italy lies a “city of gold” named Valenza. The city is steeped in the history of goldsmithing, as recorded by Pliny the Elder in the first century A.D.: “The important military post of Valentium has a river port on the Po. The inhabitants believe in the cult of the god Urano, who dominates fire and makes models with rare metals, inspiring the people also in this trade . . . Just outside the city confines are places where, by simple washing of gold-bearing sands, a diligent man can earn a day’s wages with ease.”

Today, Valenza produces some of the highest quality jewelry in the world, catering to an elite international clientele. The modest town houses more than 1,000 jewelry-related firms and 10,000 employees. Most of the companies are extremely small, consisting of the owner, his wife, their son, and one or two others. The fine craftsmanship produced under these conditions is especially appreciated by wealthy Americans.

The author interviews several owners and master-craftsmen from Valenza, revealing a world of fantastic

fortunes and commissions for pieces that dreams are made of. However, despite its billion-dollar reputation, Valenza remains a quiet, unpretentious town, truly one of Italy's finest treasures. SAT

Natural affinities. C. Seebohm, *Connoisseur*, Vol. 215, No. 885, 1985, pp. 120–127.

There are several keys to the secret of jewelry designer Angela Cummings's success. First, she has tapped her own affinity for natural shapes, colors, and patterns and translated it into beautiful, ultimately wearable jewelry. Much of her inspiration comes from her garden: a powdery butterfly wing, the cool geometry of snakeskin, the graceful twisting of a bittersweet vine. "I don't ever want to make a flower or otherwise duplicate nature," she cautions. "I am inspired by natural forms, but the shape that I finally create is not really natural."

Beneath, or perhaps parallel to, this pastoral tranquility is a fine sense of business savvy and self-confidence. She received a rigorous education in jewelry design, gemology, and goldsmithing, and took her talent—and her considerable charm—straight to Tiffany's in New York. Within an amazingly short time she became recognized as one of today's top jewelry designers. However, when the situation at Tiffany's changed with the arrival of Avon, Angela and her husband Bruce were undaunted, forging a highly successful business outside the comfortable womb of a large company. Created only one year ago, Angela Cummings Inc. now employs at least 50 multinational craftsmen to execute her designs. The husband and wife team seem to be unbeatable, with Bruce contributing keen management techniques and an in-depth knowledge of gemstones. The company has produced elegant flatware and fine porcelain plates, and is even contemplating a select line of designer scarves.

Angela Cummings's star is definitely rising, and promises to cut a meteoric path across the industry. SAT

RETAILING

Sting! Baiting the trap with jewelry. M. Schwartz, *Jewelers' Circular-Keystone*, Vol. 155, No. 11, 1985, pp. 96–100, 102–105.

The shadowy undercover world of jewelry fencing is revealed in this account of Operation Greenthumb, "the biggest law enforcement assault in history against interstate jewelry fencing." Between 1979 and 1981, soaring precious metals prices prompted a record number of burglaries and robberies in Washington, D.C. and its affluent suburbs. People were accosted in the streets, and their homes were ransacked. As their fear increased, retail jewelry sales plummeted.

Operating behind a thin façade of respectability, the kingpin fences employed a gang of petty crooks and desperate junkies to do the dirty work, paying them only

10% maximum of the stolen items' precious metal value. Stolen items ranging from simple gold chains to a \$175,000 snuff box that had belonged to Catherine the Great were sent to legitimate out-of-state refineries to be melted into scrap. It was a lucrative racket: one of the fences boasted a net worth of \$1 million, with an annual income of \$500,000.

The fences toyed brazenly with the authorities, playing an intricate game of cat-and-mouse. A network of local jewelers, the District of Columbia metropolitan and the Virginia and Maryland suburban police forces, and FBI investigators pooled their resources to gather evidence against the fences. During the eight-month probe, they set up sophisticated surveillance equipment, sifted through garbage, faked a break-in, and planted a specially trained double agent inside the fencing operation. Finally, on April 22, 1981, Operation Greenthumb closed in. A spectacular eight-site raid recovered more than \$2 million of stolen merchandise, with the kingpins later convicted on both state and federal charges. More than 70 crime suspects were identified, and 430 burglaries solved. Best of all, after news of the triumphant sting hit the press, the number of burglaries dropped dramatically, and reassured customers returned once more to patronize D.C. jewelry stores. SAT

SYNTHETICS AND SIMULANTS

The composition of the lapis lazuli imitation of Gilson.

K. Schmetzer, *Journal of Gemmology*, Vol. 29, No. 7, 1985, pp. 571–578.

Beginning with a brief description of natural lazurite and lazurite-containing rocks (i.e., lapis lazuli), the author proceeds to describe his investigation of the lapis substitute produced by Gilson.

The strongest lines in the X-ray powder diffraction pattern of the Gilson material were identical to those in the pattern of natural lazurite, with some weak pyrite lines also present. Additional weak lines, not attributable to either lazurite or pyrite, were also noted. Qualitative (EDX) chemical analysis by electron microprobe showed major elements typical of lazurite, plus substantial quantities of F, Zn, and Fe; quantitative analysis by "classical chemical methods" (wet chemical analysis) revealed that Zn and F percentages were in the range of the main constituents of the synthetic ultramarine.

Further examination consisted of thermogravimetric analysis, a chemical water determination, and analysis of the X-ray diffraction pattern after heat treatment, followed by a re-examination of the original diffraction pattern. This led to the determination that the Gilson product consists of ultramarine, pyrite, and two crystalline hydrous zinc phosphates. Because the zinc phosphates are main components, the author concludes that the Gilson product should be described as an imitation rather than as a synthetic. RCK

Nakazumi synthetic star corundum. J. Snow, J. Sanders, and G. Brown, *Australian Gemmologist*, Vol. 15, No. 11, 1985, pp. 410–412.

This Gemmology Study Club Report summarizes the results of an examination of inclusions in synthetic star rubies and star sapphires manufactured by Nakazumi Earth Crystals.

Initial macroscopic examination revealed sharp, six-rayed stars with relatively straight arms that tapered toward the girdle of the cabochons but that were somewhat less distinct than those usually observed on synthetic star corundum. Also noted were irregular, whitish masses scattered randomly on the cabochon surfaces. The flat polished bases showed distinct curved color banding, with occasional bands displaying darker color than the rest.

Microscopic examination at 30× revealed rounded gas bubbles of various sizes. It was also determined that the whitish splotches seen on the surfaces of the cabochons were caused by light being reflected from masses of gas bubbles located just below the surface. Short oriented needles were seen at very high magnification (800×). A pattern to the distribution of the gas bubbles was also noted: The darker curved color bands contained a predominance of large, stretched bubbles, whereas the lighter-colored bands contained a much greater number of smaller, rounded bubbles.

Communication with the manufacturer revealed that these synthetic star corundums are produced by the Verneuil process, with low-purity hydrogen gas partly fueling the inverted blow-torches. The rutile content was reported as 0.11%, with the asterism induced by annealing first in a gas flame and then in an electric furnace.

The authors hypothesize that the elongated gas bubbles could be generated by temperature variations in either the melt or the flow rate of the gaseous fuels. They conclude that production of these synthetic star corundums is by a relatively unsophisticated Verneuil process, with asterism being induced by either a relatively

short or a relatively low-temperature annealing step.
RCK

A re-examination of Slocum Stone—with particular emphasis on inclusions. C. R. Burch, *Journal of Gemmology*, Vol. 19, No. 7, 1985, pp. 586–596.

This article reviews the literature on Slocum Stone and reports the results of the author's microscopic investigation of six specimens.

The most prevalent inclusions noted were tinsel-like flakes—flat, extremely thin, and of varying sizes. Most had angular outlines and featureless surfaces. These flakes appeared bluish or purple in the black and white opal imitations, and were predominantly yellow, green, and orange in the fire opal imitations. When viewed with polarized illumination, the flakes exhibited strong interference colors. The edges of adjacent flakes suggested that many of these were once part of larger structures, perhaps continuous sheets.

Bubble inclusions were also common in all specimens. Their shapes ranged from those typical of glass imitations (e.g., spheres and "torpedoes") to many very unusual ones. In one specimen there was a close association between some of the unusual bubbles and the tinsel-like flakes. The author speculates that the unusual bubble shapes and the fragment-like nature of the flakes may be the result of agitation and mixing at some point in the production process.

The optical effects were also examined. In transmitted light the specimens showed very few, if any, color flashes. With overhead (reflected) light, however, they displayed a very strong effect; this changed with the angle of observation. The color effect was strongest when the specimens were viewed directly from above, due apparently to the fact that the material is cut so that the largest surfaces of most of the flakes are parallel to the base of the cabochon.

This report is illustrated with 17 fine photomicrographs.
RCK