
GEMOLOGICAL ABSTRACTS

Dona M. Dirlam, Editor

REVIEW BOARD

William E. Boyajian
GIA, Santa Monica
Jeffrey M. Burbank
GIA, Santa Monica
Stephanie L. Dillon
San Clemente, California
Bob F. Effler
GIA, Santa Monica
Joseph O. Gill
Gill & Shortell Ltd., San Francisco
Fred L. Gray
Richter's, Georgia
Mahinda Gunawardene
Idar-Oberstein, Germany

Gary S. Hill
GIA, Santa Monica
Steve C. Hofer
Kensington, Connecticut
Karin N. Hurwit
Gem Trade Lab, Inc., Los Angeles
Robert C. Kammerling
GIA, Santa Monica
Neil Letson
Palm Beach, Florida
Shane F. McClure
Gem Trade Lab., Inc., Los Angeles
Elise B. Misiorowski
GIA, Santa Monica

Michael P. Roach
Andin International, New York
Gary A. Roskin
GIA, Santa Monica
James E. Shigley
GIA, Santa Monica
Franceye Smith
GIA, Santa Monica
Carol M. Stockton
GIA, Santa Monica
Sally A. Thomas
GIA, Santa Monica
Jill M. Walker
Issaquah, Washington

COLORED STONES AND ORGANIC MATERIALS

La couleur des minéraux et des gemmes (The color of minerals and gems). E. Fritsch, *Monde et Minéraux*, Vol. 22, Nos. 67, 69 and 70, 1985, pp. 20-25, 12-17, and 12-22.

While the colors of gems and minerals contribute greatly to their appeal, the causes of these colors provide clues to the genesis of the different materials. An understanding of color origin also provides a foundation for the better use of spectral and luminescence tests for gem identification. This trio of articles by Dr. Emmanuel

Fritsch is an excellent review of how color arises in gems and minerals, with easy-to-understand explanations of atomic-level behavior. In the first article, Dr. Fritsch discusses single-element color origin associated primarily with transition-metal ions, including explanations of valence states, site coordinations, and distortions. Examples of how each of these variables affects color and the optical absorption spectrum are clearly described, and a list is provided of common transition-metal ions and their coordinations, together with the color generated by each and the minerals in which each occurs.

The second article covers the more complex cases of charge transfer and interband transitions, with explanations of the molecular orbital and band gap theories necessary to understand these color origins. Normally relegated to the realms of advanced physics and chemistry, these scientific theories take on a more elementary tone with Dr. Fritsch's explanations and the numerous graphs and drawings that accompany them. The third article concludes the series with discourses on color centers, diffraction, iridescence, Tyndall effect (scattering), and diffusion, including chatoyancy and asterism.

On the whole, this series of articles provides an excellent overview of the causes of color in gems and minerals, with intelligible explanations of complex concepts. Lavish color photographs by Nelly Bariand and numerous helpful diagrams accompany the text.

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.

Inquiries for reprints of articles abstracted must be addressed to the author or publisher of the original material.

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.

©1986 Gemological Institute of America

Many of the illustrations, however, are neither numbered nor directly referenced in the text, which is irritating and results in a lot of looking back and forth for associations. Nevertheless, the major drawback of the article for many *G&G* readers will be that it is entirely written in French. It is to be hoped that Dr. Fritsch will soon render a version in English. CMS

Crystal chemistry of zincian spinels (gahnospinel) from Sri Lanka. K. Schmetzer and H. Bank, *Neues Jahrbuch für Mineralogie Monatshefte*, No. 8, 1985, pp. 353–356.

The chemical composition, density, and refractive index of zincian spinels from Sri Lanka have been investigated. All samples were transparent gemstones of a blue, bluish violet, or violet color caused by the presence of Fe^{2+} substituting for Mg^{2+} in the tetrahedral site. These stones are members of a compositional series between spinel (MgAl_2O_4) and gahnite (ZnAl_2O_4) in which the molecular percentage of gahnite varies from 0.2% to 50.35%, with minor amounts of a hercynite ($\text{Fe}^{2+}\text{Al}_2\text{O}_4$) component (1.7% to 5.37%) also present. Density increases with zinc content from 3.60 (pure spinel) to 4.05 (50% gahnite), while the refractive index also increases correspondingly from 1.716 to 1.752.

This study confirms what is already known about this material, and substantiates the existence of a complete solid-solution series in the spinel-gahnite compositional range. Emmanuel Fritsch

Farbloser Skolezit aus Indien (Colorless scolecite from India). H. Bank, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, Vol. 34, No. 3/4, 1985, pp. 167–168.

Colorless, transparent crystals represented as natrolite were identified as scolecite by refractive indices of n_x 1.512, n_y 1.518, n_z 1.523, and a birefringence of 0.011. The specific gravity is given as 2.21. Scolecite usually occurs as radiating fibrous masses in volcanic rocks in Rio Grande do Sul, Brazil, and in Poona, India. MG

The nature of water in chalcedony and opal-C from Brazilian agate geodes. H. Graetsch, O. W. Flörke, and G. Miehe, *Physics and Chemistry of Minerals*, Vol. 12, 1985, pp. 300–306.

Chalcedony and opal-C (cristobalite) in Brazilian agates (Rio Grande do Sul) have been investigated for their water content and speciation using differential thermal analysis (DTA), gravimetry (DTG), and infrared spectroscopy, together with water titration, and specific surface and density measurements.

Chalcedony and opal-C contain molecular water adsorbed in multilayers on the crystal surfaces, fully hydrating the open porosity. They also exhibit two types of differently bonded O-H groups (hydroxyls): The Si-O-H groups (silanols) of type A are weakly hydrogen

bonded to the silica framework at structural defects, while type B involves surface silanol groups that are most likely hydrogen bonded to similar neighboring groups. Type B represents only one-third of the chalcedony silanol groups, but it represents almost all of the "water" in opal-C. All crystal surfaces are covered with silanol groups hydrogen bonded to molecular water.

Chalcedony bands ranging from translucent gray to milky white were found to correspond to a decrease in total water content, molecular water content, and specific surface, together with an increase in density.

Molecular water content also decreases with hydrothermal treatment, which indicates a variable low-temperature formation for this Brazilian agate: below 250°C and 0.5 kilobars, and possibly also at room temperature and pressure. Emmanuel Fritsch

Zirkon-Katzenauge aus Sri Lanka (Cat's-eye zircon from Sri Lanka). H. J. Müllenmeister, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, Vol. 34, No. 3/4, 1985, pp. 165–166.

The author reports on the identification of a cat's-eye zircon that had been represented as a moonstone from Sri Lanka. The specific gravity was determined to be 4.62, and the spectroscope revealed an absorption spectrum identical to that of zircon. The radioactivity of the sample is also mentioned. MG

Zur mineralogischen und chemischen Zusammensetzung des Schmucksteins Verdit aus Südafrika (Mineralogical and chemical composition of the gemstone verdite from South Africa). F. Rost, J. Wannemacher, and O. Krebs, *Neues Jahrbuch für Mineralogie Monatshefte*, No. 9, September 1985, pp. 427–432.

Verdite is a green opaque rock that has been used for centuries by South African natives for mystical purposes. However, it was only "rediscovered" as a gemstone at about the turn of this century.

Five verdite specimens from the Baberton District, Transvaal, South Africa, were studied using chemical analysis and X-ray diffraction, together with conventional microscopic observation. Fuchsite (chromemuscovite) is the most important mineral and the main chromium-bearing phase (2% to 4% Cr_2O_3), and therefore gives verdite its bright green color. Both colorless chlorite (clinochlore) and a plagioclase feldspar (near albite) may be present in significant amounts. A relatively constant TiO_2 content of about 1% is due to the presence of rutile crystals or their alteration products. The iron content is always very low ($\leq 0.1\%$ Fe_2O_3). Unusual inclusions are light-colored tourmaline and, in the absence of a calcium-containing plagioclase, margarite (a calcium-containing mica).

Verdite occurs as a secondary rock in basaltic extrusions in many South African localities. The high

chromium content is attributed to enrichment through hydrothermal solution circulations, leaching, and concentration of this element from the underlying komatiites. *Emmanuel Fritsch*

DIAMONDS

Diamond exploration in Western Australia. C. L. Geach, *Geology Today*, Vol. 2, No. 1, 1986, pp. 16–20.

In the early 1970s, major discoveries of diamonds were made in Western Australia in two principal areas—between Derby and Kununurra in the northern part of the state (Argyle and Ellendale), and a smaller area farther south near Carnarvon. These finds are important not only for their magnitude but also for the fact that the host rock of the diamonds is not kimberlite as in South Africa but rather lamproite.

Lamproites are a group of fine- to medium-grained ultramafic to mafic rocks that are rich in K, Ti, and Mg. The mineral content of lamproite thus differs from that of kimberlite (as, consequently, do the mineral inclusions in the diamonds that each hosts). Kimberlites contain olivine, garnet, ilmenite, phlogopite, calcite, clinopyroxene, and serpentine. In contrast, lamproites consist of leucite, phlogopite, clinopyroxene, amphibole, olivine, and sanidine.

At the more northern, and more economically important, of the two recent diamond discoveries in Western Australia, the deposits are located in belts of highly deformed sedimentary and metamorphic rocks. These belts rim the Kimberly craton, a large area of ancient granitic rocks of Precambrian age. This geologic setting is entirely different from that of other known diamond-producing areas. The present article summarizes the radical changes in conceptual thinking and in the strategy of diamond exploration in Western Australia that resulted from this new kind of diamond occurrence. The major difficulties encountered in bringing a new deposit from initial discovery to eventual full production, especially the length of time required, are also discussed. *JES*

Famous diamonds of the world (XVIII): the Star of Sierra Leone. I. Balfour, *Indiaqua*, Vol. 37, No. 1, 1984, pp. 129–131.

This installment on famous diamonds recounts the discovery and eventual disposition of the largest diamond ever recovered from an alluvial source: the Star of Sierra Leone. On February 14, 1972, the 968.9-ct rough diamond was recovered from the picking table at the separation plant operated by the National Diamond Mining Company of Sierra Leone (Diminco) near the Kono-area diamond fields.

Diminco asked that De Beers CSO handle the sale of the stone via a sealed bid. However, when the bids were opened on July 18, 1972, none of them had reached the diamond's reserve price. In October of that year, Harry

Winston acquired the stone, having paid "in the vicinity of several million dollars" for it, well in excess of any of the previous bids.

The original rough yielded 17 stones totaling 238.48 ct. The largest stone to emerge from the initial cutting was a 143.20-ct emerald cut. However, the stone was flawed, and Winston eventually had it recut into seven stones, the largest of which was a 53.96-ct flawless pear shape. *BFE*

Over the years with De Beers. R. Shor, *Jewelers' Circular-Keystone*, Vol. 157, No. 2, 1986, pp. 340–343.

In the past 15 years, De Beers has increased its advertising budget almost 10-fold, and as the socio-economic climate of the United States has changed, so has the focus of their ads.

In this fascinating article, Mr. Shor shows that while De Beers's ads have retained the image of romance and elegance, they have slowly shifted focus among various consumer groups, almost imperceptibly guiding the baby-boomers to adulthood. In the early 1970s, the main visual thrust of their advertising was aimed at mid- to high-income customers, but was tempered with the message "A gift of diamonds need not be expensive. Your jeweler can show you exciting pieces under \$200." De Beers also created the concept of the eternity ring, which was originally aimed at former flower children who had begun their pursuit of success. Later renamed the anniversary ring, it now accounts for 25% of all diamond jewelry sales.

Today the message is "Show her it's not lonely at the top. A diamond of a carat or more." Men's diamond jewelry is also being promoted to a new, consumption-conscious generation.

The changes have not come cheaply. In 1985, De Beers's advertising budget soared to \$34 million, with 44% invested in television spots (compared to \$4 million in 1970 and no television ads). But this campaign has paid off: During the last 15 years, sales have jumped from \$800 million to \$8 billion per year.

Patricia A. S. Gray

GEM LOCALITIES

The occurrence of botryoidal and gem-quality nephrite in Monterey County, California. T. R. Paradise, *Journal of Gemmology*, Vol. 19, No. 8, 1985, pp. 672–681.

Mr. Paradise briefly discusses the geology, mineralogy, and gemology of the nephrite occurrence at Jade Cove, in Monterey County, California, and how to successfully locate the nephrite at the site.

Nephrite, an isomorphic product of the actinolite-tremolite series, usually consists of randomly oriented interlocking and interwoven fibrous crystals. However,

the material found at the Monterey occurrence formed in botryoidal masses. These flattened, oval-shaped masses typically consist of only two to 10 nodules each, and are easily separated from the surrounding minerals, which are massive in form. Some of these nodular bundles have been so weathered that they are covered with a layer of reddish brown oxidized material or "skin" which may deceive uninformed collectors. The nephrite also occurs as polished pebbles.

Jade Cove is located between Plaskett Point and Cape San Martin, about 100 km south of the city of Monterey. The nephrite can be found in the detritus below the greenish colored cliff areas, which represent the serpentine from which the nephrite has eroded.

David C. LeRose

Les quartz sceptres de Denny Mountain (The quartz scepters from Denny Mountain). B. Jackson, *Monde et Mineraux*, Vol. 23, No. 71, 1986, pp. 20-23.

Four years ago, the most spectacular (up to 10 cm long) amethyst double scepters in the world were found by the author and an associate at Denny Mountain, near Seattle, Washington (a scepter is a crystal that has a second, wider crystal overgrown in a parallel way at its termination). At this locality, quartz crystals are formed along veins caused by the percolation of hydrothermal solutions through an iron-bearing skarn. This article describes in a very lively style this unusual mining enterprise. The quartz vein is located on a cliff in Red Wall Canyon, a very dangerous area where nine mountain climbers have died within the past few years. Jackson describes the hazards involved in mining the deposit. Even the men and equipment had to be brought in by helicopter. After 10 weeks of unrewarding digging, 40 specimens of this unusual material were recovered from this attempt.

Emmanuel Fritsch

Les tourmalines de l'île d'Elbe (Tourmalines from Elba Island). S. Lareida, *Monde et Mineraux*, Vol. 23, No. 71, 1986, pp. 4-7.

The tourmaline deposits of Elba (Italy) are located in the western part of the island, near Monte Capanne. They are found in hydrothermal pegmatite veins that intrude the granodiorite massif. The article emphasizes the coloration of Elba's tourmalines, which are often color zoned perpendicular to the principal axis; most notable of these zoned crystals is the "Moor's head" (a clear prism with a black termination).

Light violet to pinkish to carmine red crystals contain no sodium, but have appreciable amounts of iron, lithium, and potassium. Brown to orange or yellow varieties have a high sodium content. Green ones exhibit the highest amount of manganese and sodium. There are also blue, black, and colorless stones.

The history of tourmaline exploitation on Elba is

detailed, starting with the discovery of the first deposit in 1825. Included are famous finds such as the "Grotta d'Oggi," a grotto that yielded many spectacular tourmaline crystals.

Emmanuel Fritsch

INSTRUMENTS AND TECHNIQUES

Distinction of natural and synthetic rubies by ultraviolet absorption spectroscopy—possibilities and limitations of the method. K. Schmetzer, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, Vol. 34, No. 3/4, 1985, pp. 101-129.

The use of certain features in the ultraviolet spectra to identify natural and synthetic rubies was first suggested by Bosshart in 1981. He recognized differences in ultraviolet transparency between natural and synthetic rubies. He also suggested a numeric interpretation of the absorption spectra of these stones in terms of three measured parameters associated with the location of the minimum absorption in the ultraviolet. Graphic representations of these parameters revealed separate population areas for natural rubies of different origin as well as for synthetic rubies of various manufacture. This method was suggested to be valuable in distinguishing natural from synthetic ruby.

Since the publication of Bosshart's work, the diagnostic value of this identification method has been called into question by the appearance of some synthetic rubies whose parameter values fall near or within the population field of natural rubies on Bosshart's graphs. This uncertainty led to a thorough reexamination of the Bosshart method in the present study.

Spectroscopic and chemical (XRF) data were collected for some 900 rubies from 15 localities and nine manufacturers. Results of this study indicate that natural and synthetic rubies exhibit several types of absorption spectra that vary slightly in the location, shape, and intensity of their spectral features. Many of these spectra are illustrated in the 45 figures included in this article. Some of these spectra types appear to be unique for a particular natural or synthetic ruby, and hence are of diagnostic value when working with a ruby of unknown origin. It is concluded that the Bosshart method has two principal weaknesses as an identification test. The advantage of the method as a simple procedure using only three parameters is offset by the loss of further important information, such as the positions of weak absorption bands and shoulders, that is readily apparent from an examination of the spectral patterns themselves. In addition, a documented overlapping of population fields of Bosshart's parameters for various natural and synthetic rubies prevents a clear determination of the origin of a ruby. This is especially serious in the case of certain new synthetic rubies whose parameter values fall within the natural ruby field on Bosshart's graphs. Thus, the Bosshart method has limitations as a diagnostic test.

The author suggests that ultraviolet absorption

spectra can be of value in the identification of rubies of unknown origin. However, this requires a direct comparison of the spectrum of the ruby in question with standard spectra of natural samples of known origin and synthetic samples of known manufacture such as those illustrated in the article. In many instances this will provide a good indication of the ruby's locality or producer, or at least will reduce the number of possibilities. Even when the origin remains uncertain, examination of the spectra in combination with microscopic observations and, if necessary, with chemical (trace element) data, will often provide a clear determination. JES

Über die Problematik der Galliumgehalte als Hilfsmittel zur Unterscheidung von natürlichen Edelsteinen und synthetischen Steinen (On the problem of gallium as proof to distinguish between natural gemstones and synthetic materials). H.-W. Schrader and U. Henn, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, Vol. 34, No. 3/4, 1985, pp. 152–159.

The authors have proved that the presence of gallium (Ga) is not a conclusive test to distinguish the natural or synthetic origin of a gem. Neutron activation analysis (NAA) of 32 emeralds (22 natural, 10 synthetic), 18 corundums (8 natural and 10 synthetic), and 16 chrysoberyls (14 natural and 2 synthetic) yielded comparable amounts of gallium in both the natural gemstones and their synthetic counterparts. Therefore, the element Ga should no longer be regarded as a sure sign of the natural origin of a gem. MG

Touchstone testing of precious metals. W. Wälichli and P. Vuilleumier, *Aurum*, No. 24, 1985, pp. 35–45.

Touchstone testing is one of the oldest known methods of testing for precious metals. Its use is documented as early as 600 B.C. for checking gold coins. Today, it is primarily used by assayers to test and hallmark articles made of noble metals. This comprehensive article explains the procedures and tools needed to perform a number of tests used to determine the alloys of silver, and yellow, white, and colored golds; distinguish between solid and plated pieces; and differentiate between platinum, white gold, palladium, and steel. These tests have a wide variety of applications in the jewelry trade, ranging from evaluating antique jewelry to sorting semifinished manufactured pieces for fineness.

Essentially, the touchstone process is a comparison test whereby an unknown metal is rubbed on the touchstone and compared with rubbings from touch needles. Sometimes acids are applied to the two rubbings for further evaluation. The tools required are a touchstone, touch needles, blotting paper, and touch acids. Touchstones today are usually made out of black or dark red agate, of uniform color with no blemishes or veins, fine-grained with a matte finish. Touch needles are made from alloys of known composition, and the num-

ber required depends on the type of work being done and the degree of fineness that must be determined. Touch acids are essentially composed of "nitric acids of different strengths with or without the addition of copper or sodium chloride, or hydrochloric acid."

The text gives step-by-step instructions for performing the tests with 23 color photos as examples of what the rubbings and acid reactions should look like. The authors, both assayers with the Swiss Federal Bureau for the Control of Precious Metals, emphasize that touchstone testing "requires specialized knowledge and considerable experience that can only be acquired through practise." The authors' addresses are provided so that the reader can contact them for further information. EBM

JEWELRY ARTS

Antiques: alchemy of Art Nouveau. S. Birmingham, *Architectural Digest*, Vol. 42, No. 12, 1985, pp. 154–159.

This article is an abbreviated and generalized description of the exuberantly emancipated society that supported Art Nouveau around the turn of the last century. However, the text merely provides a backdrop for the six accompanying illustrations of exquisite French Art Nouveau jewelry. The captions for these jewels provide more information than the text, giving artist, date, materials used, dimensions, and a brief historical note for each. Among the pieces included is the celebrated snake bracelet and ring combination that was designed by Alphonse Mucha and fabricated by Georges Fouquet for Sarah Bernhardt's stage premiere of "Cleopatra" in 1890. The piece incorporates gold, enamel, opals, diamonds, and rubies in the exaggerated style that is representative of the period. The serpent motif was a popular one in this sensual era, when "anything that flowed, undulated, slithered, twined, or trembled in the wind" was translated into spectacular jewelry. Although the illustrations are superlative, Birmingham's article only serves to whet the appetite for more information about this brief, distinctive period. EBM

Geneva's Mr. Christie. D. Good, *Canadian Jeweller*, Vol. 105, No. 9, 1984, pp. 27–28.

The astonishing thing about this article is that it appeared at all. The author deserves high praise for lifting a corner of the veil of privacy with which Hans Nadelhoffer, president of Christie's, Geneva, usually surrounds himself. That he should also have allowed his photograph to be published puts an otherwise routine, if not actually dull, trade magazine interview into a special class.

For jewelers and gemologists who have enjoyed Dr. Nadelhoffer's monumental and definitive work on Cartier, and who have marveled at his genius in organizing some of the greatest jewelry sales of this century, this

article will be of particular interest. The author briefly outlines Nadelhoffer's professional career and provides ample proof of the magnitude of his influence in the jewelry world. Only by personal acquaintance, however, can Nadelhoffer's innate modesty, gentility, and enormous personal charm be fully understood and appreciated. NL

Goldwork of the Iron Age in "barbarian" Europe. C. Eluère, *Gold Bulletin*, Vol. 18, No. 4, 1985, pp. 144–155.

Using classical references, and archeological and technological evidence, the author shows how the goldwork of the Celtic, Iberian, Illyrian, Thracian, Dacian, and Scythian tribes was influenced by Greek, Persian, and Etruscan goldwork during the Iron Age (700–100 B.C.). Gold jewelry from the preceding Bronze Age (2000–800 B.C.) was large and heavy. The changes in use, technique, and style that developed are due, the author postulates, to interaction via trade and/or conflict with the Mediterranean cultures. With these changes, the use of gold acquired certain defined purposes: as a designation of status, an honor to gods, and in hoarding as a store of wealth. Ultimately, the latter use was manifested as coinage.

The fact that barbarian Europe had abundant sources of gold and other ores is documented in classical texts which are quoted by the author. Elaborate burial mounds of chieftans have yielded similar examples of adornment and ritual vessels from several different cultural areas. These are described in detail and include neck rings and torques, bracelets, rings, fibulae, buckles, and other ornaments, along with swords, axes, and helmets of iron that have been decorated with sheets of gold. Ceremonial cups of sheet gold and caldrons of bronze suggesting religious rituals have also been found. Citing many examples, Eluère demonstrates how techniques (such as granulation and the use of solder) were developed, and styles (as shown by decoration motifs) and types of jewelry evolved.

Much scholarly research and careful condensation of facts went into the preparation of this article, which represents an important contribution to the literature on this subject. The article is richly illustrated with 14 photographs, a table showing the chronology and location of principal finds, and a map giving their geographic locations. EBM

Getting repped. V. S. Lynn, *Metalsmith*, Vol. 6, Nos. 1 and 2, 1985, 1986, pp. 18–23 and 34–35, respectively.

Based on hours of interviews with manufacturing jewelers and jewelry representatives (reps) in a variety of markets across the country, this two-part article presents the basic considerations of a jeweler/rep relationship. First, the author defines the various types of reps

and elaborates on the nature of the products they carry. Lynn also comments on why most manufacturing jewelers prefer to hire intermediaries, noting that salespeople must be outgoing, congenial, aggressive, persistent, and able to handle rejection.

Some key ingredients for a successful relationship with your rep(s) include the manufacturing jeweler's ability to think and design ahead, ready access to a substantial amount of cash, and a real sense of commitment between both parties. Many jewelers believe that stockpiling their finished pieces is expensive and risky, but that it is also crucial that they are able to meet their manufacturing obligations on time.

Other sections cover how to find a rep, and what to look for in the person who will be largely responsible for your commercial success. Interestingly, the majority of jewelers reported that they must really like their reps and feel that they are genuinely interested in the lines they carry. Lynn also stresses the importance of checking the rep's references through other artists and store accounts.

Novice manufacturing jewelers can benefit greatly from a good rep, who can and often will help guide them through sometimes initially turbulent business maneuvers. A good rep provides valuable feedback from the marketplace, and can help a jeweler develop his or her professional identity.

The second (and shorter) part of this article deals with jeweler/rep contracts, what they can and should cover, and how jewelers protect their freedom to represent themselves at gallery shows and sales. This section also talks about reps' territories, the methods of commission payment, and the length of their contracts. It also offers good advice on how to handle a rep who doesn't sell or one who "loses" samples.

As a whole, this article provides a great deal of practical information for the manufacturing jeweler who wants to expand his or her business through representatives. SAT

A perfect match. A. DiNoto, *Connoisseur*, Vol. 216, No. 891, 1986, pp. 118–123.

A young designer named Kai-Yin Lo has catapulted from director of public relations at the Mandarin Hotel in Hong Kong to the heady realm of high-fashion jewelry design. Her work is characterized by strong, simple designs, a sensitive use of color, and an eye-catching symbiosis of antique and modern elements. "I draw on the vast and marvelous reserves of Chinese motifs and . . . adapt and synthesize," she explains.

Kai-Yin sold her first collection to Cartier, and then went on to form her own company. Kai-Yin & Co. Ltd. now provides jewelry and accessories to 150 retail outlets on four continents, including some of the finest department stores and boutiques. She features several distinct lines, with items priced from \$20 to \$20,000.

Recently, Kai-Yin became the first well-known jewelry designer to be accepted by Chinese Arts and Crafts in Hong Kong, the official outlet for higher-grade goods from mainland China, and is anticipating coproducing with them.

Incorporated into many of her striking designs are an assortment of small objects, ranging from a tiny 18th-century Mongolian leather purse to exquisitely carved beads and baubles of antique jade, turquoise, amber, or ivory. In the past few years, however, she has noticed that the master carvers are vanishing, and the old materials are becoming increasingly rare—and expensive. "Gone are the days when I could buy antique turquoise by the kilo," she laments. Nevertheless, Kai-Yin's versatility and the "wearable splendor" of her pieces seem to assure her a place in the sun for some time to come. SAT

Thomas McPhee, gem carver. D. Luckow, *Canadian Jeweller*, Vol. 107, No. 1, 1986, pp. 36–37.

Thomas McPhee, of Rare Earth Gems in Vancouver, British Columbia, has taken the gem-carving craft by storm. Although he has only been working with stone for the past two and a half years, his overwhelming success at the 1985 Tucson Gem and Mineral Show, and subsequent encouragement by Roland Naftule, past president of the American Gem Trade Association, have boosted the young Canadian carver into the limelight. His most popular works include carvings of faces, masks, animals, and birds of "exceptional quality and artistic design." McPhee carves almost any type of gem material, although tourmaline is by far his favorite. The largely self-taught artisan is presently working on a collaborative jewelry line which will include his own carvings in pendants, rings, bracelets, and brooches. Another line featuring small carved gemstone boxes and rock crystal bowls is also in the works. SAT

JEWELRY RETAILING

The story of love and wedding rings. D. Scarisbrick, *Aurum*, No. 24, 1985, pp. 46–53.

Scarisbrick traces the history of wedding rings from the days of the Roman Empire to the 20th century. Around 23–79 A.D., it was customary to exchange rings at the close of a business transaction, signifying the good faith of each party. This custom came to be applied to marriage contracts as well; after the dowry was settled, the prospective groom placed a simple iron (or gold for nobility) band on the fourth finger of the left hand of his betrothed. In fact, many rings were shaped to form two clasped right hands, symbolizing the contractual handshake. This design continued to be popular throughout the centuries, and can still be found on many modern Irish wedding rings.

Several other interesting rings are also discussed in

chronological order. During the Renaissance, the bezel of many Jewish wedding rings was set with a miniature gabled roof, symbolizing the Talmudic saying "His wife is his house." The 17th century saw the rise of the gimmel, twin hoops linked together by hearts or hands. In the 18th century, romantic inscriptions, most often in French, decorated the outside of many wedding rings, intertwined with cupids, hearts, or doves tying fast a lover's knot. The venerable Queen Victoria popularized rings in the form of coiled serpents, representing eternity. It was only after diamonds were discovered in South Africa in 1866, and were subsequently promoted by N. W. Ayer, that diamond engagement rings became the fashion, usually paired, ironically, with simple gold wedding bands.

The text is sumptuously illustrated with many fine examples of wedding and betrothal rings, as well as with reproductions of medieval drawings depicting the wedding rite. SAT

SYNTHETICS AND SIMULANTS

Neue Untersuchungen an in Japan hergestellten synthetischen Amethysten (New investigations conducted on Japanese-made synthetic amethysts). Th. Lind and K. Schmetzer, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, Vol. 34, No. 3/4, 1985, pp. 160–164.

In general, the distinction of natural and synthetic amethysts is determined with the conoscope (a kind of polarizing microscope), a gemological microscope, and in complicated instances by the use of infrared spectroscopy. Characteristic features of synthetic amethysts, particularly those made in Russia, have appeared in recent gemological publications. However, the increased amount of amethysts synthesized in Japan that are now available in the trade prompted the authors to investigate this material in detail. The new product from Japan often contains feathers that consist of liquid-filled and two-phase inclusions, sharp growth zoning parallel to one rhombohedral face, and twin structures. The twinning is readily distinguishable from the polysynthetic lamellae twinning seen in natural amethysts. The six color photographs provided with the article are useful to the gemologist. MG

Quantitative Kathodolumineszenz—ein neues Verfahren zur Unterscheidung echter von synthetischen Smaragden und Rubinen (Quantitative cathodoluminescence—a new process of distinguishing between natural and synthetic emerald and ruby). J. Ponahlo and T. Koroschetz, *Zeitschrift der Deutschen Gemmologischen Gesellschaft*, Vol. 34, No. 3/4, 1985, pp. 132–142.

Recent developments in the technical aspects of manufacturing synthetic stones have yielded enormous prog-

ress, which in turn causes difficulties in separating natural from synthetic stones with standard gemological or mineralogical methods. In their search for a solution to this problem, the authors report on microphotometric measurements of luminescence intensities emitted from emeralds and rubies during bombardment with fast-moving electrons (cathode rays).

The method, conducted on a luminoscope, is called "quantitative cathodoluminescence" (CL). The integral photocurrent intensity of the cathodoluminescence is plotted against the power of excitation. The natural emeralds exhibit a very small linear increase in intensity, whereas synthetic emeralds show a manyfold greater increase. In general, the rubies yield an exponential increase in luminescence intensity when the power of the excitation is raised. The authors compared Thai rubies as natural samples with synthetic rubies by manufacturers such as Chatham, Kashan, and Knischka. The CL intensities of the synthetics are comparatively higher than those of rubies from Thailand.

Quantitative cathodoluminescence seems to offer a relatively safe method of differentiating between natural and synthetic emeralds, as well as between Thai rubies and their man-made counterparts, especially the Kashan synthetic ruby. Measurements are now being carried out on rubies and emeralds from other sources and producers as well as on sapphires and alexandrites. However, detailed results on the latter are not included in the article. The paper includes six color photographs and two diagrams to show comparative luminescence of synthetic and natural emerald and ruby. *MG*

Seiko synthetics. G. Brown, *Australian Gemmologist*, Vol. 15, No. 11, 1985, pp. 418–420.

Adapted from technical information supplied by Suwa Seikosha Co. of Japan, the article reports on the production and properties of five synthetic gem materials manufactured by their subsidiary, Hattori Seiko Co., Ltd.

The Seiko synthetic emerald is produced by a flux-growth process, reportedly using a new flux that results in a purer crystal than is possible from older flux-growth methods. Gemological properties of this material are within the ranges for other flux-grown synthetic emeralds, with the exception of the reaction to ultraviolet radiation, which is a greenish color to both long- and short-wave U.V.

Synthetic ruby, blue sapphire, orange-pink sapphire, and alexandrite chrysoberyl are all produced by a floating zone method, which is described and illustrated. This method of synthesis reportedly produces crystals of uniform color and luster, with no chemical impurities and a minimum of gas bubbles. The synthetic ruby is grown in an inert atmosphere; the atmospheres

used in the production of the other materials are not specified.

These floating zone-produced materials are all characterized by the presence of internal, irregular flow lines, which are evident in a characteristic swirled color distribution. This diagnostic feature is most prominent in the synthetic ruby; immersion may be required to detect it in the other materials. Also characteristic of the synthetic ruby is rectilinear parting. Fluorescence can be of diagnostic value in some cases, since both the synthetic orangy pink sapphires and the synthetic alexandrite glow a strong red to long-wave ultraviolet radiation. Other gemological properties overlap with those of the natural materials.

A comprehensive table summarizes the gemological properties of the Seiko synthetics and of their natural counterparts. *RCK*

Die synthetischen "Ramaura-Rubine" und ihre Erkennungsmöglichkeiten (The synthetic Ramaura ruby and its identification characteristics). W. Galia, *Uhren Juwelen Schmuck*, Vol. 2, No. 2, 1986, pp. 154–157.

The author first encountered the new "Ramaura" synthetic ruby in 1984 and introduced it to the trainees at Königstein gemological education center in Germany. The production method is said to be spontaneous nucleation (no seed) involving flux, with crystallization taking place at a temperature of about 1250°C, which is higher than usual for flux ruby crystallizations.

The crystal form and color reported here for Ramaura synthetic rubies are identical to the details published by Kane (*Gems & Gemology*, Fall 1983). The important gem microscope observations indicate the presence of flux residue often as lacy patterns and trigonal growth marks parallel to the (0001) face. The article includes 15 color photographs that show rough crystals, faceted Ramaura rubies, and various types of inclusions. *MG*

TREATMENTS

Oven fresh sapphires. T. Themelis, *Lapidary Journal*, Vol. 39, No. 11, 1986, pp. 49–53.

This article reports on the author's personal observations of heat treating sapphire in Sri Lanka. Material treated included "Geuda" rough, other corundum containing various amounts of silk, and material previously treated unsuccessfully. After trimming to remove major inclusions, the corundum is placed in a crucible consisting of a perforated, high alumina-content brick. This is placed in a furnace that is no more than a steel drum lined with bricks. The burner unit consists of a main blower, a controller, and a pump.

The loaded crucible is placed in the oven and the temperature is then raised to about 1800°C over a four-

hour period. At this point, the oven is "hermetically" sealed to create a reducing atmosphere. Heating continues for eight to 10 hours or longer. Two or three times during heating the temperature is lowered and the furnace opened for a visual inspection of the corundum. The temperature is then lowered over a four-hour period and the oven is allowed to cool an additional 24 hours before it is opened and the stones are removed. Recovery of usable material is estimated at 25% of all material treated.

There are a number of statements in this article that must be questioned. The dimensions listed for the opening in the furnace ("about six feet to a side") and of the crucible (6' x 6' x 4') would appear unlikely. The iron and titanium color-causing agents are described as "blue colored atoms." The statement that pyrometers are not used "since the process is performed in a totally enclosed environment" seems an unlikely explanation. The chemical formula for ilmenite—FeTiO₃—is incorrectly written TiFeO₃. The melting temperature of quartz is given as 1825°C, whereas it should be 1610°C. Finally, the author also quotes the melting points of the elements titanium and iron when it is not the pure elements, but the oxides, that are involved in the reaction under discussion. RCK

MISCELLANEOUS

The geologic history and structure of the Himalayas. P. Molnar, *American Scientist*, Vol. 74, No. 2, 1986, pp. 144–154.

The Himalayas make up the world's highest and youngest mountain belt. They are between 250 and 350 km wide and extend from Afghanistan to Burma. Besides containing some of the most majestic scenery on earth, this mountainous region has been an important source of gemstones from antiquity through modern times. This article presents a general summary of the geology and geologic history of the Himalayas that would be of interest to anyone who wants to know more about this gem-producing region. It is well illustrated with color photographs and color diagrams, and is written in a readable, nontechnical style.

The Himalayas are of great scientific interest today because they represent a classic "modern" orogenic belt that exhibits many features consistent with the recent geologic theory of plate tectonics. According to this theory, blocks of continental crust have moved relative to one another throughout geologic history. This movement is caused by the movement of material in the underlying mantle. Collisions of two continental blocks result in the formation of mountainous orogenic belts.

Recent geologic studies have suggested that the Indian subcontinent, after splitting away from an earlier large landmass called Gondwanaland, drifted north-

ward to collide with the Asian landmass beginning about 40 million years ago. This collision produced the Himalaya orogenic belt. The northward movement of India continues at a rate of about 5 cm per year. The resultant shortening of the crust is accompanied by extensive faulting, earthquakes, and the continental uplift of the Himalayas themselves, which is occurring at the rate of up to several millimeters per year. JES

Editor's Note: For another general overview of the Himalaya Mountains, see Geology Today, 1985, Vol. 1, No. 6, pp. 169–173, "The Himalayas," by B. F. Windley.

Gold boom in Mali. G. Philippart de Foy, *Europa Star*, Vol. 152, No. 5, 1985, 5 pp.

In the African nation of Mali, one of the poorest countries in the world, even the smallest amount of gold is treasured. In February 1982, a woman gathering wild plants along the banks of the Niger River discovered a gold nugget caught in the plant roots. Two days later the word was out and the gold rush at Bamako had begun. Today, hundreds of gold washers work the placer deposits. The men dig pits with primitive tools at about 2 m a day. Once through the alluvial covering, they dig out the gold-bearing layer and deliver it to the women at the surface. Here the gravel is washed in a hollowed-out gourd called a calabash. The shafts have no shoring, and accidents caused by the collapse of the workings are frequent. Although gold washing provides a living only for the lucky, it provides hope for everyone. GSH

The regulation maze. E. Salomon, *American Jewelry Manufacturers*, Vol. 33, No. 7, 1985, pp. 20–25.

This is an extremely important article for everyone involved in jewelry manufacturing. It outlines the regulations regarding toxic waste disposal that are being enforced with increasing severity. The most important point that this article makes is: "You must be familiar with your local requirements. Ignorance is no excuse for noncompliance!" Any company that is involved in plating and metal finishing of any sort is required by law to dispose of waste properly. Congress is exerting pressure on the Environmental Protection Agency to oversee the individual state authorities, who are in turn enforcing regulations through the sewer officials. The author emphasizes that environmental issues can be solved efficiently by educating ourselves to the laws that pertain, and by exploring alternative technologies that help to reduce waste through recycling and recovery methods. Charts are provided that list where to find out the laws that are in effect as well as the dates they are effective, together with discharge limitations and the various metal-finishing operations that must comply with these regulations. EBM