GEMOLOGICAL ABSTRACTS

C. W. FRYER, EDITOR

COLORED STONES AND ORGANIC MATERIALS

Check-list for rare gemstones: Vlasovite. W. Wight, *Canadian Gemmologist*, Vol. 14, No. 4, 1993, pp. 110–113.

Vlasovite, a sodium zirconium silicate with a Mohs scale hardness of 6, is a very rare collectors' species. Facetable material comes from the Kipawa region of Quebec. Susan Robinson's pencil drawing shows a specimen collected in 1987 by staff of the Canadian Museum of Nature, as well as their 1.43-ct stone faceted by Art Grant. The checklist gives all the information that a gemologist needs to make an identification, including the pertinent properties of gem minerals that might be confused with vlasovite. The section ends with a list of references for additional research. *Michael Gray*

Foitite, $[Fe^{2+}_2(Al,Fe^{3+})]Al_6Si_6O_{18}(Bo_3)_3(OH)_4$, a new alkali-deficient tourmaline: Description and crystal structure. D. J. MacDonald, F. C. Hawthorne, and J. D. Grice, *American Mineralogist*, Vol. 78, No. 11/12, pp. 1299-1303.

Tourmalines are among the most important of colored gemstones. Because of a wide range of compositional variability, this mineral group consists of a number of end-member species, including feruvite, liddicoatite, and uvite. The gemological properties are sufficiently similar, and the colors sufficiently varied, that most gem tourmalines are often not gemologically identified by mineral species.

This article reports on a recently discovered tourmaline end-member. Foitite was found in the mineral collection of the Department of Geology, Dalhousie University, Halifax, Nova Scotia. The label on the material indicated that it came from an unspecified locality in southern California (presumably from one of the many granitic pegmatites).

Only two small foitite crystals are currently known from the university's collection. Foitite is bluish black, has indices of refraction of $\omega = 1.664$ and $\varepsilon = 1.642$, and a measured density of 3.17 g/cm^3. Chemical analysis reveals that it is an iron-aluminum tourmaline with a crystal-structure site that is vacant due to the lack of an alkali component. The authors describe the crystal structure of this new tourmaline, and then discuss the relationship between this and other tourmaline species. Foitite is similar to schorl, which is also an iron-aluminum tourmaline. However, schorl contains sodium, while foitite lacks an alkali component. *JES*

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 his reviewers, 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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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. Opinions expressed in an abstract belong to the abstracter and in no way reflect the position of Gems & Gemology *or GIA.*

FM-TGMS-MSA Symposium on Garnets. *Mineralogical Record,* Vol. 24, No. 1, 1993, pp. 61–68.

The 1993 Tucson Mineralogical Symposium on garnet was sponsored by the Friends of Mineralogy, the Tucson Gem and Mineral Society, and the Mineralogical Society of America. The symposium was held in conjunction with the February 1993 Tucson Gem and Mineral Show. The *Mineralogical Record* published a compilation of 11 abstracts authored by the presenters. The topics and authors include: "Nomenclature and Classification of Gem Garnets," J. Shigley and D. V. Manson; "Crystal Structures, Chemistry, and Properties of Garnets," P. Ribbe and S. Eriksson; "The Causes of Color in Garnets," E. Fritsch and G. Rossman; "Inclusions in Garnets," J. Koivula; "Geologic Occurrence of Minerals in the Garnet Group," P. Modreski; "Chemical and Physical Properties of Vanadium- Chromium- and Iron-Bearing Gem Grossular Garnets," W. Simmons, A. Falster, K. Webber, and S. Hansen; "Garnets in Architectural Paints—A Historical Perspective," L. Solebello; "Garnets in the Gem-Bearing Pegmatite Dikes of San Diego County, California," E. Foord and W. Kleck; "Garnets of Magnet Cove, Arkansas," J. Howard; "A New Garnet Locality in Connecticut," R. Behnke, F. Schuster and B. Jarnot; and "The McBride Property," J. Van Velthuizen and W. Wight. Fourteen crystal diagrams, four photographs, a table, and a graph accompany the abstracts. *LBL*

DIAMONDS

Argyle diamonds. *Swiss Watch & Jewelry Journal Export 5/93,* October/November 1993, pp. 761, 762.

This brief article features information on the Argyle diamond mine in Kimberley, Northwest Australia, including a summary of the recovery processes used. According to the article, the Argyle pipe measures about 1,600 m long and varies in width from 150 to 600 m. Much of the recovery from both the primary and secondary deposits is done by large mechanized equipment. After diamonds have been removed from the ore, sterile rock is immediately used to fill the excavation. Mined-out areas are later planted with greenery. At the treatment plant, the lamproite is washed and sieved several times. Diamonds are finally separated out using X-rays. Argyle diamonds have a coating of iron oxide that makes sorting by grease tables unreliable. The CSO markets 75% of the diamonds; the remaining crystals are cut and sold through Argyle Diamonds. Included are photos of the Argyle mine.

JEM

Crystallization of diamond from a silicate melt of kimberlite composition in high-pressure and high-temperature experiments. M. Arima, K. Nakayama, M. Akaishi, S. Yamaoka, and H. Kanda, *Geology,* Vol. 21, No. 11, 1993, pp. 968–970.

It is widely accepted that kimberlite is the transporting medium that brings diamonds to the surface after they have crystallized in peridotite and/or eclogite in the mantle. However, fluid-inclusion studies of natural diamonds suggest a genetic link between diamond formation and fluids (melts) that are broadly similar to kimberlite in composition. Further, there is the nagging problem of the origin of microdiamonds, that is, small (<1 mm) diamonds, frequently with sharp edges, that show little or no sign of the resorption that is common in larger diamonds of clearly peridotitic or eclogitic origin.

This paper shows that it is possible to grow diamonds from a kimberlite melt, which the authors produced by melting powdered natural kimberlite from the Wesselton mine, South Africa. The powdered kimberlite was placed in a graphite (source of C) capsule. Experiments were run from 20 to 900 minutes. A modified belt-type high-pressure apparatus was used at high temperatures (1800–2200°C) and high pressures (7.0–7.7 GPa); these temperature and pressure conditions are considerably higher than those generally attributed to the growth of natural diamonds. The diamonds produced (up to 100 μm in diameter) had well-developed {111} faces, typical for natural diamonds and atypical for synthetic diamonds, which are usually cubo-octahedral.

The authors conclude that kimberlite melt has a strong solvent-catalytic effect on natural diamond formation, supporting the view that at least some diamonds (e.g., microdiamonds) crystallized from upper-mantle, volatile-rich melts that are distinctly different from those of peridotitic or eclogitic affinity. *A. A. Levinson*

Diamonds show resilience. M. Cockle, *Jewellery International,* No. 18, December/January 1993/1994, pp. 85–86.

This short article offers an optimistic outlook for diamond sales in 1994. Sales, especially that of jewelry commemorating life's "important chapters" and higher-end jewelry ($5,000 plus), were up in 1993—1%-3% over 1992's $40 billion total. Japan and the U.S., which make up about 60% of the market, are spending more despite bad economies in both countries. Personal consumption seems likely to go down in the U.S. in 1994, but up in Japan. Overall, most forecasts suggest good things for the year to come, including more diamond jewelry consumption by developing markets in China, Mexico, and South America. *Elizabeth A. Keller*

Nano-structures on polished diamond surfaces. W. J. P. Van Enckevort, M. S. Couto, and M. Seal, *Industrial Diamond Review,* Vol. 53, No. 6, 1993, pp. 323–327.

Despite many debates in the past, the actual mechanism of diamond polishing is still unclear. To obtain more information on this, the morphologies of polished surfaces of several semiconducting diamonds were examined by scanning tunnelling microscopy. The results of this topographic study are presented and provide essential new insights into the process of diamond polishing, but further questions arise. Abrasion along the hard directions proceeds via fracture and chipping on a nanometer scale; material removal in the softer directions seems to take place by single-pass grooving by diamond particles at supercritical loads followed by a polishing action by particles at subcritical loads. Problems to be solved include the actual mechanism of "plastic" grooving and how the extreme dependence of polishing rate on crystal orientation can be explained—now that the Tolkowsky cleavage model must be abandoned. *RAH*

Russians adapt know-how for enhancement of rough. V. Teslenko, *Diamond World Review*, No. 75, June-July 1993, pp. 50, 52, 54.

In addition to being a producer of rough diamonds, Russian is a leader in the development of technologies used in advanced weapons, nuclear, and aerospace industries. Subsequently these have been adapted for use in other industrial sectors. For almost 25 years, programs have been in operation that aim to enhance gem-quality rough and to raise the grade of near-gem-quality stones. The current changes in political climate have increased frankness on the part of the scientists and diamond industry members about this work.

A number of industry leaders—including Igor V. Gorbunov, general director of Almazjuvelirexport; Pavel K. Kovylin, head of the export department of Almazy Rossii-Sakha; and Yuri A. Dudinkov, director of the Diamond Center—confirmed that no enhanced rough is being released on the open market. They assure that any enhanced diamond sold will include a certificate that clearly outlines any procedure used.

The article lists some technologies that Russians are using to enhance rough diamond, including annealing, thermobaric treatment, laser irradiation, surface dissolution, thermodiffusion of inclusions, and diamond deposition.

Annealing entails heating at atmospheric pressure in an inert environment to remove green or yellow spots from rough stones. A negative effect of the process, as reported by a research team from the Gemological Center of Ginalmazzolto, was "graphitization in an extremely inert environment."

Thermobaric treatment (a high-temperature and high-pressure process) was carried out at two locations, including the Institute for Synthetics and Raw Materials at Aleksandrov in the Vladimir region. Like annealing, it is used to decolor diamonds. It was difficult to maintain isothermic and isobaric conditions across masses of crystals, making it too expensive for mass treatment of small rough. Using "original equipment," another research team was able to improve the color of brown diamonds by three to four grades. Negotiations regarding future development of the latter process have been conducted with several foreign companies.

At the Gemological Center of Ginalmazzolto, another enhancement technique—laser irradiation—is used to heal microcracks and relax inner stresses for cutting and polishing.

Three basic techniques of surface dissolution—yet another enhancement method—have been reported. Plasma etching, a thermochemical process, and laser etching are used by three different institutes to dissolve or etch the surface of a diamond to enhance frosted or coated diamonds.

Little is known about techniques involving thermodiffusion of inclusions. It has been suggested that diffusion is achieved by "moving through a thermogradient enhanced by a fine electromagnetic field."

In a sidebar, "Firms Rush for CVD Technology," the Gulf War's role in spurring development of carbon vapor deposition is explained. About 200 companies and labs, including Norton Diamond Film and De Beers Industrial Diamond Division, are investigating the technology, a process that came out of early research by Russian scientists. None of their work is covered by patents.

NDC

Solid carbon dioxide in a natural diamond. M. Schrauder and O. Navon, *Nature*, Vol. 365, September 2, 1993, pp. 42–44.

Solid carbon dioxide (CO_2; "dry ice") has been discovered by infrared spectroscopy in a small, unpolished natural diamond. The 9.2-mg diamond (which was purchased in Israel but is of unknown origin) consisted of two intergrown crystals. The larger was brownish yellow and color zoned; the smaller was colorless. CO_2 was present only in the colored zones and was submicroscopic (no inclusions visible with high optical magnification). Because of the shift of certain CO_2 infrared bands from their expected position at one atmosphere of pressure (i.e., at the earth's surface), CO_2 was determined to be in the diamond crystal at a pressure of about 5 GPa (50 kbar; 50,000 atmospheres). However, the authors conclude that the CO_2-containing fluids from which the solid CO_2 formed must have been trapped at even greater pressures in the hot mantle, corresponding to depths of about 220–270 km. Diamond is one of the few minerals with the strength to contain materials (gases) under such great pressures, bring them to the surface, and keep them trapped; thus, it is an effective "sampling device" for fluids deep within the earth.

These results also have implications for the petrological processes operating in the mantle because, for example, free CO_2 at these pressures should have reacted with silicates such as olivine and pyroxene to form magnesite ($MgCO_3$). The source of the trapped CO_2 could not be determined, but the authors have several theories. These include: release from high-pressure fluids (degassing) as they ascended through the mantle; and subduction of carbonaceous sediments from the surface.

A. A. Levinson

Hydrous and carbonatitic mantle fluids in fibrous diamonds from Jwaneng, Botswana. M. Schrauder and O. Navon, *Geochimica et Cosmochimica Acta,* Vol. 58, No. 2, 1994, pp. 761–771.

Fibrous diamonds have an opaque-to-translucent outer coat composed of nearly parallel diamond fibers that appear as outward-growing columns; the inner core may be transparent and of good quality. The diamonds are usually of cubic morphology and are commonly from Zaire, Sierra Leone, Siberia, and Botswana.

When the fibers grow, they trap very small amounts of high-temperature, high-pressure mantle fluid, from which some solid minerals may crystallize as the diamond cools on its way to the surface. The remaining fluid—although modified—is trapped under high pressure because of diamond's great strength. This paper shows how information on the chemistry of the original crystallizing fluids can be obtained, and how these data can be used to interpret the composition of fluids in the earth's mantle.

The fluid inclusions of 13 diamonds (cubic morphology) from Jwaneng were studied by means of transmission electron microscopy, infrared spectroscopy, and optical microscopy. Mineral phases identified included silicates, carbonates, and apatite; fluids (gases) included water and CO_2. By assuming that the original fluids were homogeneous at depth, their original compositions can be determined from the chemistry of the identified solids and the composition of the modified fluids still in the inclusions. On this basis, the authors determined that, although there is wide compositional variation in the fluids within inclusions in these coated diamonds, there are two end-member compositions: carbonatitic and hydrous. The carbonatitic fluid is rich in carbonates, CaO, FeO, MgO, and P_2O_5. The hydrous fluid is rich in water, SiO_2, and Al_2O_3. Both end-members are high in K_2O.

Fluid inclusions in fibrous diamonds have been analyzed by other researchers. However, this is the first time that the end-member compositions have been determined. By extrapolation of published experimental data, it is suggested that these fluids existed in the diamond stability field deep within the mantle at temperatures of about 1100°C and pressures of about 4.5 GPa (45 kbar). Further, there is an implied genetic link between these fluids and diamond formation. Three possible models for the formation and evolution of the two types of fluids within the earth's mantle are presented. All are compatible with the experimental data. *A. A. Levinson*

Three generations of diamonds from old continental mantle. S. H. Richardson, J. W. Harris, and J. J. Gurney, *Nature,* Vol. 366, November 18, 1993, pp. 256–258.

Diamonds form within two rock types, peridotite and eclogite, each of which has a distinct assemblage of minerals that can be represented by minute inclusions within diamonds. Diamonds cannot be age dated. However, their minute inclusions, particularly garnet and pyroxene, can be. They contain measurable quantities of radioactive elements. Because the inclusions formed at the same time as the diamond, the age of the inclusions is also the age of the host diamond.

Diamonds from several kimberlites in southern Africa have been dated previously at about 3,300 My and 1,150 My. The older diamonds have peridotitic (variety harzburgite, clinopyroxene-free) inclusions; younger ones have eclogitic inclusions. This paper reports that diamonds of another age group, 1,930 My, have been found. These contain inclusions of another variety of peridotite, lherzolite, which is characterized by the presence of clinopyroxene. (Most peridotitic diamonds are of the harzburgite variety.) Diamonds of all three ages are found in the Premier mine in South Africa.

A. A. Levinson

GEM LOCALITIES

The emerald mines of Madagascar. A. Thomas, *South African Gemmologist,* Vol. 7, No. 3, pp. 3–11.

The author visited nine emerald mines (Ambodirofia, Ambodibonary, Ambadamanino, Ambodibakoly, Mororano, Ambodifandrika, Ambodizainana, Ambilanifitorana, and Mohotsana II) in the Mananjary District of Madagascar. He vividly describes the difficulties involved in reaching this district; the mines employ over 1,000 people, and some heavy machinery is used.

Like emeralds from other sources (Brazil, Zambia), the Malagasy stones are found in dark schist, which is composed of blackish brown biotite with quartz lenses and minor plagioclase. The author tentatively identifies cubic, high-R.I. inclusions in some emeralds as rhodizite. The coexistence of rhodizite with emerald would be unique to Madagascar. Thus, when found, rhodizite inclusions would provide a definitive identification for this source of the emeralds.

Physical properties are given for stones from three Madagascar mining districts (Ankadilalana, Mananjary, and Morafeno). Refractive indices vary between ω = 1.580–1.581 and ε = 1.586–1.589, with birefringence between 0.006–0.008; the specific gravities range from 2.72 to 2.74. For comparison, values are also given for emeralds from Mozambique, South Africa, Tanzania, Zambia, and Zimbabwe. Stones from the three districts are also described in terms of their appearance through the Chelsea filter and absorption bands seen in a hand spectroscope. Their mineral inclusions and fractures are also described. The author notes that he saw no tremolite or actinolite needles in the emeralds he examined (or in the working faces of the mines he saw), unlike the observations of earlier researchers.

There are two photographs of emerald mining, and one cover illustration of an emerald crystal, but no photomicrographs. *Mary L. Johnson*

Mineralogy of the Sanford vesuvianite deposit. D. L. Leavitt and N. J. Leavitt, *Mineralogical Record,* Vol. 24, No. 5, 1993, pp. 359–364.

The Sanford (Maine) vesuvianite deposit has produced collector-quality specimens of vesuvianite, grossular garnet, scapolite, scheelite, and other species for over 140 years. The site is still open for collecting, and this article provides location maps along with a synopsis of mining activity and the general geology of the deposit. Accompanying the many photographs is a table listing the sizes and other pertinent information of the various minerals that have been positively identified from the deposit. *LBL*

Montana sapphires. S. Voynick, *Rock & Gem,* Vol. 23, No. 8, August 1993, pp. 42–48.

This article is primarily a retrospective of sapphire-mining activity at the Yogo dike in Montana. Although sapphire from this location was first discovered in 1895, the overall working of the site has been moderately low. Based on geologic studies done in the early 1980s, and the recent discovery of a western extension of the dike, it appears that the economic potential of the dike could far exceed all previous estimates. With the announcement of a new lease on the main section of the dike by one of the world's leading mineral-resource-development corporations—AMAX Explorations of Golden, Colorado—the author speculates on the probability of greatly increased mining activity and production of gem-quality material in the near future. *LBL*

A quartz discovery at the Sally Ann claim. T. Bleck, *Mineral News,* Vol. 10, No. 2, February 1994, p. 8.

From late 1992 to Spring 1993, the author dug out a pocket containing 300 amethyst-tipped smoky quartzes on the Helena Mineral Society's claim along Sally Ann Creek in Powell County, Montana. Faceting material was also found; the largest amethyst faceted from this locality weighs 45 ct. Only hand tools are allowed at this claim, and commercial digging is forbidden. *Michael Gray*

INSTRUMENTS AND TECHNIQUES

Microscopic estimation of refractive index using a dial test indicator and a personal equation. T. Farrimond, *Journal of Gemmology,* Vol. 23, No. 7, 1993, pp. 418–421.

The refractive index of a gemstone can be estimated from the ratio of its actual depth to its apparent depth, as viewed through its table with a microscope. The author describes how a dial-test indicator can be used to facilitate this process. Since the sample must be carefully manipulated (so that its vertical position does not change during the analysis), a microscope with a mechanical stage is recommended. If one is not available, a slide mount—like the one illustrated in this article—can be used. Ten values were determined by this method for a 0.52-ct pyrope garnet; they ranged from 1.756 to 1.787—with the lowest value matching the stone's actual R.I. The author suggests that this probably represents a personal bias, which can be included in the calculation following initial trial tests. Although only useful for estimations, the test has distinct advantages: It can be performed on most mounted stones, on gems with refractive indices exceeding 1.81, and in the absence of a refractometer. *CMS*

Towards a mathematical gemmology. Thinking in terms of ratios makes a difference. M. A. Schell, *Journal of Gemmology,* Vol. 23, No. 7, 1993, pp. 422–426.

This article is intended to provide gemologists with a better understanding of the relationship of doubling to birefringence and dispersion. Although doubling is related to birefringence, it is also affected by R.I.; that is, it is more apparent (all else being equal) in stones of low R.I. For example, calcite's birefringence is less than that of synthetic rutile, but its doubling appears greater. Since most gemologists do not attempt to estimate birefringence or perform identifications based on doubling, this report initially appears to be of primarily academic interest. However, the author's discussion leads to his development of a new index, which he calls "dispersing strength." This may be of value (particularly to lapidaries) in quantifying the visual effects based on divergent light rays. This article concludes with a discussion of color fringes at the shadow edge when obtaining refractive indices with white light. By using a comparison of the critical angle in red to that in violet light, rather than dispersion, refractometer readings could be sharpened. This could point the way toward the development of a better refractometer. Gemologists with an interest in the theory and application of gemology will enjoy this well-written—if somewhat technical—article. Fair warning: Trigonometry is involved, as well as the optics we all know and love. *CMS*

JEWELRY HISTORY

The opal—Louis Comfort Tiffany's lens to a world of color. J. Zapata, *Antiques,* Vol. 144, No. 5, 1993, pp. 318–327.

This sumptuous article probes the use of opal in jewelry by renowned American artist, Louis Comfort Tiffany. Well known for his peacock art glass and innovative stained glass lamps, Mr. Tiffany was fascinated by the ever-changing mosaic of color inherent in opal. This article looks at the history of Mr. Tiffany as it relates to the inspired use of opal in his jewelry designs. Ms. Zapata, a respected jewelry historian, does justice to her subject, recording minutely the historic partnership of Mr. Tiffany with opals and jewelry. For example, she describes slight changes made to an opal necklace after it was shown at the Louisiana Purchase Exposition in St.

Louis in 1904. This article precedes a new book by Ms. Zapata, *The Jewelry and Enamels of Louis Comfort Tiffany*, published by Harry N. Abrams. Supplementing the article's well-written text are splendid photographs of Tiffany's opal jewelry. *JEC*

The Straits Chinese and their jewelry. E. Chin, *Arts of Asia*, Vol. 23, No. 4, 1993, pp. 100–108.

This article describes an exhibition of the same name that was held from April to September 1993 in the National Museum of Singapore. The Straits Chinese (also called Peranakans) were a loosely organized group of early Chinese immigrants to the British and Dutch East Indies. By the late 19th century, they had developed a distinctive culture—with some variation from area to area—and established a reputation as the leading artistic patrons of the era. Over 300 examples of their rare jewelry were gathered for this display, many exhibited for the first time. The importance of this show is underscored by an increasing interest in Straits Chinese decorative arts that has spurred the production of many fakes and reproductions. Although of obviously inferior craftsmanship, the fakes are still very effective, as little of the original jewelry had been available for study before this exhibition.

Various types of jewelry are described, from everyday wear to fantastically ornate wedding jewels, including breastplates and crowns for both bride and groom. A mixed culture, the Straits Chinese were reasonably open to foreign influence in their artwork, dress, and customs. This cultural affability resulted in some amazing creations. Because the Straits Chinese loved glitter and brightness, jade is rarely found in their ornamentation, but diamonds are very prominent. Faceted granulation was combined with intricate details to create dramatic family treasures that were handed down from one generation to the next. *JEC*

JEWELRY MANUFACTURING

Advances in gem designing by computer. B. Atwell and M. Hunt, *Canadian Gemmologist*, Vol. 14, No. 4, 1993, pp. 104–109.

This article discusses the performance of several types of gemstone-design software available to the gem and jewelry industry, and then outlines why appraisers should use these programs. Discussion is lengthy on the use of these programs by gem cutters, going so far as to suggest that the programs be used to test new facet designs for brilliance and dispersion before actually cutting the stone. Arguments are made for using this software as a marketing device to sell well-cut gems to the public, and for jewelry designers to create new gemstone cuts to accent their creations. *Michael Gray*

JEWELRY RETAILING

New jewels for the new Russians. J. Helmer, *Jewellery International*, No. 18, December/January 1993/1994, pp. 29–32.

This article tells of a new breed of Russian jewelers who are emerging onto the world market with fresh ideas and new respect for the work of pre-revolutionary Russian masters. These designers and manufacturers, however, have encountered many obstacles in their quest for a free market. For example, the supply of gems and precious metals remains restricted. In order to escape these limitations, jewelers resort to "connections and patronage," which has produced corruption and chaos in the domestic manufacturing market. Nevertheless, new companies such as Karat, Ascor, Sirin, and Juvelirprom are thriving. They employ fewer people than the "old" traditionalist companies that dominated jewelry making under the Soviets, yet they have an annual turnover of between $1 billion and $2.5 billion. Many have offices in the U.S. and western Europe. These companies, the "new" traditionalists, are creating jewelry reminiscent of well-respected predecessors like Fabergé and Khlebnikov, or they take their inspiration from ancient Byzantine art. While demand grows for their work, they also realize that Russia cannot continue to trade solely on the reputation of the pre-revolutionary masters.

Elizabeth A. Keller

Saleroom report: Sotheby's sets sale [sic] world record. *Retail Jeweller*, December 2, 1993, p. 9.

Sotheby's set a world auction record for any jewelry sale with its $78,142,350 Geneva event on November 16–17, 1993. The highlight of the auction was a 100.36-ct D-flawless diamond which sold for $13,247,194, "the second highest price in dollars for any jewel."

Meanwhile, Christie's claimed a rival success with its $46.3 million jewelry sale on November 18, 1993. Top pieces included the historic Archduke Joseph diamond, sold for $7 million to the American Ishaia Trading Corporation. Laurence Graff of London acquired a pear-shaped purplish-pink diamond of 10.83 ct for $4.6 million and named it the Graff Pink. *MD*

Tenth annual ultimate gift guide. *Robb Report*, Vol. 17, No. 12, December 1993, pp. 51, 58, 79, 81.

Unsure of what to get that certain someone who already has everything? Is price no object? Consult the 10th Annual Ultimate Gift Guide in the *Robb Report*, the magazine "for the affluent lifestyle."

For the serious scribe, consider the Solitaire Royal fountain pen by Montblanc, billed as the world's most expensive writing instrument. The cap and barrel of this $100,000 pen are covered with 4,200 pavé-set diamonds (totaling 24 ct), which form a continuous and absolutely smooth surface. Order now for Christmas. Each pen takes nine months to assemble.

Clicking their heels three times might not whisk you to Kansas, but just wearing them will undoubtedly make you the talk of Kansas—or any state for that matter. The size-5½, $3-million ruby slippers—made by Harry Winston to commemorate the 50th anniversary of

The Wizard of Oz—are embedded with 4,600 rubies and trimmed with 50 ct of diamonds.

A limited-edition Colisée Kilim wristwatch by Cartier sparkles with 530 diamonds weighing 20.63 ct, 12 emeralds weighing 1.97 ct, two rubies weighing 0.70 ct, and two sapphires weighing 0.35 ct. Plan ahead. Each watch takes 10 months to a year to complete. If you have to ask, you can't afford it. Price is available *only* on request.

Also described are $20,000-a-set, 24k gold-plated wire rims to dress up your car and a $60,000 pool cue with malachite/lapis lazuli inlays depicting the Taj Mahal and environs.

With the exception of the pool cue, one color photo illustrates each item. *Irv Dierdorff*

Two for one. S. Biallôt, *Town & Country*, Vol. 147, No. 5163, December 1993, pp. 78, 80.

Each month, various contributors write *Town & Country*'s section on jewelry. In this issue, Suzanne Biallôt explores convertible jewelry's recent resurgence. Convertible jewelry is intricate and versatile, manufactured so that it can be worn in a variety of ways (e.g., a brooch with sections that can be detached and worn as earrings). The author briefly notes current trends and designers, being sure to mention that "convertible jewelry is not a novelty," dating its origins to the mid-1800s. Color photographs of convertible jewelry from leading international jewelry houses and designers accompany the article. *Juli Cook-Golden*

PRECIOUS METALS

MetalsNews: Demand for platinum rises. *National Jeweler*, Vol. 2, No. 2, January 1, 1994, p. 41.

Total platinum demand in the "Western world" grew 6% to 4.02 million ounces in 1993, while supply rose 10% to 4.21 million ounces, according to the Johnson Matthey semiannual Platinum Interim Review. Johnson Matthey is a London-based leading refiner and supplier of platinum-group metals.

These increases were tempered by a 16.2% drop—to 685,000 ounces—in industrial demand. Jewelry demand for platinum was expected to rise 80,000 ounces, or 5%, to a record 1.50 million ounces by year end. Platinum-jewelry consumption in Japan rose an estimated 3.9% to 1.34 million ounces, despite a poor economy.

The number of jewelry designers and manufacturers working in platinum in the United States is "now more than 150," triple the figure in the 1980s. Platinum-jewelry sales in the U.S., which only totaled 20,000 ounces in 1991, reached an estimated 45,000 ounces in 1993.

Johnson Matthey predicted a 17.6% rise in platinum-jewelry consumption in western Europe, and a modest 5% increase for the rest of the Western world.

From January through September 1993, the price of platinum averaged $374 an ounce, compared to $360 for the same period in 1992. A steep late-November drop in the Nikkei index in Tokyo, and the prolonged slump in the Japanese economy, caused platinum to dip below gold's price on November 23. Platinum prices were expected to remain in the $350- to $390-per-ounce range through Spring 1994. *MD*

SYNTHETICS AND SIMULANTS

Chic and cheap. B. Greysmith, *Jewellery International*, No. 13, 1993, pp. 74–76.

This article looks at the "major players" who influence the costume-jewelry market. The article opens suggesting that, although costume jewelry is nothing more than imitation, this market is enjoying a boom, thanks to consumers and collectors. To support this notion, Ms. Greysmith mentions costume-jewelry auctions held by Christie's; the dates of these auctions are somewhat vague. She also claims that some pieces have sold for prices close to what the "real thing" would fetch. Accomplishments of major costume-jewelry designers past and present (Chanel, Dior, Swarovski, and Monet, among others) are reviewed. Also noted are how historic events have influenced these designers. Ms. Greysmith also describes basic material used in making costume jewelry, such as lead glass, bakelite, plastic, and rhodium plating. She concludes that the popularity of costume jewelry will remain strong as professional women choose to accessorize their wardrobes. *Juli Cook-Golden*

Flux-grown synthetic rubies from Russia. U. Henn and H. Bank, *Journal of Gemmology*, Vol. 23, No. 7, 1993, pp. 393–396.

Characteristics are reported for two crystals of flux synthetic ruby manufactured in Russia. The two specimens represent two types of material: one that grows in a tabular prismatic form, and the other that is rhombohedral. On the basis of SEM-EDS analyses, the authors report Al_2O_3 and Cr_2O_3 as the main components. The rhombohedral crystal revealed significantly more chromium (about 1.5 wt.% Cr_2O_3) than did the tabular sample (about 0.3 wt.%), which is consistent with the color descriptions of dark red for the former and pale red for the latter. Other reported properties are typical for flux synthetic ruby. Inclusions were found to be tungsten-bearing flux and triangular residues of crucible material (probably platinum), both also typical of flux rubies. The producer reports growth conditions of 1100°C in a lithium-tungstate melt. EDS analysis, used to determine composition of the inclusions, would detect tungsten, but not the light element lithium. This succinct report is well illustrated with color macro- and micro-photographs and a table of the measured properties. *CMS*

Imitation lapis lazuli, charoite and azurite-malachite. D. Bennett, *Australian Gemmologist*, Vol. 18, No. 3, 1992, pp. 83-84. Part II, J. L. Keeling, pp. 84–85.

Despite different outward appearances, all three types of this new range of imitations were determined to have similar gemological properties: Mohs hardness under 5; dull luster; 1.54 spot R.I.; S.G. within the range of 2.53-2.61; inert to U.V. radiation (except for the charoite imitation, which fluoresced a weak gray to long-wave U.V.); and a slight burnt-rubber smell when tested with a "hot point." None of the three was a very convincing imitation. Their gemological properties were sufficiently different from their natural counterparts to make the separations straightforward.

In Part II of this report, the materials were further studied to determine composition and structure. SEM-EDS analysis revealed two types of fine-grained powder in an organic cement. One type consisted of approximately equal amounts of barium and sulphur, and was tentatively identified as barite; the other consisted mostly of aluminum, and—with the help of infrared spectroscopy—was identified as gibbsite. Infrared spectroscopy indicated that the organic cement contained polymers similar in composition to butyl phthalate or methyl benzoate. *RCK*

TREATMENTS

Unpleasant truth behind jade treating and bleaching. R. Milburn, *Asia Precious,* September 1993, pp. 72-75.

The Hong Kong tourist association warns the jade-buying public to demand that the type of jade be described in writing on the invoice when making a major purchase. This has been prompted in part by the abundance of bleached and polymer-impregnated jadeite on the market there. Perhaps as much as 70% of the jadeite sold in Hong Kong and 90% of that sold in Taiwan is treated. China treats much of its output, too.

The "inexact" classification used by jade dealers includes three types of jade: Type A, basically untreated; Type B, bleached and polymer-impregnated; and Type C, dyed (B and C can occur together).

Recent advances in the bleaching treatment have made it difficult to detect by standard gemological methods alone. With early treatment procedures, the jade often contained a large percentage of the relatively light resin, which made its specific gravity significantly lower than the untreated material. Also, the resin commonly fluoresced a chalky blue to long-wave ultraviolet radiation. Apparently, treaters now put less polymer in the bleached jadeite and use a resin that does not fluoresce.

B jade has durability problems. Eventually, the iron oxides that have been reduced oxidize again and darken the piece. The translucency caused by the polymer also will become duller as the polymer slowly degrades over time.

This situation has created a major problem for the jade trade, as challenges in identification make proper disclosure even more difficult. This is especially true in the case of medium-quality jade, which is usually not expensive enough to justify a laboratory report. However, proper testing is necessary if the jade market is to survive. In Japan, jade sales dropped 50% in 1991 due to concerns over B jade. *EF*

Testing jadeite to protect the trade and consumers. R. Milburn, *Asia Precious,* October 1993, pp. 60–63.

Due to widespread bleaching and polymer impregnation, a new classification system for jadeite—to clearly indicate treated pieces—has been deemed necessary in Hong Kong. Many Hong Kong organizations are expected to sit on the standard-making body, including representatives of the government, trade organizations, and gemological associations. Authorities might make this standard mandatory. This raises the difficult question of who will be authorized to issue certificates, and how that will be done. It has been suggested that only qualified gemologists with an understanding of infrared spectroscopy (the only sure way to identify polymer impregnation) should be involved. Other details still need to be worked out, too. These include whether to indicate the degree of polymer impregnation and whether the cost of testing should be limited to 5% of the cost of the jadeite piece.

The rest of the article describes methods used to identify treated jadeite. The information is mostly correct. However, several mistakes in the layout could be confusing. For example, figure captions describing the infrared spectra of untreated and treated jadeite have been mistakenly switched. In addition, a number of items in the table are not matched to the appropriate discussion. *EF*

MISCELLANEOUS

The first annual Phony Awards. T. Laughter, *JewelSiam,* Vol. 4, No. 6, 1994, pp. 31–39.

Mr. Laughter has put together an informative and entertaining article that summarizes some "outstanding" synthetic and treated stones seen at Bangkok's School of Gemological Sciences in 1993. The reader might be amazed at the lengths that some of the "award winners" went to in order to deceive a customer. The Phony Awards remind us that even the best can be fooled if caution is forgotten even for a moment. Highlights include the "Best Celestial Sham," a synthetic star ruby that looked natural to the unaided eye. The cut was bottom-heavy, atypical for synthetic stars, and sported a pavilion cavity that was cut to look natural; a less distinct but more natural-looking star was the result of a low concentration of rutile needles. However, a microscope revealed curved striae, proof that it was a synthetic ruby.

The "Best Hidden Curves" featured a flame-fusion synthetic ruby that had been heat treated to reduce the appearance of curved striae and to induce inclusions that resembled natural fingerprints. The "Best Fused Flux Fusion" was a flame-fusion synthetic boule that had been given an overgrowth of flux ruby. The overgrowth made curved striae difficult to identify, while the flux inclusions in the overgrowth were much easier to locate. The motivation behind the creation of this piece is clear when one remembers that flux synthetics are 300 times more costly than flame-fusion synthetics. The winner of the "Hardest" award (as in Mohs scale) was a yellow synthetic diamond. This section included information on how the stone was identified as synthetic, as well as a portion of a conversation that then took place between the submitting company and the school's lab. Photos of each of the 17 award winners are included, with text on how each identification was made. *JEM*

1993: The geosciences in review. *Geotimes,* Vol. 39, No. 2, February 1994, pp. 10–37.

This lengthy article has 40 sections, each written by an expert in a particular field, that summarize trends seen in earth sciences in 1993.

The geosciences as a whole have been affected by the economy, ecology, and zeitgeist of the '90s. Research must be relevant, not esoteric; development must be sustainable, not just exploitive; waste-disposal problems are likely to be considered as important as extraction problems. A significant trend for individuals is the increased access to computers as a form of international communication (consider, for instance, GIA-Net and the recently announced GemLink). The successful earth scientist of the '90s will be nothing if not versatile.

In the United States and Latin America, extractive mining continues to be important for only two metals: copper and gold. Current mining techniques make it unlikely that mineral specimens (much less gems) will be recovered using modern gold-mining techniques, but copper mines are producing (for example) azurite, malachite, drusy quartz with chrysocolla, and turquoise.

Exploration geophysics continues to be of primary importance for oil producers, but exploration geochemistry is gaining further emphasis. The Geological Survey of Canada, for instance, is working on stream-sediment and heavy-mineral surveys for a national geochemical data base, with special emphasis on kimberlites. Regional mapping is also being undertaken by Greenland, Finland, Sweden, Norway, Great Britain, and Poland. Australia, New Guinea, and Fiji are searching for new gold deposits. UNESCO is sponsoring a project to systematically map geochemical regions worldwide.

Analytical techniques continue to measure smaller and smaller concentrations of more and more substances. ICP (inductively coupled plasma) emission spectrometers and mass spectrometers can measure minute amounts of elements and organic compounds; laser ablation mass spectrometry and ion microprobes measure isotopes, for example, as in the zoning patterns in individual garnets. Unfortunately, all these techniques are destructive, at least on the scale of tenths of millimeters. However, another new technique, the atomic force microscope, can look nondestructively at the positions of individual atoms on a surface. Fluid inclusions tell petrologists about formation conditions and water/rock interactions.

Diamonds are of interest to mineralogists and petrologists alike because they provide information about conditions in the Earth's deep interior. The (recently discovered) occurrence of solid carbon dioxide in diamonds suggests that the composition of the Earth's mantle may be less uniform than previously thought. High-pressure mineralogy continues to be an important field. Mineralogists are also becoming more interested in exploring the health effects of mineral-rich dusts, a subject with possible implications for the faceter and lapidary.

Mary L. Johnson

Minerals, mineralogy, and mineralogists: Past, present, and future. *F. C. Hawthorne, Canadian Mineralogist,* Vol. 31, No. 2, 1993, pp. 253–296.

Several fundamental concepts used in gemology come from the field of mineralogy. Good examples include much of gemological nomenclature, certain methods of gem identification, and ideas on topics, such as crystal growth and the causes of color in some gemstones. Thus, an understanding of mineralogy's past and its possible future directions should be of interest to gemologists.

In this article, Dr. Frank Hawthorne, a mineralogy professor at the University of Manitoba and a recent past president of the Mineralogical Association of Canada, presents a condensed but thorough overview of mineralogy. Starting with the earliest key publications on minerals, he traces the major developments, first in the classification and then in the characterization of minerals. All the major analytical techniques now used to study minerals are briefly reviewed. Future directions that research on minerals may take are highlighted. The author concludes with a plea for retaining classical mineralogical education and mineralogical research in a period of shrinking funding for both science and scientific education. *JES*

Perren Gem and Gold Room opens at Royal Ontario Museum. *Canadian Gemmologist,* Vol. 14, No. 3, 1993, pp. 86–87.

This exhibit is named for the late gemologist and gem dealer, Richard Perren. Six photographs show examples of the displays, which feature interactive videos, gold specimens, and gemstone groupings.

Michael Gray