GEMOLOGICAL ABSTRACTS

DONA M. DIRLAM, EDITOR

COLORED STONES AND ORGANIC MATERIALS

Gemmology Study Club lab reports. G. Brown, *Australian Gemmologist,* Vol. 17, No. 6, 1990, pp. 221–230.

This interesting report, with references included in individual entries, covers a number of gem materials examined by the author and other Study Club members. The first item is a ruby that contained a partially filled fracture. It apparently had been treated with a colorless "oil" to improve its transparency.

So-called "rainbow lattice sunstone" is described next and the gemological properties of two specimens listed. The investigator concludes that the aventurescence of this material is caused by thin-film interference from hematite and hydrated iron oxide (e.g., goethite) lath-shaped inclusions. The tentative conclusion is also reached that the material has properties very similar to those of an untwinned aventurescent microcline-microperthite (Harts Range sunstone) previously described in the literature.

Description of a silicon imitation of hematite is followed by a study of "variscite" from Keppel Bay, Queensland, that exhibited the following properties: color—pale slightly yellowish green with internal fractures healed by ingrowths of darker green variscite; hardness—3–4; fracture—splintery to uneven; S.G.—2.56; spot R.I.—1.58; diaphaneity—translucent; ultraviolet fluorescence (LW and SW)—inert; absorption features—nothing diagnostic. Magnification revealed irregular masses of drusy quartz, pale green masses of possibly metavariscite, and a silvery gray mineral of undetermined identity. The author presents an argument that the material investigated should be more correctly described as variscite-metavariscite.

Also mentioned are an assembled imitation of amethyst consisting of two colorless quartz sections joined by a colored cement; two materials mined near the town of Dungowan in New South Wales, described respectively as nephrite and a non-gem-quality "semi-nephrite"; "Aqua Aura"—colorless quartz crystals coated with a thin film of pure gold; prasiolite (green quartz) from Camfield Station in Australia's Northern Territory; beta-quartz; and Argentine rhodochrosite.

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

All entries are illustrated, and a map indicates the localities of the various Australian materials described. *RCK*

Gemmology Study Club lab reports. G. Brown, S. M. B. Kelly, R. Beattie, and H. Bracewell, *Australian Gemmologist*, Vol. 17, No. 7, 1990, pp. 279–286.

Brown et al. report on several interesting natural, enhanced, and man-made gem materials in this series of brief entries. An ornamental white chalcedony included with greenish cuprous dendrites had a high S.G. (around 2.76) that varies according to the amount of copper minerals present. Next covered are 3/4 cultured (bead-nucleated) pearls that had been silver-nitrate treated to produce a black color and then wax coated. Also discussed are key considerations in faceting calcite, the heat treatment of pale yellow sapphire to turn it colorless, and a diamond with surface etching caused by heat damage.

Among the man-made and assembled materials covered are a purple synthetic spinel "triplet" with a very thick center layer of colored adhesive; didymium-doped, color-change CZ; translucent "powder" blue synthetic quartz resembling blue chalcedony; a banded (yellow, green, and brown) synthetic quartz; Japanese synthetic citrine with two distinct bands of "breadcrumb" inclusions; reconstructed New Zealand kauri gum; and a single glass imitation pearl in a necklace of otherwise natural pearls.

Other materials covered are scenic common opals reportedly from Peru and some questionable turquoise with a brecciated texture that was reminiscent of reconstructed material but yielded a negative test to hydrochloric acid. *RCK*

Some rare ivories. G. Brown, *Australian Gemmologist*, Vol. 17, No. 7, 1990, pp. 256–262.

Beginning with a brief historic note on what constitutes the "ivory of commerce," the author goes on to describe and illustrate the general appearance/morphology and microscopic features of five rare ivories and the X-radiographic appearance of three of them.

First described is a commercially marketed, wax-treated walrus ivory, sold as a "fossilized" material and claimed to be recovered from walrus skulls buried in Arctic soil for 100 to 2,000 years. The second, crocodile ivory, is from the estuarine crocodile of Papua–New Guinea. The feline ivory described is from the canine teeth of the Bengal tiger, while the boar ivory is from the tusks of the wild boar native to Oceania. The final ivory discussed is from the tusks of the dugong, an aquatic herbivorous ungulate of northern Australia and islands of the Torres Strait.

Although brief, this very descriptive article is a nice addition to the literature on organic gem materials. *RCK*

Spessartine garnet in Brazilian topaz. J. I. Koivula, C. W. Fryer, and R. C. Kammerling, *Journal of Gemmology*, Vol. 22, No. 6, 1991, pp. 366–368.

Inclusions of spessartine garnet were identified in pale brownish yellow topaz crystals from Minas Gerais, Brazil. Identification of the macroscopically visible inclusions was based on a combination of microscopy, refractive index, and X-ray diffraction. The included crystals are described as transparent to translucent "slightly pinkish-brownish orange" and often exhibit obvious dodecahedral symmetry. One included crystal was removed from the host topaz and revealed a refractive index (by the Becke line method) of slightly below 1.81. X-ray diffraction of another exposed crystal yielded a pattern almost identical to that of end-member spessartine. *CMS*

Technology and weathering of Mesoamerican jades as guides to authenticity. L. A. Garza-Valdes, in *Materials Research Society Symposium Proceedings Volume 185, Materials Issues in Art and Archaeology*, ed. by P. B. Vandiver, J. R. Druzik, and G. Wheeler, 1991, pp. 321–357.

Pre-Columbian jade artifacts are much prized by museums and collectors alike. Often, however, they have been removed from the site where they were originally found before they can be authenticated by a reputable expert. In this article, Dr. Garza-Valdes explores methods by which evidence from ancient and modern lapidary techniques as well as from the nature of surface weathering can be used to determine the age—and, hence, authenticity—of worked "jade" specimens from Mesoamerica, primarily Guatemala.

The term *jade* is used by the author in the loose, nongemological sense and refers to a variety of minerals and rocks, usually with some tinge of green color, that can be worked by ancient lapidary techniques. Almost 80% of the more than 10,000 specimens examined for this study consist primarily of albite; only slightly over 7% contain any jadeite or chemically related mineral, and even fewer contain actinolite (including nephrite). The remainder are composed of a wide assortment of materials, including amazonite, basalt, jasper/quartzite, serpentine, and the like.

Each of the minerals used by pre-Columbian lapidaries has a different rate of weathering (dissolution). Since weathering on a worked surface occurs only after the material was last freshly exposed—presumably at the time of fracturing or polishing—then the date of working can be determined from the amount of weathering, given the rate at which dissolution of the particular material occurs. The author provides dissolution formulas for the most common minerals encountered in pre-Columbian artifacts. By using comparison samples of known age and provenance, he determined, the authenticity of most unknown artifacts could be ascertained. Occasionally, a genuinely ancient piece is repolished by a modern collector to improve its attractiveness; such a practice will destroy the evidence of weathering.

Also useful in authenticating pre-Columbian artifacts is evidence of ancient lapidary techniques. Infrared spectroscopy can identify remnants of polishing compounds; some (such as tin oxide) were not used in ancient times and others (e.g., tripoli) were used prehistorically but continue to be used today. Moreover, ancient lapidary techniques left characteristic features of drilling and polishing – resulting from the use of stone and botanic instruments – that are distinctly different from the evidence left by modern drills and laps.

Accompanying the article are numerous black-and-white photographs and photomicrographs (the latter of use to the gemologist in identifying gem materials used in carvings) as well as infrared spectra of polishing compounds and minerals that will be of interest to advanced gemological laboratories. *CMS*

The tourmaline. E. L. F. Locke, *Town & Country*, Vol. 145, No. 5133, June 1991, pp. 136–139, 172.

The relatively short but fascinating history of tourmaline is detailed in this lively and well-researched article. Unknown in mineralogy texts before the 18th century, tourmaline first made its appearance in Holland as pipe cleaners. By the end of the 19th century, the bulk of southern California's Himalaya mine tourmaline was being shipped to China for the Dowager Empress Tz'u-hsi's vast collection. The development of the tourmaline market in this century was, until recently, largely due to the efforts of George F. Kunz and Tiffany & Co. A bit of inspired claim-jumping brought the New York store rights to the Himalaya mine's rich yield at the turn of the century, but the sea-green colors of Maine tourmaline had figured in the Art Nouveau designs of Charles Comfort Tiffany since the 1890s. Today, Paloma Picasso uses enormous stones from many locales to create her one-of-a-kind jewelry.

Many contemporary designers make use of tourmaline's extraordinary palette of colors. The article shows pieces from Marina B., Bulgari, Tivol, Black Starr and Frost, H. Stern, and Van Cleef and Arpels, among others; the versatility of this stone is obvious.

The search for gem-quality tourmaline can take the serious collector into the wilderness of Brazil's mining country; but as more designers start to work with these lovely stones, the search need only go as far as the neighborhood jeweler. *LES*

An unusual Indian aquamarine. J. Koivula and R. Kammerling, *Australian Gemmologist*, Vol. 17, No. 7, 1990, pp. 270–272.

The authors studied a rectangular emerald-cut aquamarine that they were told had been mined and faceted in Madras State in southeastern India. The stone showed a rich, slightly greenish blue color (reportedly natural) and was a sizable 41.76 ct.

The authors documented the stone's gemological properties, noting that the refractive index, specific gravity, U.V. fluorescence, and absorption spectrum all fell within the ranges previously published for this gem variety of beryl. When examined with magnification, the stone displayed a distinct layered growth structure, which was oriented parallel to the crystal axis; polarized light revealed heavy strain.

While trying to obtain an optic figure, the authors noted an unusual characteristic: a uniaxial optic figure in some directions and a biaxial optic figure in others. Although such strain-induced biaxial anomalies had been reported before, the authors had previously seen this feature only in sliced crystals that had been prepared for cross-sectional strain studies. This was the first time they had observed such an obvious dual optic character in a faceted aquamarine. *Glen R. Hodson*

Vulcanite or gutta-percha? That is the question. G. Brown, *Journal of Gemmology*, Vol. 22, No. 5, 1991, pp. 292–297.

This intriguing article provides information on two poorly documented materials that were used to imitate jet during the 19th and early 20th centuries. Gutta-percha is a naturally occurring polymer obtained from the milky latex of two species of Malaysian tree. Jewelry-grade material is obtained by remelting and filling raw gutta-percha with a variety of inert materials such as zinc oxide, chalk, waxes, or resins. The resulting mixture can be molded as desired and yields a reddish to brownish gray solid that can be painted black to simulate jet. Jewelry-grade gutta-percha is soft (Mohs hardness of 1; easily scratched with a fingernail) and brittle, with a specific gravity that varies from 0.96 for pure gutta-percha to as high as 1.9 when filled. Its spot refractive index of about 1.58 is difficult to determine due to the solubility of gutta-percha in refractometer fluid. Gutta-percha softens at temperatures as low as 40°C and melts between 65° and 70°C.

Vulcanite, the second jet simulant discussed, is a compound of natural rubber and sulphur that is thermoset at 168°C and 90 psi into a solid. The resulting material lacks the thermal instability and elasticity of pure natural rubber, which is produced from the milky latex of a variety of trees from Asia and Central and South America. Jewelry-grade vulcanite, also known as "ebonite," consists of 50% natural rubber, 30% sulphur, 3% black pigment, and 17% fillers. It is initially black but oxidizes to shades of brown; it is slightly harder than gutta-percha (hardness 1–2; not scratched by fingernail, but can be scratched by gypsum); and has a specific gravity of 1.20+, depending on fillers, and a spot refractive index of 1.60/1.61.

Vulcanite can be distinguished from the less common gutta-percha on the basis of microscopic examination of the surface as well as by hot-point and solubility testing. With low-power magnification, gutta-percha will often reveal areas from which the black coating has worn away, will have a fibrous or granular surface, and—where the coating is absent—may appear finely crazed. Vulcanite, on the other hand, is evenly colored and has a uniformly smooth texture. A hot point, applied judiciously, yields an odor of burning rubber from vulcanite, while the odor from gutta-percha is distinctly different. Moreover, gutta-percha will soften at a much lower temperature than will vulcanite, which tends to char. Finally, a carefully applied, minute drop of toluene will quickly soften gutta-percha in the same time that the surface of vulcanite softens only slightly.

Gemologists who deal with period jewelry will find this article especially useful. Black-and-white illustrations and photos illuminate the text. *CMS*

Why the Vietnam reds are giving us the blues. R. Weldon, *Jewelers' Circular-Keystone*, Vol. 162, No. 5, May 1991, pp. 46–48.

This report gives a fairly comprehensive view of the current status of the gem-quality ruby finds in Vietnam. The first rubies to emerge were typically small—roughly 1 ct or less—but of excellent color, according to Dr. A. Peretti, director of the Gübelin Gemmological Laboratory, Lucerne, Switzerland. Recent reports from Thailand, however, claim that some stones weighing 6 ct to 11 ct have been found; colors range from pink to red. Dr. Henry Hänni, of the Swiss Foundation for the Research of Gemstones, suggests that if the stones were heat treated they might compare with Burmese or East African rubies in color.

To date, there is only one operating mine, Luc Yen, although other secondary alluvial deposits have been found. Weldon quotes sources who have determined (from inclusion studies) that the original occurrence must have been in a mineralized marble zone, which is similar to the geologic formations of Mogok in Burma, the Hunza Valley in Pakistan, Djegdalik in Afghanistan, and the Pamir range in the Soviet Union.

Drs. Ulrich Henn and Hermann Bank of the German Foundation for Gemstone Research, in Idar-Oberstein, report the refractive indices as 1.760–1.762 and 1.768–1.770, the pleochroism as red to yellowish red, and inclusions that consist of "healing cracks of unusually vermicularly-shaped fluid inclusions" and lamellar twinning. The rubies also tend to fluoresce to visible light.

The Vietnamese government formed Vinagemco to represent its interests in ruby mining and, in 1988, Vinagemco and B. H. Mining Co. of Bangkok signed a contract to develop the mining operation. A reported 1.25 million carats of ruby rough currently awaits scheduling of an auction date. *KBS*

GEM LOCALITIES

Die Amethyst-Vorkommen von Las Vigas, Veracruz, Mexiko (Occurrence of amethyst at Las Vigas, Veracruz, Mexico). W. Lieber and G. Frenzel, *Lapis*, Vol. 15, No. 6, June 1990, pp. 21–22, 31–38.

Although amethyst specimens from Las Vigas have found their way into gem and mineral collections all over the world, this article represents the first comprehensive report on their origin and mineralogical properties.

The amethysts occur in andesitic rocks of the Sierra Madre Oriental, in an area of several square miles near the town of Las Vigas. Lieber and Frenzel state that the crystals are found in klufts (clefts) which they believe are similar in formation to those of the Alpine klufts. The crystals usually reach 3 cm, although specimens as long as 10 cm (4 in.) have been found. The authors give a detailed analysis of the andesite and conclude that it was altered by hydrogen metasomatism and that the amethyst formed at temperatures of 150°–250°C. Milky to colorless quartz and amethyst are generally the only minerals in the pockets, but calcite, epidote, zeolites (laumontite), and lepidocrocite can sometimes be found.

Further aspects discussed are the origin and distribution of color, crystal forms (often Muzo habit, also doubly terminated crystals, rarely crystal scepters), and inclusions (negative crystals, lepidocrocite, rarely epidote). Chemical analyses of typical material are provided. The deposit is likely to produce fine specimens in the years to come, since it is only worked irregularly on a small scale and the area has not yet been prospected intensively.

The article is illustrated with many color photographs of specimens, characteristic features of the crystals, and views of the mining area.

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Crystallized and massive rose quartz deposits in Brazil. J. P. Cassedanne and M. Roditi, *Journal of Gemmology*, Vol. 22, No. 5, 1991, pp. 273–286.

Rose quartz is found in a number of localities in Brazil, almost all of which involve granitic pegmatites. This article reviews many of these localities and focuses on the geology and mineralogy of the occurrences. Massive rose quartz is more common than the crystallized form, which is primarily found in Minas Gerais.

A brief description of gemological properties concludes the article. Refractive indices, birefringence, and specific gravity are typical for quartz. In more intensely colored material, a fairly strong pleochroism of dark pink/light pink can be observed. There is no distinctive absorption spectrum and no radioactivity; the color disappears when the material is heated to 575°C. Microscopic needles of rutile may provide asterism in some specimens, and macroscopic needles of rutile and tourmaline also occur in massive material. The most common internal features observed with the microscope are two-phase inclusions, milky veils, small secondary healing fractures, and fissures, sometimes with iridescence.

Color and black-and-white photographs of localities and specimens accompany the text, as does a map of localities where crystallized rose quartz is found. There is also a diagram of a typical pegmatite. *CMS*

Emeralds from Colombia (Part I). G. Bosshart, *Journal of Gemmology,* Vol. 22, No. 6, 1991, pp. 355–361.

Part I of three, this review article provides an introduction to Colombian emeralds that includes their history, geography, geology, genesis, and mining. The history begins with the 16th-century discovery by the Spanish of first Chivor and then Muzo. By the middle of the 17th century, emerald mining in Colombia was so productive that the Spanish sold gems all over Europe and the Middle East.

The emeralds occur in the Cordillera Oriental range of the Andes Mountains, a product of recent and ongoing tectonic movement. They are found in early Cretaceous shales and limestones (120–130 million years old). The associated mineral assemblages are summarized for the major localities. Also provided is a discussion of the predominant theories of emerald genesis, still a topic of controversy.

Part I ends with a brief description of the historic production and mining at the most significant mines—Muzo, Coscuez, Chivor, and Gachalá. Parts II and III will cover gemological properties, treatments, and identification. This promises to be an excellent review of this important gemstone, written (so far) in a lucid and readable manner that gemologists will find appealing and informative. The bibliography is one of the most complete reference lists available on the topic. One color figure of specimens accompanies part I; it is to be hoped that more illustrations and a map will be forthcoming in parts II and III. *CMS*

Gem thaumasite from the Black Rock Mine, South Africa. U. Henn, M. Redmann, and H. Bank, *Journal of Gemmology,* Vol. 22, No. 6, 1991, pp. 334–336.

The mineral thaumasite is usually found as aggregates of tiny needle-like crystals. Recently, however, crystals of gem quality and size (up to 1.5 cm) were found at the Black Rock mine in northern South Africa. The crystals show a distinct hexagonal prismatic habit. Refractive indices of n_o = 1.505–1.510 and n_e = 1.467–1.480, birefringence of −0.030 to 0.038, and density of 1.88–1.90 g/cm^3 are within documented values for thaumasite from other localities. No description of color or transparency is provided, although photographs of inclusions suggest that the material is transparent. Observed microscopic features include: (1) distinct growth zoning both parallel and perpendicular to the c-axis, (2) liquid films, (3) partially liquid-filled negative crystals with a gas bubble, and (4) bunches of needle-like crystals. *CMS*

'Machingwe': A new emerald deposit in Zimbabwe. J. Kanis, C. E. S. Arps, and P. C. Zwaan, *Journal of Gemmology,* Vol. 22, No. 5, 1991, pp. 264–272.

The authors describe a deposit of emeralds discovered in 1984 in the southern part of the Rhodesian Craton, approximately 12 km northeast of the original Sandawana mine in Zimbabwe. This find, known as the Machingwe mine, is claimed to be the most important emerald discovery since Sandawana.

The article includes descriptions of regional geology, emerald occurrence, mining procedures, and emerald properties. The emeralds are extracted by a combination of simple mechanization and hand methods from pits as deep as 21 m. Few well-developed crystals are encountered, but the relatively small broken pieces found are of "superb emerald green" color. The largest faceted stone to date is less than 5 ct.

Chemical data for two emerald specimens from the Machingwe mine are provided along with comparable information for samples from Sandawana and Zambia. The Machingwe material is notably higher in iron and lower in chromium than is the emerald from Sandawana. The dull red color observed for Machingwe emeralds through a Chelsea filter is consistent with such a composition.

Refractive indices and birefringence for the Machingwe emeralds are within values previously observed for emeralds from Zimbabwe. Reaction to long-wave U.V. is bright green; short-wave reaction is a weaker green. The absorption spectrum, most distinct in "samples with the finest colours," reveals chromium lines in the red and a strong band in the yellow-green region. Inclusions observed in the Machingwe emeralds are similar to those found in material from Sandawana. Four color photomicrographs—as well as maps, locality photos, and graphs—accompany the text. *CMS*

Gems around Australia, part 3. H. Bracewell, *Australian Gemmologist,* Vol. 17, No. 7, 1990, pp. 265–269.

This third part in a series of gem-related travelogues takes the reader to Australia's Northern Territory, beginning with a brief review of mining activities dating back to 1865. Within the Territory is the Harts Range, a 250-km^2 area known by such names as the "Gem Centre of Australia" and the "Jewel Box" for its wealth of gem materials.

First visited were Zircon Hill and Specimen Hill, where both zircon and apatite are found. The author next visited a garnet field, where small pieces that cut nice gems were collected. Nearby, beryl crystals were picked up at Annamurra Creek. Traveling east, a stop was made at the Disputed mine for specimens of beryl, tourmaline, and mica "books." The author was also able to collect specimens of extremely thin, tabular ruby crystals in amphibolite at a site where commercial mining had recently ceased.

The author describes as the highlight of the trip her first sighting of a profusion of kyanite crystals scattered down the side of a mountain, having weathered from a mica schist. These crystals ranged up to 29 cm in length.

Other stops were made to collect various gem materials, including good-quality deep green epidote crystals and glassy fragments of iolite, the latter in the region of Inkamulla Bore. The final gem-collecting site described is the Plenty River mine in the Jervois Range, where gem-quality lepidolite was found. Unexpectedly, the report concludes with a number of the author's observations on the aborigines. It is regrettable that this article did not include a map of the localities visited. *RCK*

Mt. Philp aventurescent iolite. G. Brown and H. Bracewell, *Australian Gemmologist*, Vol. 17, No. 6, 1990, pp. 231–234.

This well-illustrated report is a follow-up to a preliminary note by the authors on iolite from Australia. The deposit, previously described as being at Mt. Isa, is actually located 55 km to the southeast, in the southern foothills of Mt. Philp in northwest Queensland. It is worked by simple hand-mining procedures, with most gem-quality material being recovered from small pebbles that surround larger iolite boulders in a red soil.

Internal features noted beyond those previously described for this material are blue and yellowish masses of pinite, greenish hexagonal flakes resembling chlorite, and evidence of at least two directions of cleavage. Some specimens display an "iridescent aventurescence," which is attributed to thin-film interference from very small, thin, hexagonal platelets of possibly hematite. Other gemological properties of this phenomenal iolite are as follows: S.G.—2.59; R.I.— α = 1.531, β = 1.534; δ = 1.540; birefringence—0.009; optic character—B—; pleochroism—strong, α = pale yellow, β = grayish, δ = violet-blue; absorption spectrum—indistinct and very directional, with strongest features being vague bands at 585, 493, and 436 nm. *RCK*

INSTRUMENTS AND TECHNIQUES

Medo hand® vacuum tweezers, model MH-100 and Linicon LV-125 vacuum pump. T. Linton and G. Brown, *Australian Gemmologist*, Vol. 17, No. 7, 1990, pp. 272–273.

This Instrument Evaluation Committee report covers the use of a Japanese-manufactured vacuum pump in conjunction with an American vacuum tweezers for handling gemstones. First addressed are the technical specifications of the two components, which include the noise generated by the pump's motor (64 dbA at a distance of 0.3 m), something the evaluators recognize as potentially annoying.

Next, the use of the system with a variety of gem sizes and shapes is described. It was found effective with stones as large as 31 ct and as small as 0.01 ct; it could handle faceted stones, cabochons with flat bases, and gems with curved surfaces (including pearls and small carvings); and it eliminated the confusing reflections gemologists often encounter when holding gems in tweezers or stoneholders for examination with magnification. Among limitations noted (in addition to the noise problem) is the fact that the hand set cannot be used effectively on either irregular or wet surfaces.

In summary, the evaluators feel the system should prove of considerable use to gemologists who regularly handle large numbers of gemstones. *RCK*

The microscopic determination of structural properties for the characterization of optical uniaxial natural and synthetic gemstones. Part I: General considerations and description of the methods. L. Kiefert and K. Schmetzer, *Journal of Gemmology*, Vol. 22, No. 6, 1991, pp. 344–354.

This first article in a three-part series provides information on structural characteristics of corundum, beryl, and quartz. The angles between crystal faces for these three gem minerals are characteristic, constant within small tolerances, and well documented, making them useful for purposes of identification.

The authors describe how, with immersion and polarized light, the angles between crystal faces and/or twin planes can be determined through the use of a two-axial sample holder with a 360° dial and/or a microscope ocular with cross hairs and a 360° dial.

The application of the information determined in this way, to be discussed in parts II and III, involves the distinction between natural and synthetic specimens of corundum, beryl, and quartz. The current article is accompanied by extremely helpful diagrams, tables, and color photomicrographs. The gemologist whose crystallography has become rusty will want to bone up a bit before tackling this one. *CMS*

Sodium polytungstate as a gemmological tool. W. W. Hanneman, *Journal of Gemmology*, Vol. 22, No. 6, 1991, pp. 364–365.

Dr. Hanneman describes an alternate heavy-liquid solution for determining the specific gravity of gem materials. Sodium polytungstate, an inorganic salt that comes as a powder, is reported to be less toxic than the liquids now commonly used by gemologists. Solutions of various specific gravities—from 2.4 to 3.1—can be prepared by the addition of water. Initially, a saturated solution of sodium polytungstate is prepared and adjusted slowly by adding water until an indicator stone remains suspended. The density of the solution is checked by obtaining its refractive index and comparing it to the graph provided that correlates R.I. with density. Special considerations in the use of this heavy liquid are discussed in the note, but they appear to present no significant problems. *CMS*

JEWELRY MANUFACTURING ARTS

A designer/jeweler's route of investigation, learning, change, discovery. B. Greenberg, *Metalsmith,* Vol. 11, No. 2, 1991, pp. 28–33.

Mary Ann Scherr has been contributing to jewelry design for over 30 years. Trained at the Cleveland Institute of Art, she began her career as an automobile designer in 1950. Later, after she had opened her own industrial design company with her husband, she began her training in metals. She has been teaching metals and jewelry design since 1968.

Mrs. Scherr's design career took a turn when she discovered that one of her design students had a trachea tube in her throat. She proceeded to design a piece of jewelry to cover the trachea tube, and realized that others might benefit from similar devices. Since then, Mary Ann Scherr has spent a large part of her time designing jewelry to disguise life-saving devices. For example, she has worked with engineers to design pieces of "jewelry" that monitor air quality and pulse rates and even convert into an oxygen mask.

Etching is one of Scherr's other passions, and through experimentation she has become a recognized authority. In fact, she served as a technical advisor on etching to Oppi Untracht while he was putting together his jewelry encyclopedia, *Jewelry Concepts and Technology.* Since 1989, Scherr has been working on a process that uses computer silkscreening to accelerate and improve the etching of metal. The article recounts several other aspects of Scherr's interesting and varied work with metals and jewelry. Six photographs of her jewelry and sculptures accompany the article.

Glen R. Hodson

A garden of delight: Victorian flower jewelry. P. Foy, *Jewelers' Circular-Keystone,* Vol. 162, No. 2, February 1991, pp. 146–149.

The key to understanding many styles of period jewelry is in knowing the socioeconomic climate of the time in which the jewels were made. In this four-page article, the author outlines the reasons for the immense popularity of botanical jewelry during the 19th century. England under the rule of Queen Victoria was enjoying a period of prosperity and expansion. The arts and sciences, including botany, were burgeoning as well. Gardening was a pastime that had scientific as well as spiritual virtues, and it became associated with success and abundance. Flowers and fruit were used as motifs in all the decorative arts and were more often than not assigned a sentimental symbolism.

The author expands on these themes, and cites examples from literature. Six color photos provide illustrations of Victorian botanical jewels. *EBM*

Jewelry: New looks for a changing world. A. G. Kaplan, *Jewelers' Circular-Keystone,* Vol. 161, No. 5, May 1990, pp. 140–145.

In this very general overview, the author has managed to compress nearly eight decades of jewelry history into five pages that also include nine illustrative photos. The article is excerpted from Mr. Kaplan's forthcoming book and presents, in a nutshell, the basic characteristics of jewelry from the Arts & Crafts, Art Nouveau, Edwardian, Art Deco, and Retro periods. The lists Kaplan provides of designers for several of the periods could act as signposts for future research. (However, the text typo of *Murrie,* Bennet & Co.'s name [it *should* be *Murrle,* Bennet & Co.] adds confusion rather than clarity.) Although the article may be helpful as an introduction for those unacquainted with period jewelry, it presents very little new information to anyone familiar with these jewelry styles. *EBM*

JEWELRY RETAILING

Putting the punch behind tradition. A. Marshall, *British Jeweller,* Vol. 58, No. 9, May 1991, pp. 18–22.

The rigorous British hallmarking system may be a thing of the past after 1992. The majority of the member countries of the EEC do not have compulsory hallmarking and feel that it inhibits jewelry trade between countries, so they may vote for its demise. Most of the European countries now either hallmark on a voluntary basis or rely on self-certification by the manufacturer. The understandable concern by the British is that this results in poor quality control and increased competition from foreign competitors with substandard goods, which will inevitably lead to defrauding the public. *RT*

Software review: Tracking loose stones. M. Thompson, *Jewelers' Circular-Keystone,* Vol. 162, No. 4, April 1991, pp. 122–125.

Mr. Thompson discusses three software packages designed to keep track of diamond and gemstone inventory: Loose Gem Management, Gemdata, and The Diamond Dealer. All three packages work on IBM or IBM-compatible personal computers. A detailed overview of each system is provided as well as comments by the reviewers on publisher support, user-friendliness, and problems encountered. *RT*

SYNTHETICS AND SIMULANTS

Biron® synthetic pink beryl. G. Brown, *Australian Gemmologist,* Vol. 17, No. 6, 1990, pp. 219–221.

Beginning with a succinct review of natural morganite, the investigator goes on to briefly describe the hydrothermal synthesis of pink beryl by Biron International Ltd. of Perth, Australia. This is followed by information gleaned from a gemological examination of a 21.44-ct sawn crystal section and a 2.34-ct faceted specimen of the Biron product.

On the basis of this investigation, the author concludes that the identification of the Biron synthetic pink beryl "should not prove to be too difficult" because of what he feels are "considerably lower" ranges of specific gravity and refractive indices for the Biron product compared to those for natural morganite. However, an examination of the data on both the Biron product and natural morganite, conveniently presented in a table, leads this reviewer to conclude that the properties of the Biron product are too close to those of the natural to classify this as an easy separation. This is especially true when one considers that the author's conclusion was drawn after examining only two samples. The most promising distinguishing characteristic of the Biron material, should additional research prove it to be consistent, is an "apricot pink" fluorescence to long-wave U.V. that has not been observed in natural morganite. Inclusions, as usual, are also important distinguishing features. *RCK*

Gemmological investigation of a synthetic spinel crystal from the Soviet Union. J. I. Koivula, R. C. Kammerling, and E. Fritsch, *Journal of Gemmology,* Vol. 22, No. 5, 1991, pp. 300–304.

The authors describe a 17.19-ct flux-grown synthetic red spinel crystal reportedly manufactured in the Soviet Union. The crystal is described as a near-perfect octahedron of exceptional transparency, with a refractive index of 1.719 and a specific gravity of 3.58, both within the ranges for natural spinel. Reaction to long-wave ultraviolet radiation was strong purplish to orangy red; there was a similar but weaker reaction with a slight chalkiness along some edges to short-wave U.V. Comparison to the reactions of natural pink and red spinels revealed no significant difference. The Chelsea color filter reaction was comparable to that of similarly colored natural red spinels.

The visible-range absorption spectrum of the synthetic crystal, as viewed with a hand-held prism spectroscope, consisted of general absorption from 400 to 450 nm, a weak diffuse band between 580 and 630 mm, a strong fine line at 680 nm, and a strong fluorescent line at 690 nm. Examination with a spectrophotometer confirmed these features. The spectrum is similar to that of natural red spinel except that the two distinct "chromium lines" found around 650 nm in the natural material appear as a single broader band in the synthetic specimen.

The crystal was originally described by its supplier as hydrothermally grown, but mid-infrared spectroscopy revealed none of the features associated with hydroxyl groups that are characteristic of hydrothermally grown synthetics. EDXRF bulk chemical analysis, moreover, revealed the presence of molybdenum, a common component of fluxes used to grow gem materials. EDXRF also revealed, in addition to the basic elements of red spinel composition, a lack of the titanium typically found in natural spinels.

Microscopic examination revealed a number of features that further confirmed the origin of the crystal to be flux growth and that can be used by gemologists to distinguish such material from natural red spinels. Deep orangy brown primary flux inclusions, with an angular to jagged profile, formed a phantom aligned with the external octahedral crystal faces. Also noted were reflective and iridescent air-filled fractures associated with strain (observed in polarized light), and semi-circular growth hillocks on octahedral faces that are quite distinct from the triangular etch pits commonly present on the crystal faces of natural spinels. Color photomicrographs clearly illustrate the features described. *CMS*

YAGG. G. Brown, J. Snow, and R. Brightman, *Australian Gemmologist,* Vol. 17, No. 6, 1990, pp. 239–242.

After a brief review of the crystal chemistry of garnets—including the so-called synthetic garnets YAG (yttrium aluminum garnet) and YAGG (yttrium aluminum gallium garnet)—this Gemmology Study Club report addresses the properties of the flux-grown YAGG once manufactured by J. O. Crystal Co. of California, but no longer in production.

Available information suggests that the material, which the authors consider an effective imitation of tsavorite, is crystallized from a brownish yellow flux held in a platinum crucible. The green color is caused primarily by Cr^{3+} substituting for Al^{3+}; according to communication with the crystal grower, the addition of Ni^{3+} will superimpose a blue-green color while the addition of Fe^{3+} will result in a yellowish green hue.

The authors list the gemological properties of this YAGG and conclude that the material can be identified by its S.G. (5.05–5.08), R.I. (over the limits), red fluorescence (to long- and short-wave U.V. and white light), Cr^{3+} absorption spectrum, and inclusions (yellowish brown flux and "reflective silvery platinum"). *RCK*

Correction: Spring 1991 issue abstracts of the articles "Gem-quality Chrysoprase from Haneti-Itiso Area, Central Tanzania," "Role of Aluminium in the Structure of Brazilian Opals," and "Colored Pectolites, So-Called 'Larimar' from Sierro de Baoruco, Barahona Province, Southern Dominican Republic" were erroneously attributed. Professor R. A. Howie wrote the abstracts of the articles for *Gems & Gemology.* We sincerely regret the error.