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DIAMONDS

Consequences of recycled carbon in carbonatites. D. S.

Barker, Canadian Mineralogist, Vol. 34, 1996, pp. 373-387.

The question of the cycling of carbon through the Earth's crust and mantle is one of great interest with regard to the origin and evolution of diamonds. Carbon-bearing phases in the mantle include calcite and dolomite, as well as diamond, graphite, silicon carbide, dissolved methane, carbon monoxide, and carbon dioxide in fluids, and "carbonate components" in magma. The phases that form are a function of the availability of oxygen, as well as carbon, in the mantle.

Evidence has been accumulating that carbon from the crust is recycled deep into the mantle by subduction, - an important destination for this carbon—other than in diamonds—is the igneous rock carbonatite. The carbon isotopes in carbonatites do not match those of either marine carbonates (e.g., from coral reefs) or organic carbon (e.g., from plant debris); however, these isotopes are similar to those in peridotitic diamonds. From the study of trace-element distributions, especially of ultramafic xenoliths in carbonatites, the author concludes that these rocks probably result from repeated interactions of carbonate-rich magmatic fluids with restricted volumes of metasomatically altered mantle rocks. Several influxes of carbon-rich magma have been implicated in the formation of diamonds at the Premier mine, and of coated diamonds from Africa, Siberia, and

Australia. Carbonatites are uncommon in the Earth's crust, but this is probably because the mantle "soaks up" most batches of carbonate-rich magma, and only a few manage to reach the surface. *MLJ*

Southern Africa's offshore diamonds. *Mining Journal*, London, January 26, 1996, p. 63.

An increasing share of South Africa's diamond production comes from offshore deposits; for instance, in 1994, 31% of the country's total output (407,000 carats out of 1.31 million carats [Mct]) came from offshore, and 1995 production probably exceeded 500,000 carats. "Huge quantities" of gem-quality diamonds have been deposited

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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along a 1,000 km stretch of Namibia's and South Africa's west coast; the total resource is estimated at 3,000 Met. Most of the deposits are along the Namibian coast because of prevailing northward currents and waves. To date, about 80 Met have come from these deposits, but on-shore production from marine terraces and beaches in Namibia is expected to decline in the future.

Most offshore diamonds are presently recovered by De Beers Marine, from Namdeb concessions at 100 m depth, about 40 km from the coast. However, Namibian Minerals Corp. (Namco) has the largest exploration program in southern Africa, with concessions at Luderitz Harbor and Hottentots Bay in Namibia and in two areas off South Africa's west coast; its reserves are estimated at 80 Met. Namco is using a converted Russian spy ship to mine in water as deep as 100 m.

Diamond Field Resources (DFR) also has a concession (with BHP/Benguela) in the Luderitz area, between Diaz Point at the south and Hottentots Bay in the north, extending from the shoreline to 12 km offshore (water depths to 125 m). On the basis of modest amounts of exploration, a resource of over 1 Met, with an average value of \$165/ct, has been confirmed. In 1995, DFR was granted two South African concessions, including the Cape Canyon area (200-500 m depth), which is thought to be a major repository of diamonds carried along a former trajectory of the Orange River. Last, Capetown-based Ocean Diamond Mining is expanding its small-scale mining around the 12 Penguin islands, off Namibia's southern coast.

MLJ

The typical gemmological characteristics of Argyle diamonds. J. Chapman, G. Brown, and B. Sechos, *Australian Gemmologist*, Vol. 19, No. 8, 1996, pp. 339-346.

The Argyle mine produces more diamonds (about 40 million carats annually) than any other single source in the world. Yet there is a paucity of published data on the gemological properties and characteristics of these diamonds.

Most Argyle diamonds are classified as industrial (45%) or near-gem (50%); only 5% are considered gem quality. Of this small percentage of gem-quality diamonds, the main colors are brown (80%), yellow (16%), colorless (2%), gray (2%), and pink and green (each < 1%). This article provides a valuable compilation of the properties of three color groups of gem-quality material: colorless, brown, and pink-red-mauve.

The following characteristics of these three categories are clearly tabulated and compared: classification (based on nitrogen aggregation), nitrogen content, habit, colors, color zoning, UV fluorescence and phosphorescence, absorption spectra (infrared, visible, and ultraviolet), and characteristic inclusions. Thirteen color photos illustrate surface and internal features, such as etch pits, color zoning, graining, and inclusions.

The authors found that more than 75% of the inclusions were of eclogitic origin, with orange garnet particularly abundant. However, epigenetic graphite lining cleavages and fractures was the most common inclusion

in the Argyle diamonds studied. Also summarized is the discovery and geology of the Argyle pipe. Available reserves (if underground mining goes below the 300 m planned for the open pit) total about 100 million tonnes; a diamond content of 3.7 ct per tonne is estimated.

AAL

GEM LOCALITIES

California jade, a geological heritage. A. Pashin, *California Geology*, Vol. 48, No. 6, 1995, pp. 147-154. Nephrite, and to a lesser extent jadeite, has been found at several localities in California. California jade ranges from white to almost black, but the most common colors are shades of green.

Primary deposits are found throughout the state's extensive serpentinite zones, with significant localities in the counties of Monterey, San Benito, Mendocino, Mariposa, Tulare, Marin, and Siskiyou. However, most of the material recovered comes from secondary alluvial deposits of rivers draining the Klamath Mountains, Coast Ranges, and Sierra Nevada. Jade Cove nephrite can be found in the rough waters of the Pacific Ocean.

Commonly, jade is found in or adjacent to serpentinite bodies. An exception is in Riverside County, where a dark-green-to-black nephrite is found in a contact meta-morphic zone between quartz monzonite and dolomitic limestone. A Mendocino deposit is unique in that jadeite and nephrite are found together, often in the same rock.

The most common California jade simulants are massive vesuvianite (idocrase or californite) and serpentine. The vesuvianite varieties have been marketed as "Happy Camp Jade" and "Pulga Jade." A California serpentine called bowenite is marketed as "New Jade."

LBL

Charoite: A unique mineral from a unique occurrence.

M. D. Evdokimov, *World of Stones*, No. 7, 1995, pp. 3-11.

Charoite was first discovered in 1949, but it was not confirmed as a new mineral species until 1978. Unlike some other decorative stones, charoite occurs in several different colors—such as lilac, brown, and gray—often in the same specimen. Contrary to prior beliefs, charoite is not named after the Chara River (the closest bend of which is 70 km from the occurrence). "Instead, it was named for the impression that it gives: *chary*, a Russian word meaning *charms or magic*."

Charoite occurs in about 25 areas along the Ditmar and Davan streams. The structure and subsequent mineralization of the occurrence are quite complicated. The stages of formation, which began in the early Archean (about 4.6 billion years ago), are described in detail. Charoite formed in breccia zones, the result of a mixture of solutions that was either deposited between the breccia fragments or metasomatically replaced the fragments in the zone. Discussions of the origination of the Murun Alkaline Complex and metasomatic rocks within the Complex complete a complicated and highly technical explanation of the formation of charoite.

Eight structurally diverse varieties of charoite reflect the order in which they were formed. The earliest to form was massive, structureless charoite. This was followed by parallel fibrous, undulatory-fibrous, felted, radial aggregates, mosaic-fibrous, slate-like, and, finally, sheaf-like varieties. Each of these is illustrated by intricate pen-and-ink sketches (which, unfortunately, are not clearly identified with figure numbers). Crystalline charoite has not been seen, so it is impossible to define the crystal structure and exact chemical formula of this mineral. There are at least nine different variations of the proposed formula.

LBL

Combarbalitá: An ornamental kaolinite from Combarbalá, Chile. R. R. Coenraads, *Australian Gemmologist*, Vol. 19, No. 8, 1996, pp. 325-334.

Combarbalitá, a beautifully colored and patterned ornamental clay material, formed through the deep kaolinitic weathering of a metamorphosed volcanic and sedimentary rock sequence. It is found only in a region near the town of Combarbala, Chile—hence, the material's name. The small town is about 900 m above sea level, 90 km south of Ovalle and 80 km from the Pacific Coast. Mining this ornamental material (by hand) and crafting objects from it are important activities in this small town.

Long before the arrival of the Spanish, the original inhabitants of the area crafted beautiful pieces from this soft, easily worked and polished material. Examples of this somewhat primitive early art include pendants, necklaces, bowls, plates, arrowheads, and figurines. They have been found mainly in the local indigenous cemeteries, or as abandoned domestic items.

Hundreds of small quarries in the hills around Combarbalá produce combarbalita, with each quarry yielding specific colors or patterns. The mines are all close to the surface, the only area from which material can be recovered because weathering has made the original rock soft enough to be worked. The mines are worked by hand with basic tools—crowbars, hammers, and chisels. Pieces larger than 10 cm³ are collected and tested with a hacksaw blade. If the blade easily saws the material, then it is soft enough to be turned on a lathe or worked by hand.

Most highly favored is a blue combarbalita that varies from a "blue-white" to a "strong sky-blue," very much resembling turquoise. These scarce varieties occur near copper mineralization, which points to copper as the possible coloring element.

MD

Ethiopia: A new source for precious opal. D. B. Hoover, T. Z. Yohannes, and D. S. Collins, *Australian Gemmologist*, Vol. 19, No. 7, 1996, pp. 303-07.

A new source for precious opal has been discovered near the village of Mezezo, Shewa Province, Ethiopia. The deposit is located about 200 km northeast of Addis Ababa, on the Ethiopian plateau in central Ethiopia. Although Africa is not known for precious opal, artifacts show that ancient native cultures used it. Perhaps the source of these artifacts was the North Shewa deposit

near Mezezo, the Kushitic people, a group of stone age farmers, inhabited the region about this time.

Opal-filled lithophysae (hollow, bubble-like structures composed of concentric shells of finely crystalline alkaline feldspar, quartz, and other minerals found in silicic volcanic rock) weather out of the host rhyolite and are found scattered on the ground. The smaller nodules are remarkably spherical, while the larger ones tend to be slightly elliptical. Careful sampling at one site indicated 80 nodules per square meter at the face of the welded tuft host unit. About 10% of the nodules are solidly filled, the remainder have either partial or no opal filling.

The common opal that fills the nodules occurs in many colors—colorless, white, brownish red, orange, yellow, greenish, pale lavender, and an unusual chocolate-brown. The opal can be opaque, or it may be semi-translucent to transparent. Much of the material is transparent enough to facet; some is reminiscent of red Mexican "fire" opal. Precious opal is estimated to be present in about 1% of the nodules, but much of this has a weak play-of-color. Body color is similar to that found in the common opal, but no black opal has yet been found.

More than 50% of the precious opal is of the crystal to semi-crystal type. Typically, the play-of-color covers the spectrum in each piece. Green and blue or only blue play-of-color is rare; red is common. Pinfire patterns are rare; most examples show "flashfire." In better-quality material, the play-of-color is evident in many lighting directions. Some of the opal, both common and precious, has been found to be of the hydrophane type, which becomes more transparent when immersed in liquid. Some specimens of translucent gem hydrophane opal become completely transparent after they have been soaked in water for an hour. At that point, these opals lose most or all of their play-of-color, but they regain their fire once they are dry.

The long-term stability of this new opal is not known. Only a limited amount of material from near the surface has been collected and worked to date. Weathering has already taken its toll. Thus far, the authors of this article have not experienced any major problems, such as fracturing or crazing, during cutting. Government regulations limit opal production to acquisition of representative samples for testing and evaluation, in advance of detailed mapping of the deposit and filing of a formal development plan.

MD

Editor's note: A detailed article on this locality was also published by Johnson et al. in the Fall 1995 issue of Gems & Gemology, Summer 1996, pp. 112-120.

Euclase from Colombia showing three-phase inclusions. J.

M. Duroc Danner, *Journal of Gemmology*, Vol. 25, No. 3, 1996, pp. 175-176.

This note documents the properties of a greenish blue euclase from Colombia. The specimen was notable for its wealth of "well-shaped" three-phase inclusions, as illustrated by a single photomicrograph. Other properties were characteristic for euclase.

CMS

Goodletite—a beautiful ornamental material from New Zealand. G. Brown and H. Bracewell, *Journal of Gemmology*, Vol. 25, No. 3, 1996, pp. 211–217.

The ornamental gem material from New Zealand called "goodletite" has been known for more than 100 years. Although mentioned as early as 1962, it has not been detailed in the gemological literature. This is partly because of its rarity. It is a coarsely granular rock consisting of red to blue corundum, green Cr-rich margarite-muscovite mica, and green Cr-tourmaline. Examination of two specimens revealed, not surprisingly, variable properties consistent with the composition of this rock. The best means of identification is magnification, as illustrated by two photomicrographs. No *in situ* deposits have been located yet, and the availability of this material is still extremely limited. CMS

Investigations on sapphires from an alkali basalt, South West Rwanda. M. S. Krzemnicki, H. A. Hänni, R. Guggenheim, and D. Mathys, *Journal of Gemmology*, Vol. 25, No. 2, 1996, pp. 90–106.

Yet another new locality for natural blue and treatable sapphire surfaces in this description of material from the Cyangugu district of South West Rwanda. Following summary descriptions of the sapphires' geologic setting and apparent origin from alkali basalts, the results of testing 20 samples is reported. Absorption spectra (visible and infrared), quantitative chemistry (microprobe), and microthermometry were performed on two specially prepared samples. Ten prepared specimens were examined by SEM-EDS for inclusions, and eight rough samples were also studied by SEM for detailed surface analysis. The apparently meticulous methodology yielded high-quality detailed information that is a welcome addition to the gemological literature, despite the small sample size. Numerous illustrations also indicate that this material yields fine-quality gems of brilliant blue color. However, no mention is made of its commercial availability or potential supply. CMS

North Carolina's link to the Washington Monument. K. H. Roll, *Rock & Gem*, Vol. 27, No. 2, February 1997, pp. 32–34.

The author relates the little-known story of the five-pound solid aluminum "pyramidion"—made by processing rubies and sapphires mined in North Carolina—that was placed atop the Washington Monument in 1885. This leads to an account of corundum mining in North Carolina and the history of the Corundum Hill mine, once the world's largest producer of commercial corundum.

In the 19th century, aluminum was \$1 an ounce and the North Carolina corundum was prized as a source of nearly pure aluminum oxide for use in the manufacture of the newly discovered metal. The Western world's primary source of corundum-based abrasives and jewel bearings before the first World War, the Carolina deposits were played out by the early 1900s. Still, recreational panning

for the small gem-quality rubies and sapphires, notable for the distinctive asterism that many reveal, continues to be a tourist attraction in privately owned streambeds around the Corundum Hill area. AC

Older and wiser. G. Poinar, *Lapidary Journal*, Vol. 49, No. 10, January 1996, pp. 52–56.

The differences between copal (dried resin) and amber (fossilized resin)—a median of about 200 years versus 2–4 million years—is discussed, along with a simple hot-needle test for separating the two similar-appearing materials. Copal is popular as counterfeit amber. Large, colorful insects or lizards can be pressed into resin, which then hardens into copal in about a month. The author examined copal from deposits in New Zealand and Colombia (the latter is the basis of a bustling "amber" trade). Carbon dating showed that several samples of Colombian copal were between 10 and 500 years old. Nuclear magnetic spectrometry analysis confirmed that the samples did not differ significantly from resin from modern trees. The author concludes that most Colombian "amber" is really copal, found in fields and alluvial soil. Theoretically, amber could be found there, but it would most likely be in sedimentary formations. AC

JEWELRY HISTORY

Gleaning treasure from the Silver Bank. T. Bowden, *National Geographic*, Vol. 190, No. 1, July 1996, pp. 90–105.

On October 31, 1641, the Spanish galleon *Nuestra Señora de la Pura y Limpia Concepción* struck a reef north of the (now) Dominican Republic and sank with most of her crew. The *Concepción* was carrying treasure from the Philippines and Mexico; the reef where she sank was named the "Silver Bank" because the sailors piled treasure from the sinking boat on it. They did this not only to save the treasure but also to provide a higher place to stand, to literally keep their heads above water.

The first successful salvager was William Phips, who hired native pearl divers to recover goods in 1687; the Burt Webber expedition visited the site in 1978. The author of this article returned to the site recently, under a contract with the Dominican Republic's Commission for Underwater Archaeological Recovery, and used ship-mounted vacuum-pumps to expose more artifacts. Shown in the article are gold chains, three gold-and-diamond pendants, a set of diamond-centered gold studs, and an amethyst ring. It is interesting that some of the porcelains recovered from the site show false markings, in an apparent attempt to indicate manufacture in an older (and more desirable) era than the one in which they were actually made. MLJ

JEWELRY MANUFACTURING ARTS

Elusive talent. Cathleen McCarthy, *Lapidary Journal*, Vol. 50, No. 10, February 1997, pp. 14–17, 66, 68, 70, 71. This article gives insight into one of America's most cre-

ative carvers, Steve Walters, a true craftsman who can pick out the right piece of material, look at it, and "see" the design. This rare in-depth interview, well worth reading, covers Mr. Walters' beginnings, influences, and current thoughts on his creative talents and their continuing evolution. (He has no formal art training.) The unpretentious and prolific Mr. Walters insists that he is a craftsman and not an artist. Still, his work is so much in demand that his booth routinely sells out in the first four hours of the week-long Gem and Lapidary Dealers Association show in Tucson each February. How does he come up with his popular and unusual designs? "I don't know why I do it, and I don't know why it works. . . I've lucked out," he says. AMB

Making semi-precious precious. C. Frankel, *Art & Antiques*, Vol. 19, No. 9, October 1996, pp. 90–94.

Andrew Grima has long been a force in jewelry design. His use of unusual materials, from the common to the unique, has marked his flamboyant style for the past 50 years. Grima believes that good design need not always use the biggest stones and most costly materials. Originally a draftsman in a civil-engineering firm, he is thankful that he never formally went to school to learn design; he would have ended up turning out the same kinds of pieces as everyone else, he believes. His jewelry, though based on organic forms, tends toward the abstract, with emphasis on textured gold and exotic gems.

Grima's London gallery was opened in 1966. He moved his shop to Gstaad, Switzerland, in late 1993. His clients have included Queen Elizabeth, Jacqueline Onassis, and Elizabeth Taylor. JEC

Stuck on glue. A. Oriel, *Lapidary Journal*, Vol. 50, No. 10, February 1997, pp. 34–38, 39, 41, 44.

Andy Oriel talks about a product with which most in the jewelry and gem trade are unfamiliar—adhesives. These adhesives are very different from the gloppy "white" glue of our childhood. According to five jewelers and lapidaries who use high-tech adhesives in their work, the new adhesives stick with a vengeance and last not forever, perhaps, but certainly for a very long time. Thomas Harth Ames, Sid Berman, Henry Hunt, Martin Key, and Eugene Miller explain the different adhesives that each uses and their properties, although they do not detail how the adhesives work chemically. All interviewees agree that adhesive has a place in working with gem materials, and they urge that we rethink the stigma of impermanence sometimes associated with "glue." The use of these new adhesives will allow more jewelry and carving possibilities than ever before. AMB

JEWELRY RETAILING

Retail pearl sales increase. *National Jeweler*, February 16, 1997, p. 16.

U.S. retail pearl sales increased an average of 18% in

1996 over 1995, according to a Cultured Pearl Information Center (CPIC) poll. Almost 89% of retailers surveyed reported an increase in their annual cultured pearl sales; 5% reported no change, and 6% reported a decrease. In terms of pearl sales, 41% of the retailers interviewed said they had an excellent year, 32% said they had a good year, 23% said they had a fair year, and 4% rated the year poor. The CPIC cited several reasons for the large increase in 1996, including more money spent on advertising, larger pearl inventories, better-quality pearl jewelry stocked in stores, and greater awareness of Tahitian and South Sea pearls. In addition, pearls appear to have become a more important fashion accessory. Retailers expect an average 14% increase in 1997 over 1996. MD

The revised FTC guides—what's permissible, what's not.

Jewelers' Circular Keystone, Vol. 167, No. 8, August 1996, pp. 152–154.

This article focuses on the many changes present in the newly revised guidelines issued by the Federal Trade Commission for the jewelry industry. Included are reports on some of the commission's internal discussion of the issues involved. Sections on disclosing artificial coloring, misrepresentation of weight and total weight, and misuse of words such as *ruby*, *sapphire*, *emerald*, and *birthstone* are examined. This article is particularly helpful for anyone involved in manufacturing, sales, or appraisals. JEC

TREATMENTS

Dyed opalised sandstone and conglomerate: A new product from Andamooka.

I. L. Keeling and I. J. Townsend, *Australian Gemmologist*, Vol. 19, No. 5, 1996, pp. 226–231.

Opal-cemented sandstone and conglomerate from the Andamooka opal fields in south Australia is being treated by a process that is said to differ from the traditional sugar-acid method. The finished material is marketed for use in carvings, inlay work, cabochons, and assembled stones. Because of the high porosity of the sandstone and conglomerate starting material, it was very difficult to remove all traces of acid from the finished product when the conventional sugar-acid treatment was used. The new treatment process, the exact method for which (a "closely guarded secret") is not given in this article, purportedly has solved this problem.

The article did reveal that an organic solution is converted to carbon in a nonoxidizing environment at temperatures above 500°C. This produces an overall darker body color in the material, making any play-of-color more apparent. It also results in the production of the typical black microscopic specks of carbon that are associated with the well-known sugar-acid treatment method. These carbon specks made the sandstone and conglomerate treated by this "new" method very easy for this gemologist to identify as treated. However, it may not be possible to distinguish between this "new" treatment method and sugar-acid treatment. JIK

On the identification and fade testing of Maxixe beryl, golden beryl and green aquamarine. K. Nassau, *Journal of Gemmology*, Vol. 25, No. 2, 1996, pp. 108-115.

Dr. Nassau discusses his latest findings on the distinguishing characteristics and color stability of Maxixe, golden, and green beryl. Having originally made the distinction between Maxixe and "Maxixe-type" beryl in the 1970s, he now proposes that both be referred to by the term *Maxixe*, on the premise that the distinction "serves no useful purpose in gemmology." Maxixe samples tested in less-than-ideal conditions revealed spectra (680 nm absorption) typical for Maxixe-type beryl. They also responded to color-stability testing with the fading typical of this material.

Similar testing of four "yellow to greenish" beryls produced no fading, but exposure to $100^{\circ} \pm 10^{\circ}\text{C}$ heat (in darkness) for a week visibly reduced the yellow color component of two out of the four. Eight light-green to greenish yellow beryls proved to be aquamarine-type (pre-treatment) beryls with no Maxixe component. All of the colors studied could be natural or the result of laboratory irradiation, with no possibility of distinguishing between these origins of color. CMS

MISCELLANEOUS

A critical matter. M. Heckenberg, *Australian Gold Gem & Treasure*, Vol. 11, No. 2, February 1996, p. 26.

The working definition of a gemstone's critical angle is the minimum angle at which the gem can be cut before it will have a "fish-eye" effect when viewed through the table. Light generally travels in a straight line, but it travels at different speeds in materials of different optical densities. Thus, light bends at the interface between media of different optical densities (such as air and water—a stick appears bent where it goes through the interface between the two). Light passing at an angle into a different medium is split into two parts: Some bends into the medium, and some reflects off the surface. At an angle greater than the critical angle, no light escapes from the denser medium (gemstone) into the less-dense air; all of it is reflected back into the gemstone.

In cutting a stone, one wants the light coming in through the table to be completely internally reflected by the pavilion facets, - none should "leak out" the back. The higher the optical density of the gem material is, the higher the refractive index—and the smaller the critical angle—will be. If you know the refractive index of a particular gem material, you can look up the critical angle in a book of mathematical tables. It can also be calculated from the natural cosecant of the refractive index. MLJ

Program to study crust and mantle of the Archean craton in southern Africa. R. W. Carlson, T. L. Grove, M. J. de Wit, and J. J. Gurney, *EOS, Transactions, American*

Geophysical Union, July 16, 1996, pp. 273, 277.

A research program has begun that will systematically study the Kaapvaal craton, which covers 1.2 million km² (extending across South Africa, Lesotho, Swaziland, and Botswana, and grading into related rocks in Mozambique and Zimbabwe as well). The Kaapvaal craton contains rocks between 3.7 and 2.6 billion years old, and was last disturbed about 2.5 billion years ago; it is cut by kimberlite pipes, including the Jagersfontein, Finsch, Premier, Northern Lesotho, Farm Louwrensia, and Ramapfeliso.

Cratons are mysterious because of their long-term stability, which is thought to be caused by different types of sub-basement rocks in the mantle (for instance, the rocks under cratons are colder than other mantle regions at the same depths). Most of the information about these rocks comes from xenoliths in kimberlite pipes; the upcoming study will examine these xenoliths systematically in terms of their chemical and isotopic compositions, petrologies, and petrofabrics. Also, a portable seismic array will be deployed to look at seismic velocities (and their anisotropies) under the Kaapvaal craton. Experimental petrology of lower crustal rock types (that is, growing examples of these rocks at high pressures and temperatures), and studies of the sedimentary history of the Kaapvaal craton, are also planned. MLJ

A salty heritage. J. Raloff, *Science News*, April 27, 1996, pp. 264-265.

Chandeliers and life-size statues, altars, and "terrazzo" floors—all have been carved from rock salt (halite, NaCl), underground in Poland's Wieliczka mine. The dry air in the mine has preserved even the earliest carvings, which date to the late 17th century; recently, however, high pollution levels and variable humidity (exacerbated by hordes of tourists) have eroded fine features of the oldest and most valuable works.

An international team of scientists has studied the moisture-related deterioration. They found that, although pure rock salt does not start to pick up water until the relative humidity reaches 75%, pollutant-related salts (such as ammonium nitrate) that collect on the rock-salt carvings can absorb water at relative humidities as low as 20%. A special dehumidifier has been designed to lower the moisture content of the mine's air—and, it is hoped, protect Wieliczka's unusual art. MLJ

What everyone should know about the hardness of diamonds and other minerals. B. Cordua, *Rocks Digest*, 1995, Vol. 8, No. 2, p. 20.

The durability and hardness of minerals can be explained in many different ways. Tests include Mohs and Knoop. Important terms are *brittleness*, *tenacity*, and *strength*. This article not only describes these tests and terms, but it also provides some insight into why various rocks can be made up of either hard or soft minerals, yet have very different "strengths" due to internal structure. CEA