The Color of MONEY

Country of origin and treatments impact colored gemstone prices.

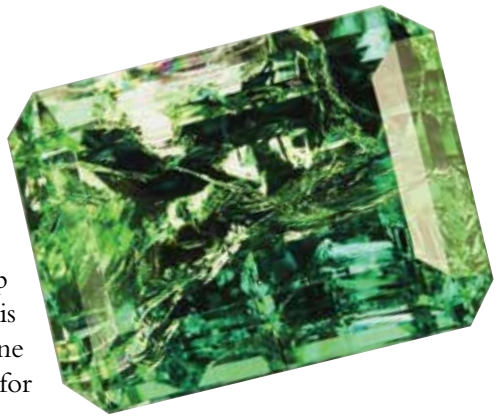
By Ettagale Blauer

Takat

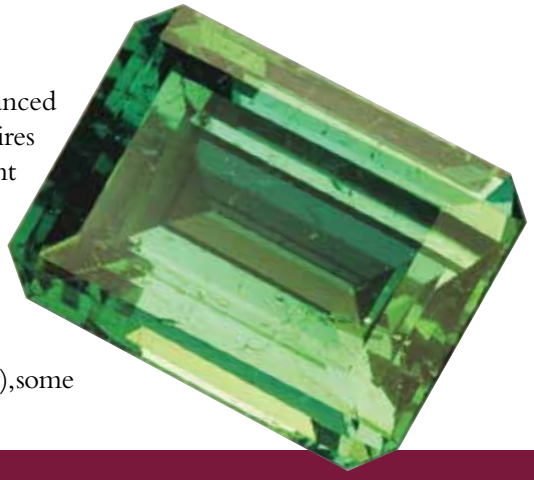
In the world of gemology, two key factors influence the price of rubies, sapphires and emeralds — whether the stone is treated and its country of origin. While treatments such as heat or clarity enhancement play a role in determining the market value of a stone, it is the country of origin that has the most significant impact on price. According to Rahul Kadakia, international head of jewelry for Christie's, a very fine, unheated Burma ruby can fetch $1 million a carat, while a comparable Thai ruby might bring only $100,000 per carat. Given the importance of country of origin, there is growing pressure on laboratories to make this vital determination.

Ascertaining country of origin poses many challenges. Christopher P. Smith, president of American Gemological Laboratories (AGL), says the process is "part science and part art," with "lots of experience" added in. The scientific methods are used to examine the "different properties and characteristics" while looking at the stone in its entirety. "Methods include microscopy, visible and infrared spectroscopy, as well as chemical composition," Smith explains. All the data has to be examined and interpreted.

Pierre Hardy, spokesman for Gübelin Gem Lab, a Swiss gem laboratory that examines colored gemstones, likens the process to detective work, "gathering all possible clues and evidence, in order to put the puzzle together and see the big picture, that is, the origin." Moreover, he points out, "The gemological properties are primarily the result of the geological environment in which the gemstone grew within the earth." As a result, Hardy notes that many gem laboratories are hiring scientists trained in geology rather than regular gemologists.



Place of origin remains the most difficult part of the Gemological Institute of America's (GIA) work explains Shane McClure, GIA's global director of colored stone services. AGL, Gübelin and GIA send field gemologists deep into the mines to see the gems where they are found, which is the best means to obtain verifiable source material to determine origin. This research in the field provides samples as a basis for the laboratories' reference data.



TREATMENTS

Although whether or not a gemstone has been treated or enhanced factors into price, the reality is that very, very few rubies, sapphires and emeralds reach the market without some kind of treatment or enhancement. To maintain the integrity of the colored gemstone business, Douglas Hucker, chief executive officer (CEO) of the American Gem Trade Association (AGTA), says, "Any treatment should be properly declared. Customers accept information as long as it is disclosed."

However, counter to regulations (see Treatment Disclosure, right), some stones sold in the market are treated and not disclosed as such. This can cause problems for the laboratories, wholesalers and retailers alike. For laboratories, all stones are initially suspect and the process of investigation begins.

The complex world of treatments in terms of rubies, sapphires and emeralds comes down to two words: heat or fillers. Today, the heat treatment of corundum and clarity enhancement of emeralds is routinely employed to improve the color and/or clarity of these gems. Other forms of treatment may also be applied to these gems, however they are not as common. Additionally, certain treatments, such as heating, may inhibit the ability to perform a country of origin determination, whereas others, such as clarity enhancement, do not materially impact a lab's ability to determine a gem's provenance.

Adding another layer of complexity is the lack of agreed-upon definitions among the laboratories on how to describe the amount of treatment or the color of a stone and the difficulties in interpreting the nomenclature appearing on colored stone reports today. What is "minor" as compared to "insignificant" or "moderate," for example?

TREATMENT DISCLOSURE

The Federal Trade Commission (FTC) specifies when treatment must be disclosed as follows:

- If the treatment is not permanent.
- If the treatment requires special care.
- If the treatment has a significant impact on value.

The American Gem Trade Association (AGTA) offers the following guidelines:

Treatment should be disclosed at every step along the way, which means from the moment it is mined, where filling or heating may take place in the rough, to the cutter, dealer, jeweler and retailer.

For more information, contact the Jewelers Vigilance Committee, 212.997.2002.

EMERALD ORIGINS

According to Smith of AGL, most gem varieties form around a limited range of geological variables. As a result, there are similar types of material that can occur in different geographical areas. "For emeralds, we are looking at specific inclusion features, chemical composition and spectral features as clues to origin. When one considers

Top: *Emerald before (top) and after (bottom) ExCel® process. Photo courtesy Eternity Natural Emeralds.*

Colombian emeralds, they stand out as originating from a unique geologic occurrence consisting of an evaporative brine from black shales in veins and breccia, which imparts properties unique to that location. Whereas, emeralds from Brazil and Zambia have mostly formed in a classical schist type deposit and therefore may be very similar in properties and characteristics to one another."

Another point of distinction, says GIA's McClure, is that "Colombian emeralds typically have three-phase inclusions in jagged voids, calcite and pyrite crystals and an unusual kind of graining referred to as 'gota de aceite' — literally 'drop of oil.'"

EMERALD TREATMENTS

Wendi Mayerson, senior staff gemologist at AGL, notes that the treatment of emeralds is nothing new. "Pliny describes dyeing emeralds in 77 AD." Moreover, she says, "You can use almost anything to fill fissures in emerald," which can make identifying the nature of the filler challenging. Few labs, such as AGL, identify the nature of the fillers used to clarity enhance emeralds in addition to quantifying the degree of the treatment. Most labs, such as Gübelin and GIA, only quantify the extent.

Adding oil to emeralds is considered the "traditional" treatment. According to Kadakia, an emerald "that only has minor oil is an accepted form of enhancement." Polymer-type resins are the tool of choice of many for filling the fissures that are common in emeralds. Unlike oil, which can dry up or leak out over time, resins are said to be more permanent, but Mayerson says that's not always the only point to consider. "Modern, polymer-type fillers," Mayerson says, "can also be better at reducing the appearance of fissures."

While there is a variety of polymer-type fillers used on emeralds, the ExCel® process is often mentioned by dealers and other laboratories as the best method. Clarity Enhancement Lab (CEL), located in New York City, is credited with developing the ExCel® process and remains the only location performing the treatment process. Although it is considered to be permanent, Eternity Natural Emeralds (ENE) President Shawn O'Sullivan says, "It is a stable filler and so will not alter in color or transparency over time. However, it can also be taken out."

PRICING EMERALDS

According to Gary Schuler, director of the jewelry department at Sotheby's, if an emerald is untreated, other than with minor oil or traditional type filler, it's worth 20 percent to 30 percent more than a stone treated with a modern filler. If there has been significant treatment resulting in more fissures filled with a product such as resin, he says, "the value decreases by another 50 percent to 60 percent."

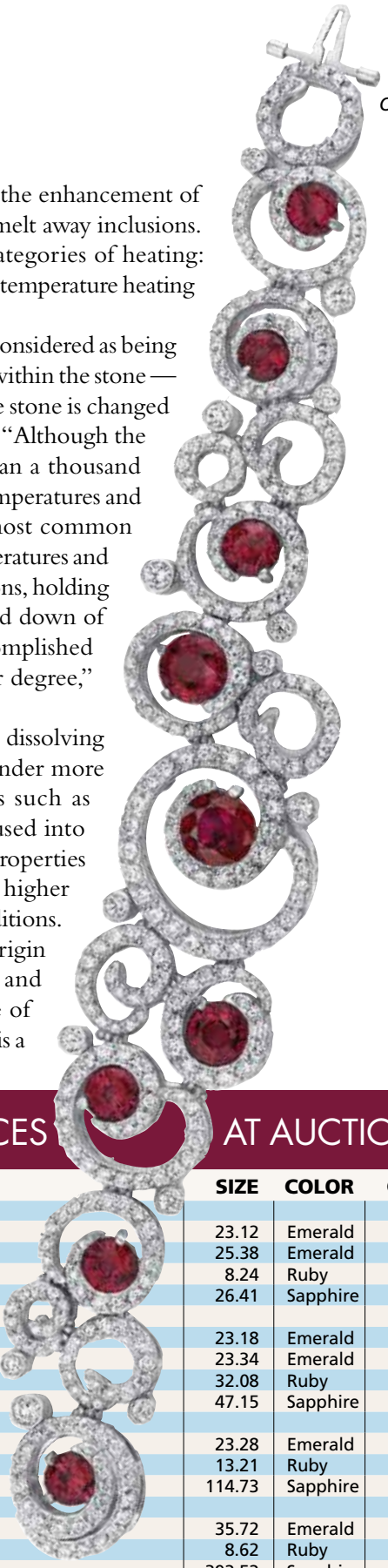
Stuart Robertson, research director for GemWorld, a Glenview, Illinois, company that offers appraisals, a colored gem and diamond price guide and other gemology-related services, puts the price difference for finer quality 5-carat to 8-carat untreated emeralds at 70 percent to 100 percent more than treated stones.

Rayaz Takat, of Takat Gems, USA, a dealer in fine colored gemstones in New York, points out that the branding of colored stones based on country of origin has added an even wider disparity in pricing. He says an unenhanced Colombian emerald is priced five times as high as an unenhanced Zambian emerald — $200,000 per carat for the Colombian, $40,000 to $50,000 for the Zambian.

BURMA: SANCTIONS

It is known within the industry that rubies mined in Burma prior to 2008 are not allowed to be imported into the U.S. Why then are sapphires not part of the sanctions? Cecilia Gardner, president, Jewelers Vigilance Committee (JVC), says, "The sanctions were enacted under President George W. Bush. It was known that the Burmese military controlled rubies, and jadeite. Sapphires were not under the same control."

The sanctions were renewed in 2014 in spite of tentative moves toward democracy. Christopher P. Smith, president of American Gemological Laboratories (AGL), says, "Before sanctions were imposed, the ruby trade in Burma was decentralized. The government was not able to get control of it. Since sanctions, the small-scale miners were cut out of the distribution networks."



Omi Privé

CORUNDUM TREATMENTS

For corundum — sapphires and rubies — heat is the enhancement of choice for its ability to add or soften color or even melt away inclusions. Smith explains there are broadly speaking three categories of heating: relatively lower temperature heating, relatively higher temperature heating and more extreme heating conditions.

Relatively lower temperature heating is generally considered as being below the threshold when rutile silk — an inclusion within the stone — dissolves, where primarily only the appearance of the stone is changed by removing less desirable colors or color modifiers. "Although the practice of heating corundum dates back more than a thousand years, since about the mid-1970s relatively higher temperatures and controlled heating conditions have become the most common type of heating," Smith explains. "Using higher temperatures and controlling factors such as the atmospheric conditions, holding the stones at temperature, as well as ramping up and down of the temperatures allows for much more to be accomplished in addition to just modifying the color to a greater degree," Smith says.

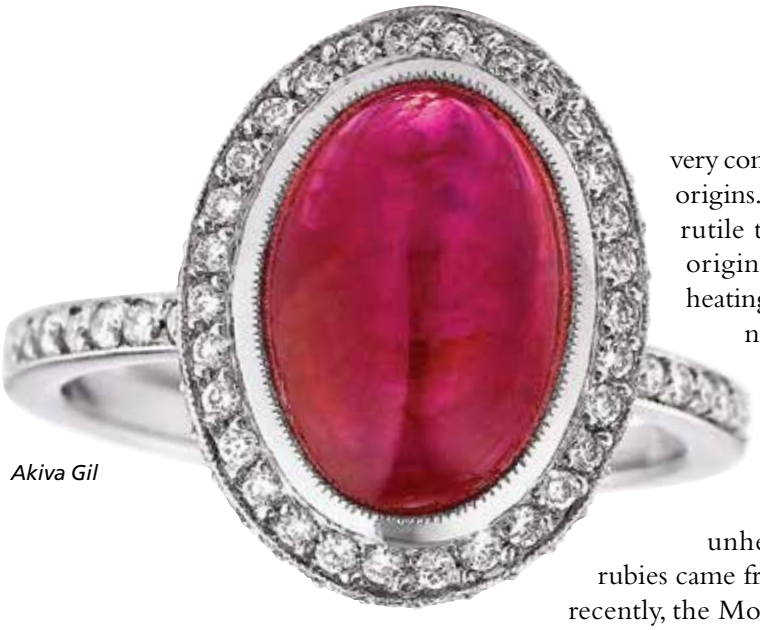
The transparency of a stone may be improved by dissolving rutile silk, as well as healing fissures. In addition, under more extreme heating conditions additional elements such as titanium, chromium and/or beryllium can be diffused into the stone. Smith adds, "Essential characteristics and properties of rubies and sapphires are altered at the relatively higher temperatures and under more extreme heating conditions. This can impact a lab's ability to determine origin." Origin determinations are still possible in heated rubies and sapphires, however Smith points out one example of why this can become more challenging. "Rutile silk is a

TOP COLORED GEMSTONE PRICES AT AUCTION 2011-2015

DATE	CITY	HOUSE	LOT#	SHAPE	SIZE	COLOR	CLARITY	$/CARAT	US $/LOT
2011									
11/11/11	Hong Kong	Christie's	~2724	Cushion	23.12	Emerald	Colombia	$83,612	$1,933,103
11/11/11	Hong Kong	Christie's	~2724	Cushion	25.38	Emerald	Colombia	$83,612	$2,122,066
12/01/11	New York	Christie's	77*	Oval	8.24	Ruby	Burma	$512,925	$4,226,500
11/11/11	Hong Kong	Christie's	2813	Cushion	26.41	Sapphire	Kashmir	$145,347	$3,838,618
2012									
11/27/12	Hong Kong	Christie's	~1898	Pear	23.18	Emerald	Colombia	$97,919	$2,130,674
11/27/12	Hong Kong	Christie's	~1898	Pear	23.34	Emerald	Colombia	$91,919	$2,145,381
05/14/12	Geneva	Christie's	66	Cushion	32.08	Ruby	Burma	$209,154	$6,709,664
05/16/12	Geneva	Christie's	358	Octagonal	47.15	Sapphire	Burma	$77,884	$3,672,235
2013									
05/15/13	Geneva	Christie's	263	Cushion	23.28	Emerald	Colombia	$83,434	$1,942,341
11/26/13	Hong Kong	Christie's	2075	Oval	13.21	Ruby	Burma	$449,596	$5,939,160
11/13/13	Geneva	Sotheby's	355	Oval	114.73	Sapphire	Burma	$62,082	$7,122,692
2014									
10/07/14	Hong Kong	Sotheby's	1935	Step-cut	35.72	Emerald	Colombia	$121,777	$4,349,880
11/12/14	Geneva	Sotheby's	470	Cushion	8.62	Ruby	Burma	$993,816	$17,575,740
11/11/14	Geneva	Christie's	348	Cushion	392.52	Sapphire	Ceylon	$44,777	$4,226,500
2015									
06/02/15	Hong Kong	Christie's	2111	Octagonal	38.51	Emerald	Colombia	$60,383	$2,325,356
05/12/15	Geneva	Sotheby's	502	Cushion	25.59	Ruby	Burma	$1,183,045	$30,274,113
05/13/15	Geneva	Christie's	351	Cushion	35.09	Sapphire	Kashmir	$210,268	$7,378,310

*Sold at Elizabeth Taylor Auction

Source: *Rapaport Magazine* auction results.



Akiva Gil

very common inclusion in rubies and sapphires from many origins. However, some sources may exhibit patterns of rutile that help us to determine where the stone has originated from. Since relatively higher temperature heating will dissolve the rutile, making it disappear, we no longer have this inclusion feature to help us in our determinations."

RUBY

While most ruby undergoes heat treatment, there is a small production of stones that remain unheated. In the past, a majority of the unheated rubies came from Burma, presently Myanmar. However more recently, the Montepuez region of Northeast Mozambique has become an important source of unheated gems. Originally discovered in 2003, London-based mining company Gemfields obtained the mining rights in 2011. Gemfields subsequently started to offer their ruby production through public auctions in June 2014.

Niveet Nagpal of Omi Privé in Pasadena, California, says, "There is always a challenge sourcing finer-quality material. Rubies are probably the most difficult because of the way ruby is formed in nature; larger sizes are very rare." Of the new source, he says, "The Montepuez stones are some of the most beautiful in the world." Many of these stones tend to be darker with brownish or purplish undertones, however in the best-quality stones, the color can be bright and vibrant, even rivaling Burmese gems. On the plus side, he says, "There is a small, yet consistent supply of unheated stones so sellers are able to offer the rarity of an unheated ruby without the price tag associated with fine Burmese gems."

"There are a few classic inclusions in each of the big three colored gems but also exceptions to all of them," says McClure. "Burma ruby from Mogok typically has clouds of very fine rutile needles, rounded transparent crystals of calcite and irregular swirling graining and color zoning."

Still, nothing surpasses fine Burma rubies. "Burma stones have a kind of inner glow that no other source seems to have," elaborates Nagpal. "Thai and African stones typically can't compare. They tend to have a different chemistry, usually meaning more iron that impacts their color."

PRICING RUBIES

In the market today, Burma and Mozambique dominate the ruby landscape. In terms of pricing rubies, Nagpal goes on to say that for an unheated gem of similar quality, Burma ruby carries an enormous premium over beautiful Mozambique rubies, with the Burma ruby costing 200 percent to 300 percent more. "Pricing for these rubies however," Nagpal continues, "is not an exact science."

The difference is not as extreme for heated stones. The difference between a price for a Burma or an African ruby from Mozambique or Madagascar is 20 percent to 30 percent for smaller sizes and average qualities. As the size and quality increase, so does the difference in price.

SAPPHIRES

In the world of sapphires, there is considerably more unheated material than one can find in ruby. For blue sapphires there are also more sources that supply global demand: These sources consist of Burma (Myanmar), Ceylon (Sri Lanka), Kashmir (Northern India) and Madagascar. When it comes to origin determinations, this greater number of sources can also make origin determinations trickier. "You would never confuse Burma and Kashmir blue sapphires," Smith says, "however both Sri Lanka and Madagascar can produce Kashmir-like stones." Smith further explains, "On the other hand, true Burma stones may be confused with some Sri Lankan and Madagascar material as well."

Kashmir sapphire typically has extremely fine-grained clouds in parallel planes, tourmaline inclusions and elongated corroded zircon crystals, says McClure.

SAPPHIRE PRICING

With blue sapphires, Takat says, a stone from Kashmir would be worth $100,000 per carat, while a similar sapphire from Madagascar would go for $20,000 per carat.

Time has played a role in pricing, of course, as the market for the increasingly rare stones grows. According to Kadakia, a 10-carat Kashmir sapphire that sold for a total of $10,000 in 1965 is now priced at $150,000 to $200,000 a carat.

GRADING SYSTEMS

Unlike the world of diamond grading where the GIA's D-to-Z system is in use globally, several color grading systems compete for buyer's and seller's attention. Explaining GIA's procedure, McClure says, "The colors listed on our reports are simple visual colors. We use Munsell color references for consistency."

GemDialogue, a color communication system devised by the late gemologist Howard Rubin in 1983 and still in use today, includes 21 transparent color charts showing ten saturation levels for each color. A stone is positioned against the various charts until a match is found. The system is presented in a loose-leaf binder and is meant to be used in the field when the gem buyer is without access to other tools.

In the past two years, GemWorld introduced a very similar system, based on Munsell chips, but also providing pages with overlay charts. Each of the 1,400 colors is given a specific name. The system is intended for use with the firm's GemGuide pricing scale.

The system in use at AGL takes a more holistic approach to grading colored stones. It evaluates the color based on a 1-to-10 scale, while also looking at other important factors, such as the clarity and cutting. AGL's system is not as easy to grasp at a glance as there is a lot of information to absorb, but it is intended to give the most precise, and repeatable, measurement of a stone's quality in a way that is comparable to the GIA grading system for diamonds.

Kashmir Sapphire. Photo courtesy Sotheby's.

The traditional description of the finest rubies as "pigeon's blood" color is coming back into use. GemWorld's Robertson says one lab mainly servicing the Chinese market is grading up to 90 percent of the rubies it sees as being "pigeon's blood" red. Schuler notes, "We are going back centuries when the ultimate customer was a king, a conqueror. They lived and breathed battles and hunting."

RUBIES, SAPPHIRES, EMERALDS 2011-Nov. 2015

Source: U.S. Census Bureau

QUANTITY BY CARATS

	Rubies Cut But Not Set For Jewelry	Sapphires Cut But Not Set For Jewelry	Emeralds Cut But Not Set For Jewelry
2011	3,922,651	6,981,303	2,755,435
2012	4,259,789	5,944,317	2,894,750
2013	3,757,687	6,862,776	3,039,527
2014	3,616,487	6,079,823	3,320,118
2015-Nov. 2015	3,142,900	6,142,333	4,738,196

CUSTOMS VALUE (US$)

	Rubies Cut But Not Set For Jewelry	Sapphires Cut But Not Set For Jewelry	Emeralds Cut But Not Set For Jewelry
2011	44,185,657	280,730,523	348,192,117
2012	111,535,046	268,391,400	410,381,298
2013	148,162,093	345,595,211	433,569,922
2014	132,358,567	415,740,636	647,422,754
2015-Nov. 2015	137,651,515	401,449,056	530,239,342

PAPER TRAIL

Given the increased value of colored stones, today's buyers want more than a single report. As a result, it is not uncommon for important colored stones to have two or three reports for any given stone. With the demand from the market and consumers, several labs have also developed special letters and even custom made small books to better highlight the qualities of a particular gem, as well as the region from which it originated.

With demand for the finest rubies, sapphires and emeralds on the rise, the pressure will only grow on labs that certify these gems to maintain their standards and to continually pursue more and better ways to ensure their results in terms of origin determinations and the detection of treatments. It is an ongoing struggle but one that must be waged with vigor.

CONCLUSION

As the most prized emeralds, rubies and sapphires become increasingly rare and a more sophisticated global customer emerges, country of origin and treatments, or lack thereof, are increasingly important elements in a gemstone's pedigree, all of which determines just how much the stone is worth. Gemological laboratories play an important role in ascertaining that gemstones and the factors influencing their value are properly identified. This is essential for safeguarding consumer trust.

"The laboratories take very seriously the trust that the trade and consumers have placed in us to accurately identify the stones they submit to properly disclose treatments and establish their provenance," Smith concludes "Although gemology is not an exact science, we are constantly investigating ways to refine our due diligence, to improve upon our standards and increase confidence in our results." ✦