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# Oiling of Star Rubies from Burma

By Tay Thye Sun & Loke Hui Ying, Far East Gemological Laboratory, Singapore

Recently, a client brought in three pieces of beautiful oval shape cabochon medium purplish-red Burmese star rubies for examination and its weight range from 3.95, 3.03 and 2.69 carats (Fig. 1).

Fig.1. Three pieces of Burmese rubies weight 3.95 ct, 3.03 ct (bottom left) & 2.69 ct. (Photo by Tay).

The standard gemological testing of the star rubies was carried out, R.I. spot reading 1.76, ruby absorption spectrum, UV long wave shows strong red and short wave shows weak red. Under microscopic observation, the rubies showed prismatic arrangement of needle-like inclusions and also arrow twin (Gubelin & Koivula, 1986). Besides the needle-like inclusions, some of the fingerprint inclusions show some slightly brownish stain (Fig. 2). Further examination using Infrared spectroscopy, the rubies were found to have some kind of oil with the peaks at 2852 and 2924 cm-1 (Fig. 3). When this information was revealed to our clients, he said that the Burmese gem cutter would normally dip the polished star rubies in peanut oil after polishing. That explains why the presence of oil in fissures (Hughes, 1997).

This calls to mind for disclosure of treatment of gemstones. As an example, in 1999, the DATELINE program shown on NBC channel about treated emerald which created such a negative impact that led to the collapse of

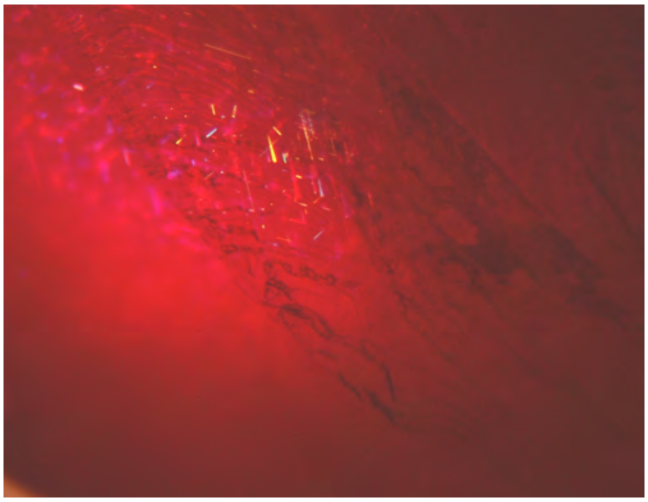


Fig.2. Silk-like inclusions with slight brownish stain along the fine healed fissures (20x) (Photo Tay)

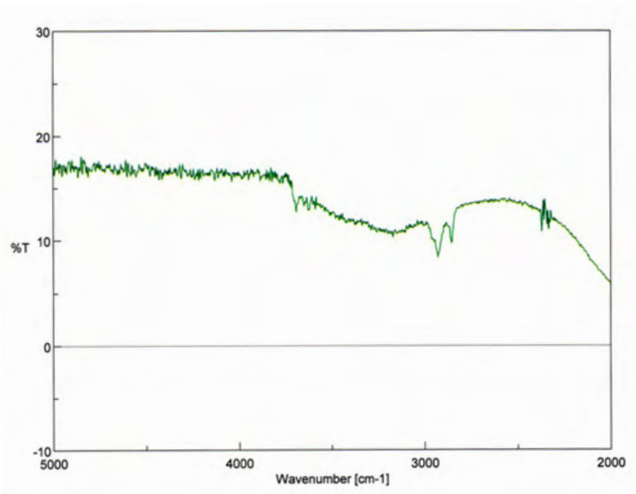



Fig.3. Using FTIR, the absorption spectrum of 2852 and 2924 cm-1 indication of some kind of oil in the fissures of this star rubies 3.07 carats (Tay, 2014).

the demand and also price of emerald in general, so disclosure about oiling of Burmese star rubies should be paramount importance.

*Reference:*
*Photoatlas of inclusions in gemstones by E.J. Gubelin & J.I.Koivula, (1997) pg 327.*
*Ruby & sapphire by Richard W. Hughes (1997) pg 129-130.*

# Ancient Roman Bead-Makers of Arikamedu, South India

- Jayshree Panjikar, Pangem Testing Laboratory, Pune, India
- jayshreepanjikar@gmail.com

In March 2014, I visited Arikamedu, a small village 12Km south of Pondicherry (now called Puducherry) (Fig 1 & 2) along the South-eastern coast of India. I had heard that it had ruins (Fig 3) of some ancient settlements. On visiting the actual place I came to know that this was the Roman Settlement who had mastered the bead making technique that perhaps dates back to as early as the 2nd Century AD. It was a booming, global centre of trade between India and the rest of Southeast Asia as well as with the empires of Greece and Rome. Arikamedu beads as well as the methods used to manufacture the beads are now documented in archaeology literature. The bead makers of Arikamedu produced in those years the smallest beads (Fig 4) in the world almost less than one millimetre in size (Fig 5)!


Fig 1 Location of Pondicherry

After heavy rains one can sometimes find in the ruins beads made centuries ago. Actually the earlier day it had rained heavily and therefore I could collect some beads from the location as well as from the villagers. All types of beads were made by these Romans including garnet, ruby, emerald, sapphire and glass. I have described how glass beads were made then as described to me by a villager.


Fig 2 Location of Arikamedu

## How Glass Beads Were Made

It is said in the village, the Romans used the kiln to build up the fire with wood and twigs. When the temperature was perfect, the raw glass was melted on a slab at the back of the furnace. When that started to melt, one man would gather some of the melt onto a hollow iron stick with a smooth wooden length for handling which held eventually more than 50 kilos of molten glass on its tip, rolled into a gigantic cone-shaped ice candy. Then a group of men would turn, prop, and heave the weight between the burning furnace, the raw glass slab, and the shaping stone. The tool used for gathering and shaping the glass cone was hollow, and then worker would blow into the end of the tool in order to create the space for the piercing tool to eventually move through the entire mass.

Later I believe, by trial and error, a thin iron tool was pushed through this long tube into the molten cone and out the other end. The cone thus pierced, and at the precise moment when the temperature was perfect, another worker would peek through a smaller hole on the opposite side of the furnace, and would grab the glass with a hooked tool from the inside of the pierced cone, and would pull it out across the floor. The floor would be precisely measured so that when the tiny tube reached the opposite end of the room, it would cool into a perfect, brittle, hollow length of glass.

Fig3 Ruins in Arikamedu

Fig 4 Cobalt glass beads made in Arikamedu by the Romans in the 2nd Century B.C. Gemmological properties: RI=1.52spot, show gas bubbles, swirl marks and chalky fluorescence.

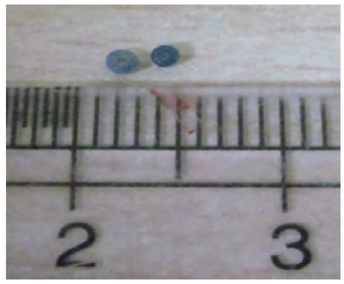



Fig 5 Smallest beads less than 1mm

The worker at one end of the room would pull uniform lengths of the tube continuously for some hours together, while the worker at the other end would turn the molten cone in the furnace. The workers would perform their repetitive tasks mostly through-out the night until the fifty kilo cone was completely pulled into thousands of glass tubes with a diameter of less than a millimetre. Finally the tubes would be finely chopped into beads (Fig 4) cleaned and strung and exported all over the world. All this happened centuries ago!

Among the beads which I collected there are many blue in colour and these are all cobalt glass I have checked the properties.

## Routine Findings in the Gemmological Laboratory Black Synthetic Moissanite Sold as Black Diamond - Elisabeth Strack

A black stone of 12.04 carat, sold as a black diamond on the internet, was identified as black synthetic moissanite.

Black synthetic Moissanite

Moissanite, a mineral with the chemical formula SiC (silicium carbide), occurs naturally in the shape of tiny crystals only. It was named after the French chemist and nobel laureat of 1906, Henri Moissain, who identified it in a specimen of the Canyon Diablo meteorite in the American federal state of Arizona.

For many decades, non-transparent moissanite is produced synthetically and marketed as silicium carbide or carborundum in a number of industries. It serves mainly as an abrasive. In the 1960s and 1980s, green transparent synthetic moissanites were occasionally cut as gemstones, to which the jewellery industry did however hardly pay attention. It was only in 1998, that colourless synthetic moissanite began to play a role as a diamond simulant, and in the beginning it caused great uncertainty and confusion. Conventional devices for testing thermal conductivity indicated the new product as diamond and in many cases synthetic moissanites were bought and sold as diamonds.

It soon became evident that the new simulant can be identified with a simple method. Synthetic moissanite has a high double refraction that can be recognized by the doubling of facet edges with a 10x lens. However, a certain practice is necessary and it has to be taken into account, that the direction of viewing must not coincide with the direction of the optic axis (direction of single refraction in a double refractive crystal). Moreover, synthetic moissanite often shows needle-like inclusions.

Black synthetic moissanite is difficult to identify, as both inclusions and doubling of facet junctions cannot be observed. The lower specific gravity of synthetic moissanite provides however a simple method of distinction.

| | Synthetic moissanite | Diamond |
|---|---|---|
| Chemical formula: | SiC | C |
| Refractive index: | 2.65-2.69, | 2.417 |
| Double refraction. | 0.043 | single refractive |
| Specific gravity: | 3.22 | 3.52 |
| Dispersion: | 0.104 | 0.044 |
| Mohs hardness: | 9.25 | 10 |

A BOOK REVIEW BY ELISABETH STRACK

# Colour of Paradise

## - The Emerald in the Age of Gunpowder Empires

Kris Lane, 2010 - Yale University Press New Haven and London, 280 pp


The authour is a Canadian-American Fulbright scholar who taught at the College of William and Mary (the second-oldest American university, founded in 1693 in Williams-burg, Virginia) and is now a professor at Tulane University in New Orleans. His teaching and research focus on Latin American history and, having travelled widely in South and Central America, he has (amongst others) published books on slavery, piracy and goldmining in colonial Ecuador and Colombia (see Wikipedia). Given this extensive background in Latin American and especially Colombian colonial history, it does not really come as a surprise to see a whole book devoted to the topic of Colombian emerald. The book examines, as the author says in the Preface, „the mining, exchange and consumption of Colombian emeralds from the early 16th to the late 18th centuries", a period that covers the first three centuries of Europe's modern history.

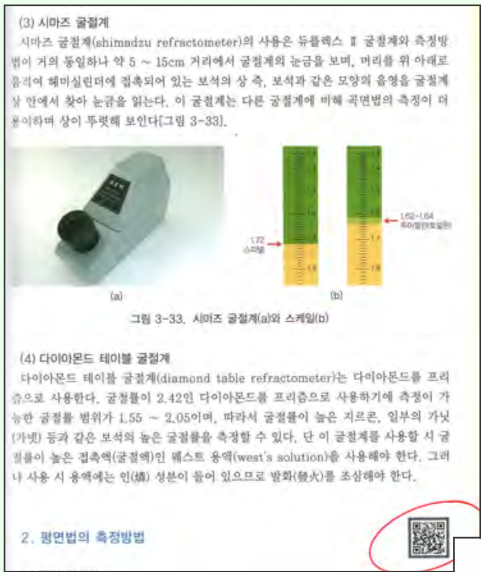
Emerald becomes a global commodity for the first time, greatly esteemed both by the Habsburg and other Christian courts in Europe but even more appreciated because of its green colour by the Islamic Ottoman, Safavid and Mughal empires in Turkey, Iran and India. In Islamic tradition, green is the colour of paradise.How emeralds from the Spanish colony of New Granada, present-day Colombia,got half around the world to Europe and Asia in the „age of sail and gunpowder",who mined them, who traded them and who bought them, are the main subjects of Kris Lane's book. He conducted an extensive primary research in national and regional archives in both Colombia, Equator and Spain, Portugal and England.

Starting with the discovery of emeralds in the Muisca highlands of eastern Colombia,the author follows up the history of conquest and emerald mining, explaining both the primitive conditions under which conquered local Indians or slaves from Africa did the heavy work and early ways of the emerald trade.The first modern world trade with emeralds was in the hands of a small group of European merchants, mainly of Spanish and Portuguese sephardic Jewish origin or so-called New Christians, Iberian ethnic jews forced to convert to Catholicism.Still based mainly in Lisbon (a main centre of the gem trade in early modern history) or Spanish port cities like Seville, the New Christians were closely linked to those families that had fled from the inquisition to mainly north European cities like Amsterdam, Antwerp, London or Hamburg.

Sephardic gem merchants travelled from Europe to India by land or sea and they could count on family living in Cartagena in New Granada, in harbour cities in the Persian Gulf, in the Portoguese city of Goa in India but later also in the English ports of Madras and Bombay or in Manila, the Spanish crown colony since 1570. Emeralds were brought to the eastern ports, from where they were sold to Mughal and other Indian rulers, and Indian diamonds, textiles, silk and spices were brought back to Europe. Pearls were traded both ways. Most dealers were probably also involved in the slave trade for which Spain's expanding overseas territory became an ever extending market. There were direct trade ties to Luanda, capital of Portuguese Angola on the western African coast, linking both the gem with the slave trade. Contraband trade, and the influence of Dutch and English competition, both in America and elsewhere, are also discussed.

Colombian emeralds were classified from 1572 onwards in „oriental" and „Peruvian"or „New World" emeralds, the latter being of a lower quality.The Eastern market demanded „oriental" emeralds, this meant that they were sold as such, leading for a long time to a confusion as to the actual origin of the beautiful emeralds in Mughal jewellery. The book's final chapters give an overview of emerald mining in Colombia well into the 20th century and it concludes with statistics on production and taxes and with notes on cutting, setting and appraising emeralds since the 16th century.

The main merit of the book lies in its attempt to disentangle the role of Colombian emerald in the complicated pattern of early modern history's world economy.This aim has been achieved well although the wealth of presented facts is sometimes overwhelming and confusing. But it is an excellent book.



(3) 시마즈 굴절계

시마즈 굴절계(shimadzu refractometer)의 사용은 듀플렉스 Ⅱ 굴절계와 측정방법이 거의 동일하나 약 5 ~ 15cm 거리에서 굴절계의 눈금을 보며, 머리를 위 아래로 움직여 헤미실린더에 접촉되어 있는 보석의 상 즉, 보석과 같은 모양의 음영을 굴절계 상 안에서 찾아 눈금을 읽는다. 이 굴절계는 다른 굴절계에 비해 곡면법의 측정이 더 용이하며 상이 뚜렷해 보인다[그림 3-33].

(a) (b)

그림 3-33. 시마즈 굴절계(a)와 스케일(b)

(4) 다이아몬드 테이블 굴절계

다이아몬드 테이블 굴절계(diamond table refractometer)는 다이아몬드를 프리즘으로 사용한다. 굴절률이 2.42인 다이아몬드를 프리즘으로 사용하기에 측정이 가능한 굴절률 범위가 1.55 ~ 2.05이며, 따라서 굴절률이 높은 지르콘, 일부의 가닛(가넷) 등과 같은 보석의 높은 굴절률을 측정할 수 있다. 단 이 굴절계를 사용할 시 굴절률이 높은 접촉액(굴절액)인 웨스트 용액(west's solution)을 사용해야 한다. 그러나 사용 시 용액에는 인(燐) 성분이 들어 있으므로 발화(發火)를 조심해야 한다.

2. 평면법의 측정방법

# Innovative Idea of Teaching Gemmology

By Sunki Kim, Hanmi Laboratory, Korea

In Korea, there are handbooks of 'Diamond Grading' and 'Gem Identification' for Beginners of gemology. The books have been up-dated with QR code. QR code is inserted on every chapter of the books. It is helpful to understand of gem testing practice. A reader can see a video of gem testing and diamond grading practice through scanning a QR cord. So, the video shows how to use gem testing instruments. It is very useful for gem and diamond education. Nowadays, people know what is QR cord because a mobile smart phones are very popular. The books have been written by Dr. Young-Chool Kim, who is the founder of Hanmi Gemological Institute, Laboratory (Hanmi Lab) in Korea. QR cord system in handbooks of Gem Identification and Diamond Grading was published on the 14th March 2014.

# Questions for Elisabeth Strack

Introducing Founding Member 004: Gemmologisches Institut Hamburg, Germany

Year of Establishment **1976**

Full Name of the Owner of the Laboratory: **Elisabeth Strack**

Qualifications of the Owner/Founder **FGA (Tully Medaillist) and GG, MA in Art history**

Address **Business Center, Poststrasse 33,20354 Hamburg.** Country **Germany**

Telephone **0049-40-352011** Mobile **0049-174-9750146** Fax **0049-40-343419**

Email **info@strack-gih.de** Skype **strack.gih** Website **www.strack-gih.de**

Owner's Experience in the Trade **Diamond identification, diamond grading, coloured gemstone and pearl testing, antique and present-day jewellery.**

What Standard Gem Testing Equipments do You have? **All the standard equipment like refractometer, spectroscope, microscope, polariscope, ultra violet lamp etc.**

What Advanced Instruments do you have?
**A Kodak 2200 Digital X-ray system and a Raman Spectrometer**

Have you published or presented papers at conferences/magazines/seminars?
**Yes, since the 1970s I have given about 160 presentations, including those at more than 20 conferences in different countries worldwide and have published about 100 articles on different gemmological topics in different magazines and journals, a book on Antique Jewellery in 1997 and the book "Perlen" (English translation "Pearls") in 2001/2006.**

Are you a Member of a Gem Trade Organization? **Of the Deutsche Gemmologische Gesellschaft, the Gemmological Association of Great Britain and the Association and Francaise de Gemmologie**

Are you giving lectures and educational programs to trade? **Since the 1970s, I have been teaching more than 400 seminars on diamond grading, gemstone identification, ruby/sapphire/emeralds, pearls and antique jewellery.**

Why did you decide to found ICGL? **I liked the idea that independent experts who own their own laboratories in different parts of the world could join forces in order to create a collective, international voice for the advancement of gemmology.**

## Interesting articles in the latest issue of the

# “The Journal of Gemmology”


The Journal of Gemmology (Vol. 34, No. 1, 2014) under the dynamic Editor-in-Chief, Brendan Laurs has an updated format and several new sections. Some of the interesting articles are A. Mottana’s article on Galileo’s attempt at scientifically testing gemstones, another by K. Schmetzer , J. Hyršl, H.-J. Bernhardt and T. Hainschwang on Purple to reddish purple chrysoberyl from Brazil, Natural and imitation hornbill ivory by J. Liang, H. Li, T. Lu, J. Zhang, M. Shen and J. Zhou and The detection of ruby crystals in marble host rock using X-ray computed tomography by A. Bouts.

Section What’s New gives info on studies of tourmaline magnetism, HPHT-treated diamond and CVD synthetic diamond, the release of updated (2013) CIBJO Blue Books, and the opening of the MIM Mineral Museum in Beirut, Lebanon. The Practical Gemmology section explains how to take photomicrographs through a microscope using a Smartphone camera. Gem Notes documents colourless cat’s-eye apatite, prismatic Ethiopian aquamarine crystals, blue chrysocolla, chalcedony from Peru, the discovery of a remarkable painite specimen, tanzanite as a ‘stinkstone’, a beaded cultured pearl misidentified as natural, the application of micro-focus X-radiography to pearl identification, an exceptional Quahog pearl, a parcel of melee-size yellow-brown diamonds containing synthetics, and a visit to Mogok, Myanmar. Other new sections are: Learning Opportunities, From the Archives, Conference Section, New Media and Literature of Interest. All these features make the Journal very useful and an educational resource.