

Jade - "Stone of Gods"

Appreciation & Certification of Fei Cui (Jadeite-Jade)



presented by
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Swiss Gemmological Institute SSEF

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Introduction

Jade, since thousand of years a mythical stone appreciated in Far East and in the high cultures of native Americans, is currently again rising high and is sought after at auctions in Hong Kong and elsewhere.



Lot **3780**

Jade: "Piedra de ijada"

Spanish „piedra de **ijada**“ or stone of loins (deriving from the Latin word *ilia* for intestines and abdomen), based on the belief of native Indians of the Mesoamerican cultures in curing ailments of the loins and kidneys (**nephritis**, an inflammation of the kidneys) by these stones (Nicolas Monardes 1565).



Map from 1736 of mesoamerica



Copperplate engraving by Thomas de Bry (1590)



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Jade in Mesoamerican cultures

From the Olmec civilisation (1500 BCE - 400 BCE) in Guatemala a large number of highly artistic jadeite-jade carvings and objects have been recovered by archaeological campaigns.



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Jade in prehistoric European cultures



© Sheridan, 2007

Jadeite localities in the Italian Alps were the source of neolithic jadeite artefacts, traded throughout Europe.

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Jade in the Far East



Jadeite bowl, Qing dynasty

Photo © www.cultural-china.com

Jade has always been a material to represent status and was considered the "Imperial Gem" from the earliest Chinese dynasties to the present. By its durability, the possibility to be carved in delicate designs and by its mere beauty, jade has become connoted with divine qualities, such as protection, longevity, health and luck in Asian cultures up to the present day (Jones 2004).

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White “mutton fat” Nephrite Jade from Xinjiang



Digging for jade along the Yurungkash River (white jade river) near Hotan, Xinjiang, China.

An Imperially inscribed white and russet mutton fat jade pebble. Qianlong, Yu Ti mark and of the period, (1736-95).

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Fei Cui, 翡翠

In China, the term „Yù“ 玉 - literally „the most beautiful stone“ – was used to describe jade, but also other hard material such as chalcedony and marble that was carved into tools and ceremonial objects since Neolithic times.

In the Chinese understanding, the term jade historically was separated into the terms Ying Yù (hard jade), mostly equal with pyroxenitic jade (also known as “Fei Cui” 翡翠) and Ruan Yù (soft jade), which apart from nephrite also included minerals of the serpentine group (Xiù Yù jade, Henan) (Krzemnicki 2008) and even marbles (Lantian jade, Yuchuan quarry in the Shaanxi Province).



Emperor Qianlong (1711 – 1799), the sixth Emperor of the Qing Dynasty, had a great appreciation for Burmese jadeite-jade because of its beauty and qualities.

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Fei Cui, 翡翠

Promoted by the creation of an ISO standard for Fei Cui testing (HOKLAS ISO 17025; August 2006), this historic term is gaining more importance in the Asian market.

HOKLAS definition:

Fei Cui (Jadeite Jade) is a granular to fibrous polycrystalline aggregate. It is composed of **Jadeite** as major mineral. It may consist of other minor minerals such as Omphacite, Kosmochlor, Amphibole and Feldspar.



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Jade as defined by CIBJO

CIBJO: The World Jewellery Confederation



Jade is a general term describing two different minerals (jadeite and nephrite) in their massive form, as polycrystalline, quasi-monomineralic rocks. The term jade is usually used as a suffix after the mineral name.



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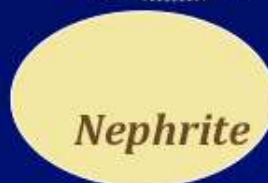


Terms and nomenclature...

Based on historic references, the Chinese understanding of terms for jade is not equal to the Western understanding.



Musée de la Couronne, Paris, France (1919)



Despite all differences, common understanding is, that jade is a polycrystalline aggregate made of fine and very densely interwoven mineral grains or fibres, thus resulting in its outstanding workable properties.

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Jadeite $\text{Na Al Si}_2 \text{O}_6$

Member of the pyroxene mineral group

Sources :
Burma (Myanmar),
Guatemala, Russia...

Jadeite-Jade



Jadeite courtesy Silkeneast, Bangkok



Jadeite and the Pyroxene group



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CHEMICAL MINERAL ANALYSES (in wt.%)

	JADEITE pyroxene	KOSMOCHLORE pyroxene
SiO ₂	56.8	54.3
Al ₂ O ₃	22.4	2.5
CaO	9.1	89.8
Fe ₂ O ₃	0.9	1.3
MgO	1.0	0.0
CaO	1.3	0.0
Na ₂ O	14.2	13.8

Chem. Formula (theoretical)

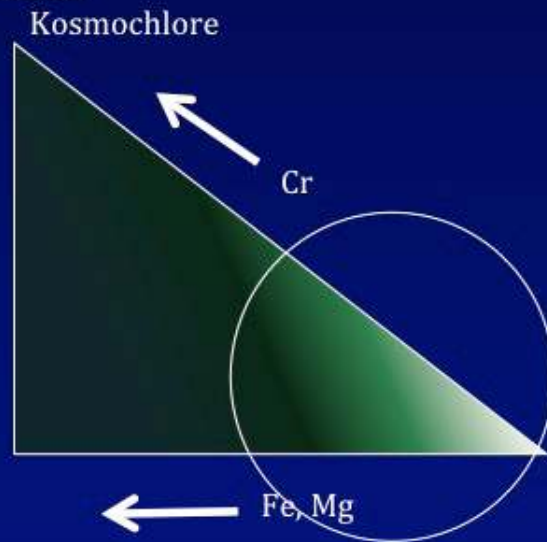
NaAlSi₃O₆ NaCaSi₃O₆

← solid solution →

Al Cr



Omphacite



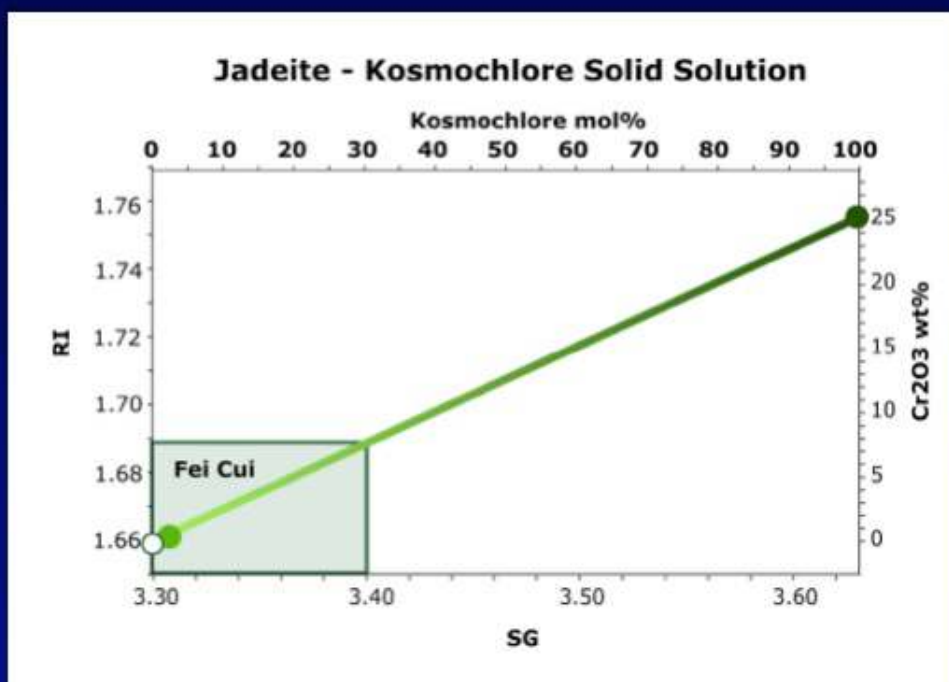
Jadeite

Chemically pure jadeite
colourless (or white).

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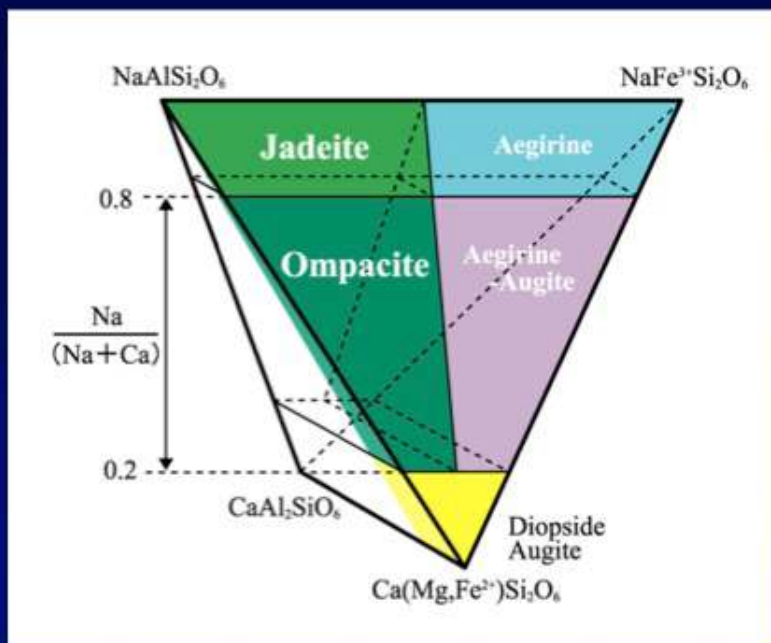
Jadeite and the Pyroxene group



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Jadeite and the Pyroxene group



The reality is much more complex !

A chemical analysis is mandatory for a mineralogical identification of jadeite !

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Jadeite-Jade colour varieties:

The colour results either due to colouring elements (e.g. chromium for vivid to deep green, iron for greyish green to dark green, manganese and iron for purple to lavender colour) or due to fine dispersed inclusions (e.g. graphite for grey to black) and iron hydroxide for brown)



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Nephrite-Jade



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Nephrite has been carved since prehistoric times into artefacts and ceremonial objects, especially in China.

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Nephrite is a variety name used for a rock consisting of fibrous **tremolite-actinolite** (amphibole group)

Tremolite $\text{Ca}_2\text{Mg}_5\text{Si}_8\text{O}_{22}(\text{OH})_2$

Actinolite $\text{Ca}_2(\text{Mg,Fe})_5\text{Si}_8\text{O}_{22}(\text{OH})_2$

Nephrite-Jade



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Deposits found worldwide: Especially in China, Russia, New Zealand, Switzerland...

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Nephrite-Jade



Lot **3519**
Nephrite-Jade box designed
by Cartier

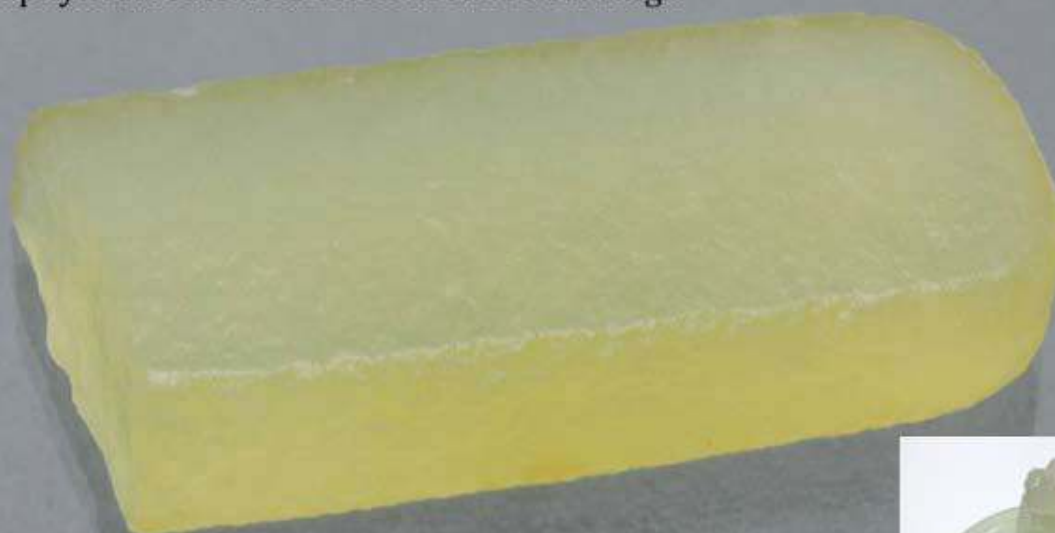


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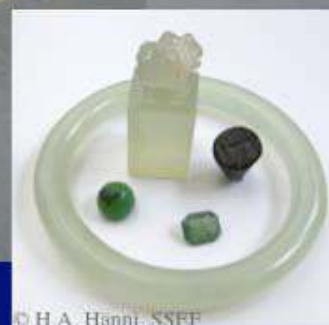


Serpentinite is a "soft" rock consisting of densely interwoven submicroscopic hydrous magnesium iron phyllosilicate. It is often used for carvings.

Serpentinite carvings



Prehistoric stone axe, found at Lop Nor, Taklamakhan desert in the Xinjiang Province (northwestern China)



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Testing of Jadeite



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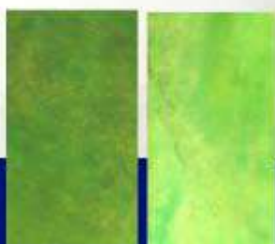
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Treated Jadeite



Green dyed jadeite

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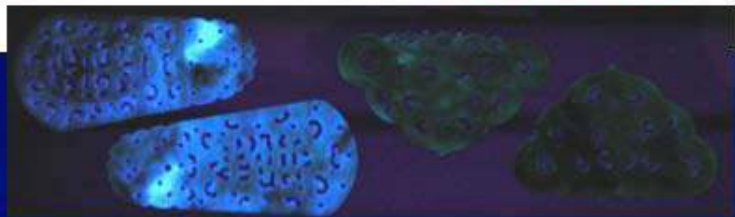


Before and after bleaching and impregnation with a colourless artificial resin (polymer).

Testing of Jadeite



Photos © H.A. Hänni, SSEF

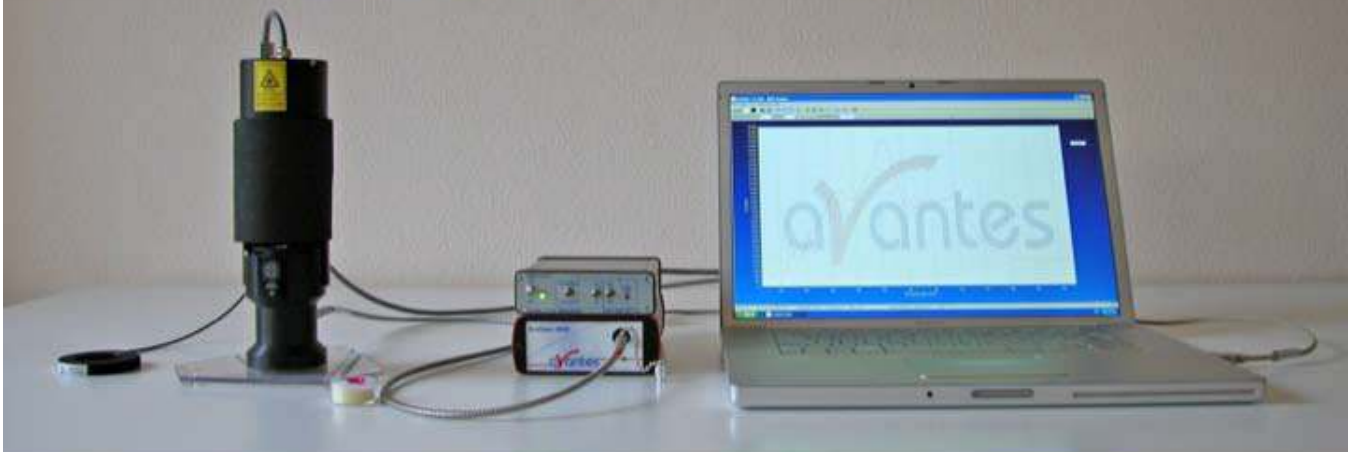
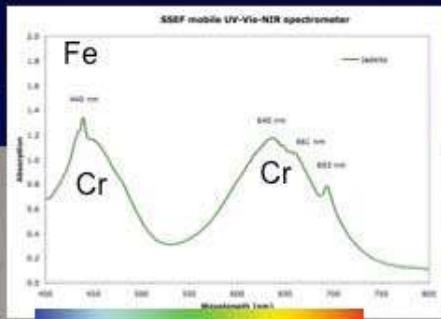


Longwave UV reaction of treated (left) and untreated jadeite (right).

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Testing of Jadeite

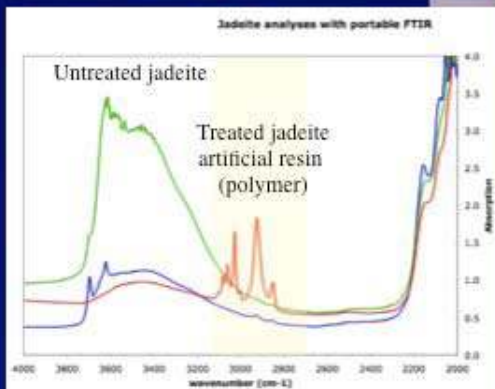


UV-Visible absorption spectrometry of jadeite to test for colour authenticity.

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Infrared spectrometry (FTIR) to detect impregnations with oil, wax or artificial resin (polymer).



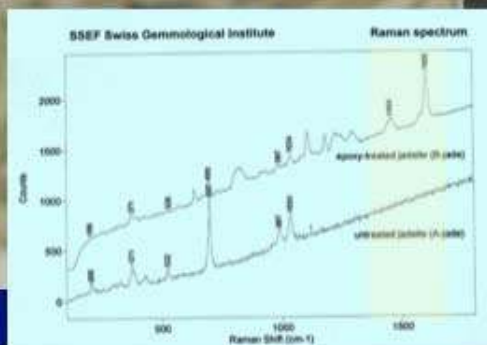
Testing of Jadeite



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Raman microspectrometry to detect impregnation treatment in fissures and pores.

Testing of Jadeite



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Test Report No. 800006

on the authenticity of the following gemstone,
mounted in a ring with diamonds

Total weight:	approximately 25.2 grams (including mounting and diamonds)
Shape & Cut:	oval, cabochon
Measurements:	approximately 21.50 x 18.45 x 10.00 mm
Calculated weight:	approximately 37 ct.
Colour:	green

Identification: **JADEITE-JADE**

Comments:	The analysed properties confirm the authenticity of the translucent jadeite-jade.
	No indications of any treatment.
	On the Asian market this jadeite-jade is usually called jadeite-jade type A.
	Origin: Burma (Myanmar)

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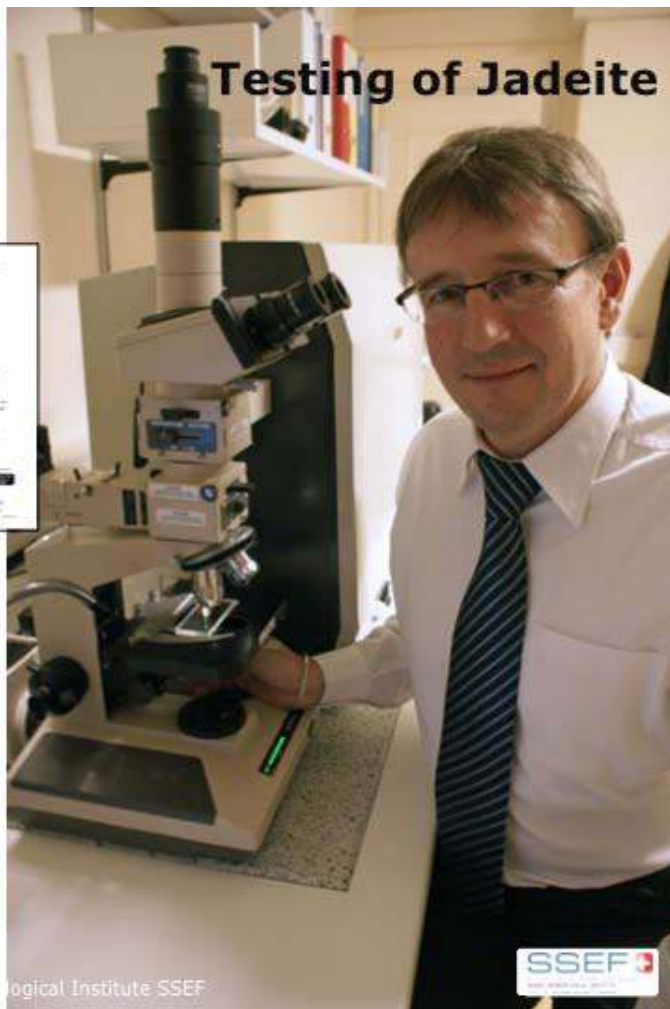


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Testing of Jadeite



Burmese Jadeite

The beauty, the textures and what it tells us about its formation...



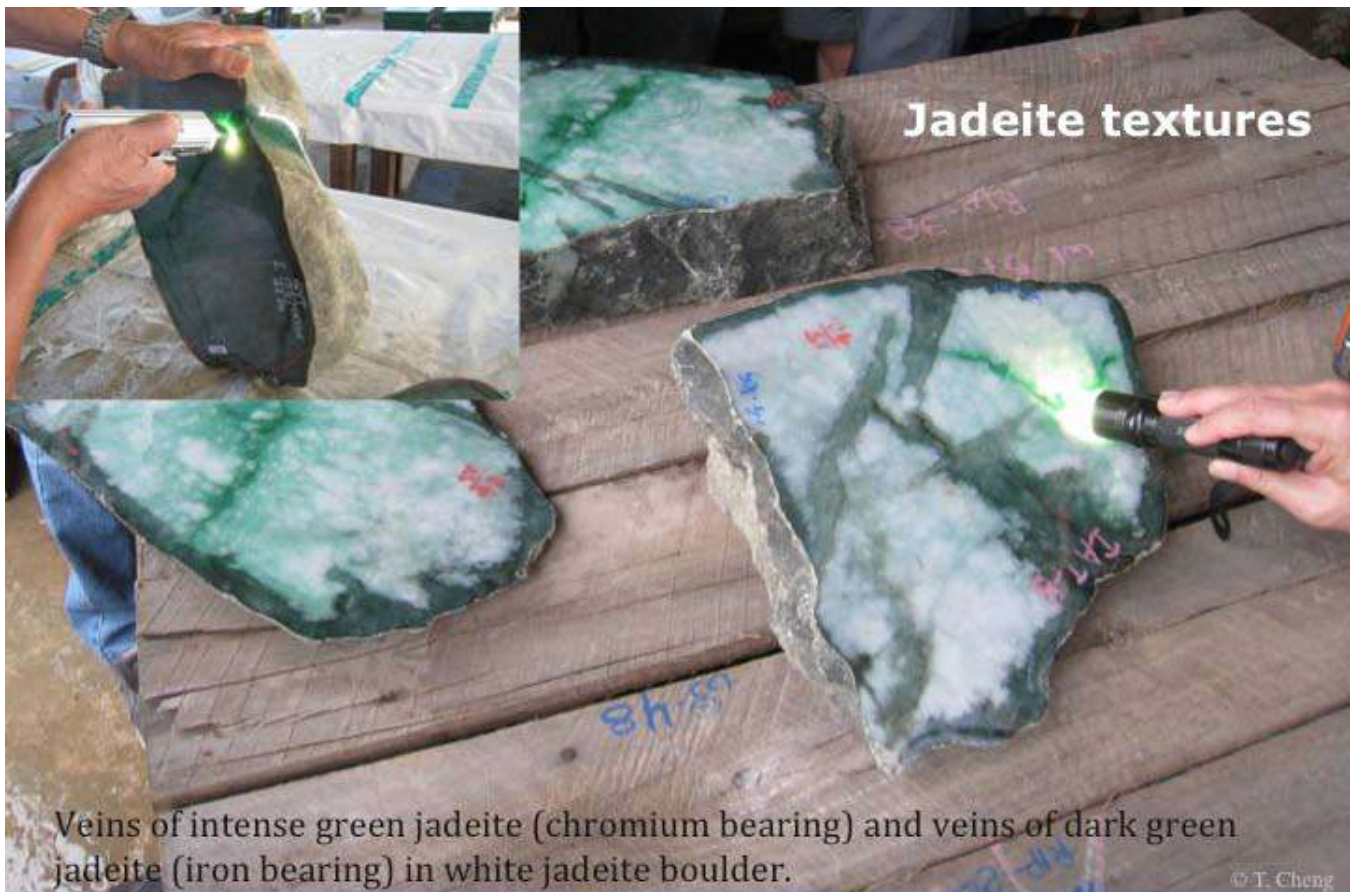
Jadeite textures

Colourless jadeite associated with multi-mineral rock maw-sit-sit, containing fine grained jadeite, kosmochlore, feldspar and zeolite minerals.

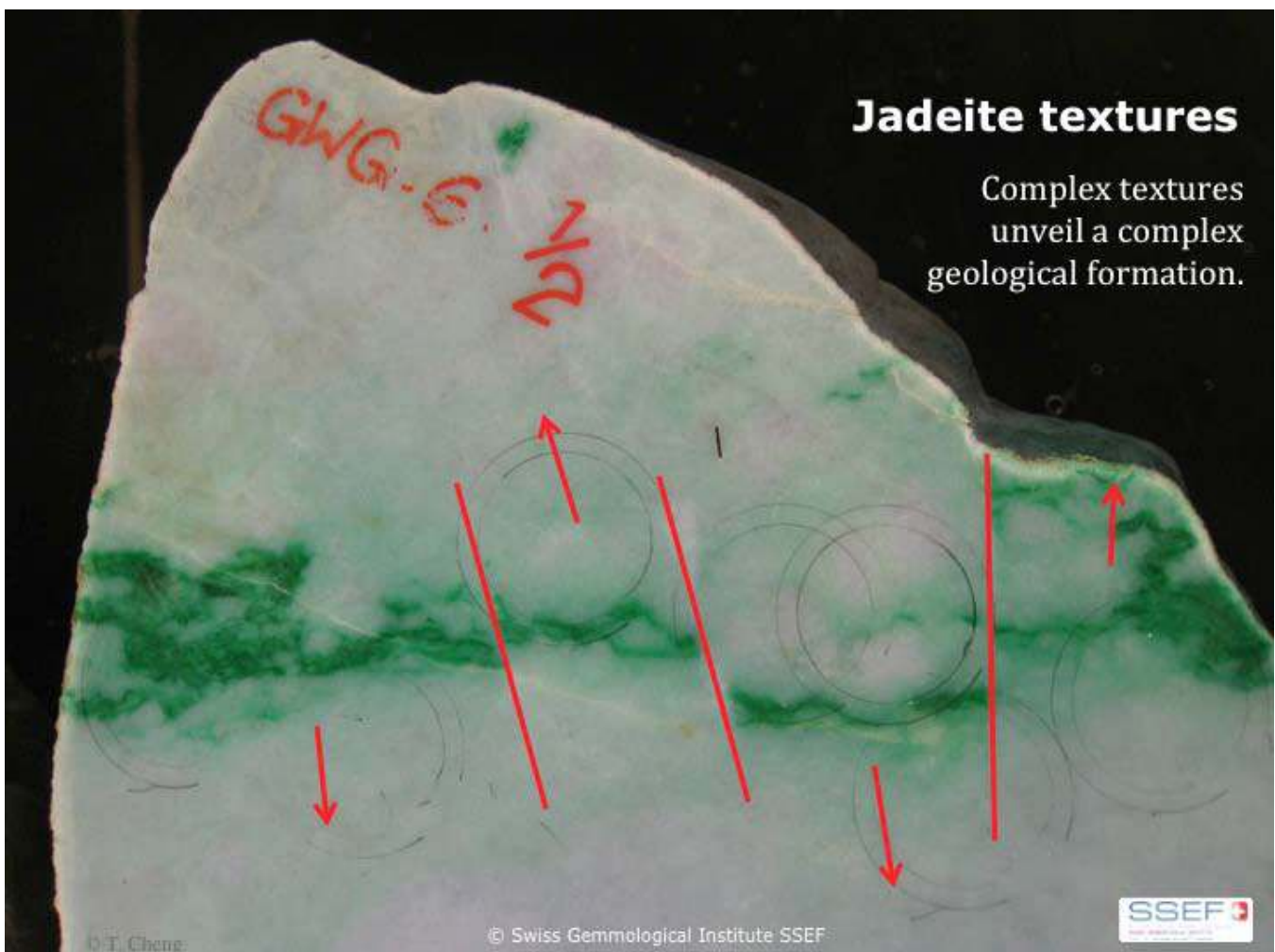
Jadeite courtesy Silkeneast, Bangkok

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Jadeite textures



© T. Cheng

Chromium impregnation into "pure" white jadeite along pre-existing layers and primary fracture zones, followed by distinct lateral chemical diffusion and late stage brittle deformation.

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Jadeite textures



© T. Cheng

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Lavender jadeite is often present in larger pillow-like nodules cross-cut by folded and green chromium-rich jadeite.

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Lot **3727** & **3728**

Lavender jadeite rings

Using the rough at its best requires much experience



Lavender jadeite of high transparency

Jadeite textures

© F. Cheng



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Jadeite textures



Lot **3737**
Carved lavender jadeite

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Jadeite textures



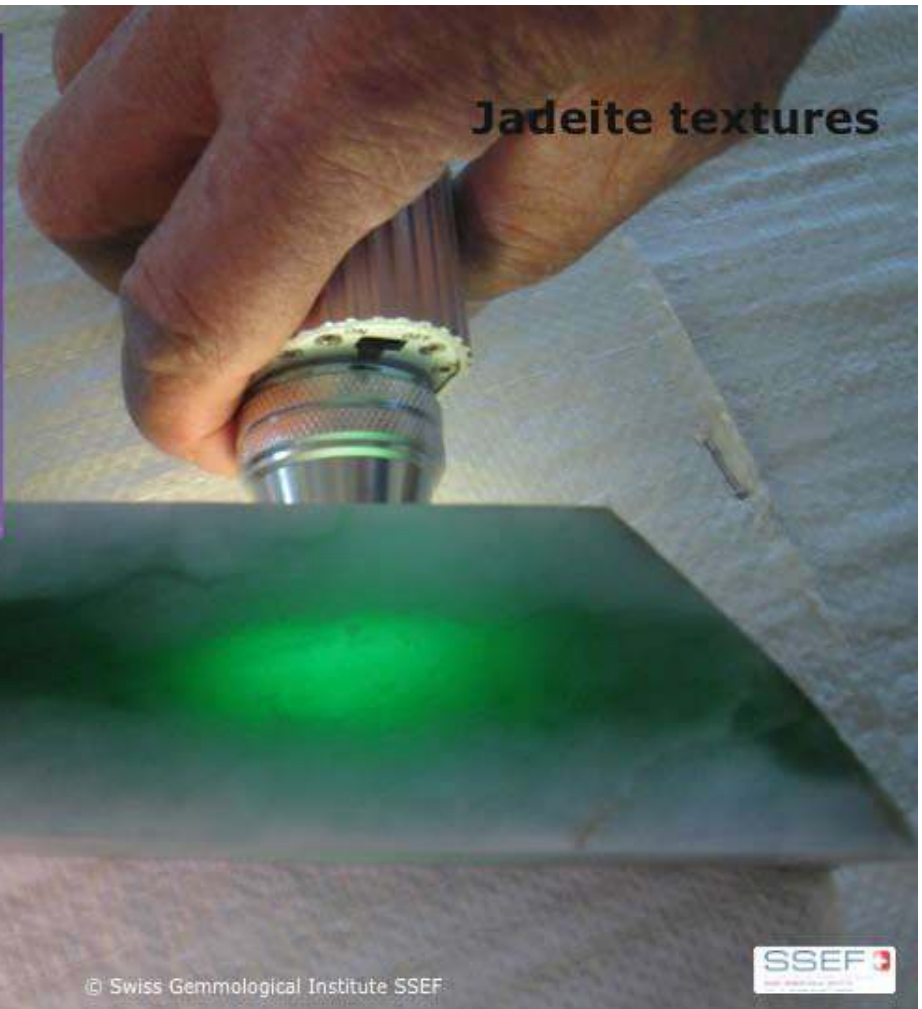
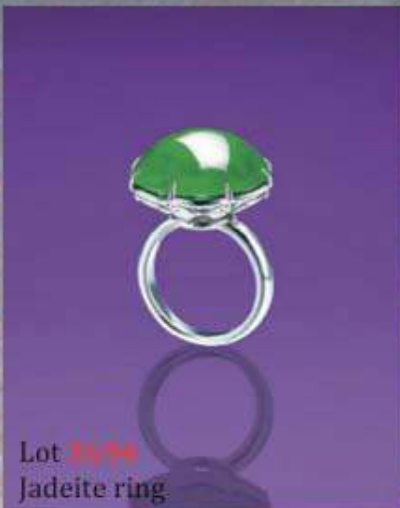
Lot **3548**
Jadeite bowls

C.T. Cheng

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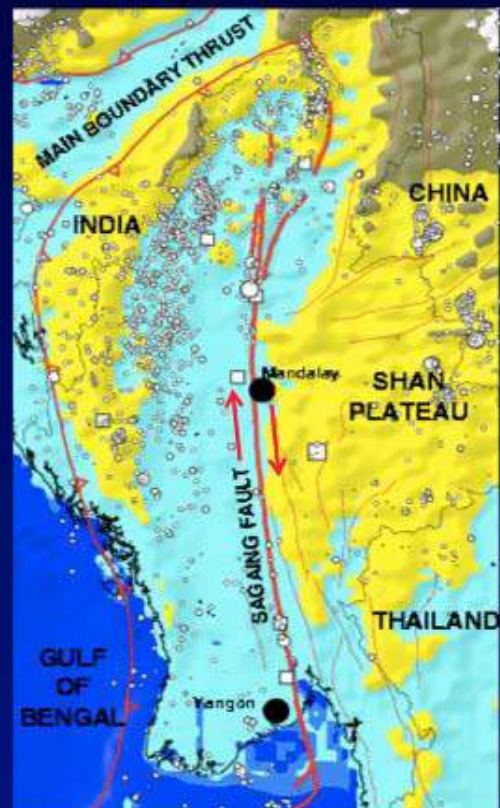
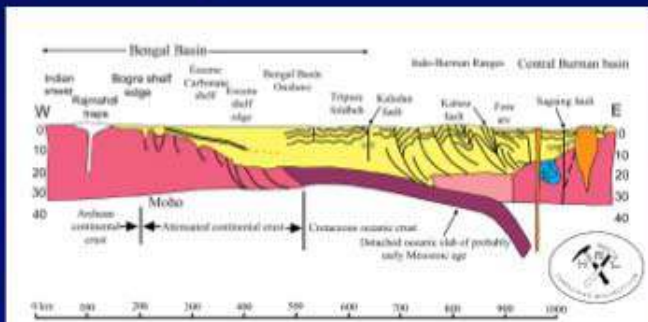
Jadeite textures



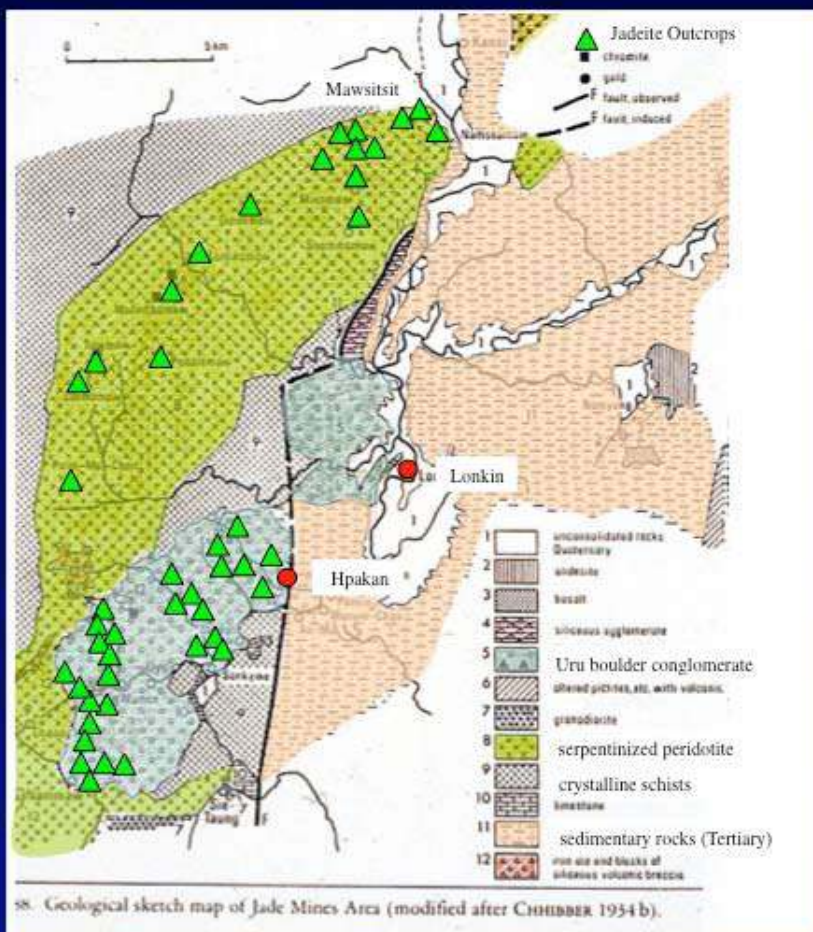
Jadeite formation



Collision between the Indian plate and the Burmese subplate (part of Eurasia) result in subduction and metamorphism of ocean floor rocks into jadeite rocks.



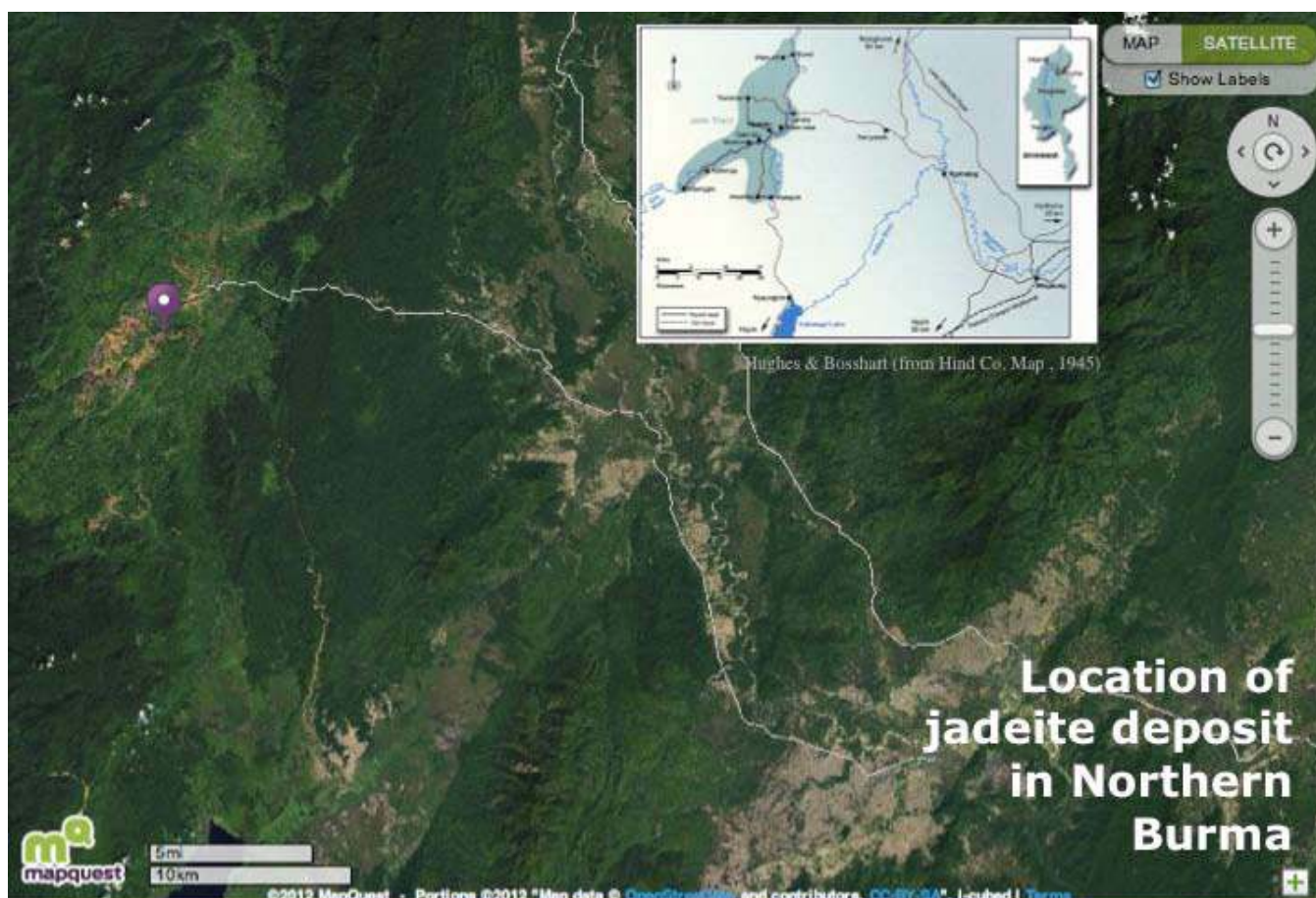
Geology of jadeite deposit in Northern Burma



Photos © R.W. Hughes

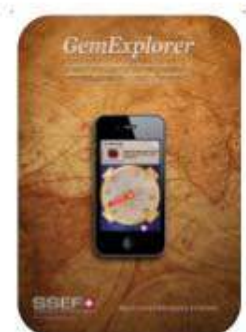


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A guide to the world 's major sources of coloured gemstones, diamonds and pearls.
 for more details see www.gemexplorer.org
 also as a free App available in iTunes,

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