



LA VALMALENCO DI “PIETRA”

Tirano, 11 marzo 2014



Lo “Sferlün”



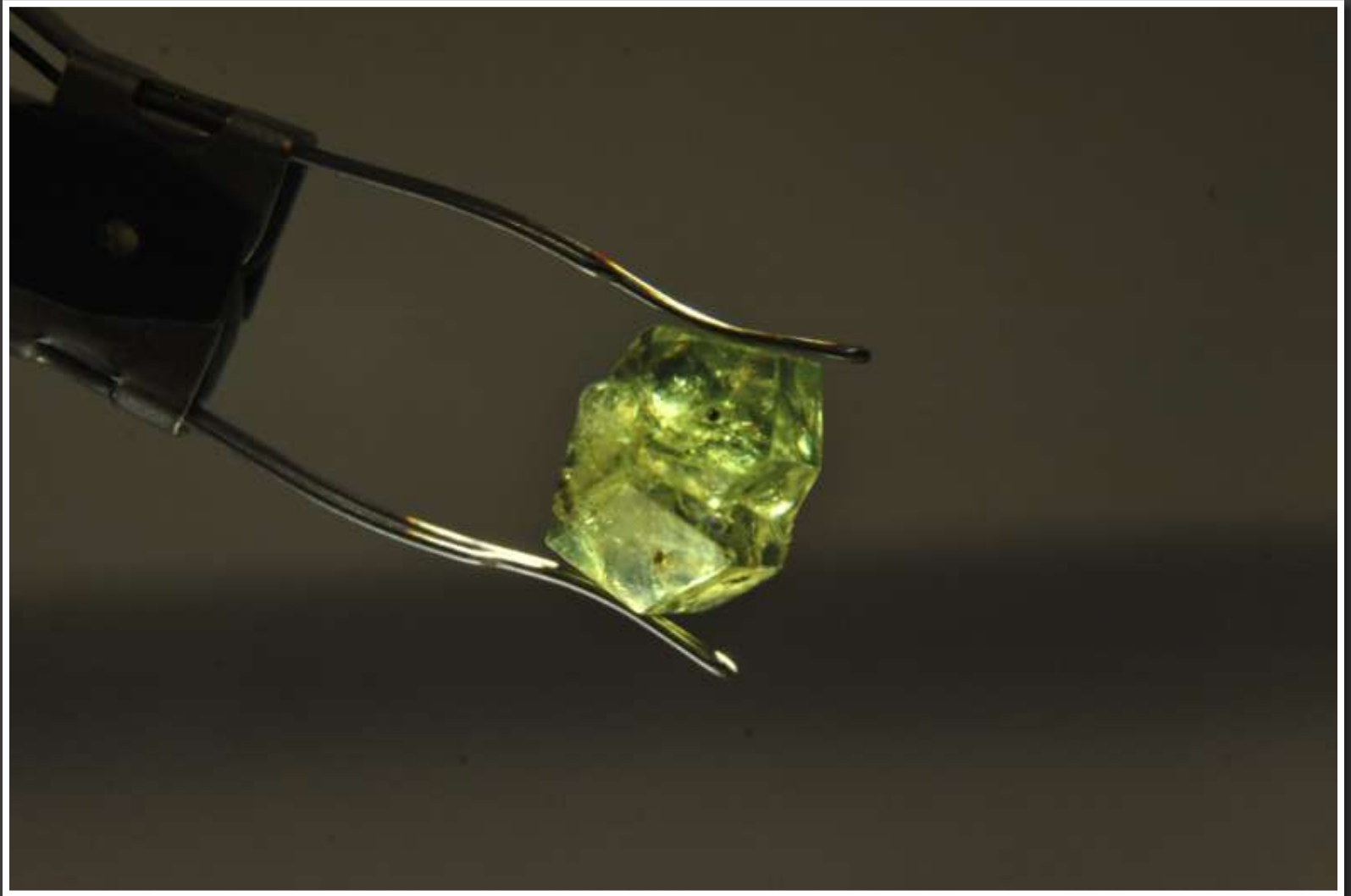
Località Sferlün, Lanzada.



Località Sferlün, Lanzada. Luglio 2007



Acquanera



Demantoide grezzo rinvenuto in località Sferlün.



Demantoidi della Valmalenco ritrovati in località Sferlün.



Ciondolo realizzato con Demantoide della Valmalenco proveniente dalla località Sferlün



Spilla realizzata con granati Demantoidi grezzi della Valmalenco e montata in oro 750‰



Demantoide Sferlun





Ingrandimento





Mastabia

NEPHRITE JADE FROM VAL MALENCO, SONDRIO, ITALY: REVIEW AND NEW DATA



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INTRODUCTION

Nephrite jade, valued for ornamental carvings and gems, is an almost monoclinic rock, mainly a tremolite $[\text{Ca}_2\text{Mg}_5\text{Si}_8\text{O}_{22}(\text{OH})_2]$ -actinolite $[\text{Ca}_2(\text{Mg},\text{Fe},\text{Si})_7\text{O}_{22}(\text{OH})_2]$ composite.

Major nephrite sources were found in China, Russia, South Korea, New Zealand, and Australia.

A new deposit producing gem-quality nephrite has been discovered some years ago at Mastubia, in Val Malenco, Sondrio, northern Italy. Nephrite is found in a talc-tremolite cordierite, associated with doleritic marble and calc-silicate rocks (Nichol and Grew, 2005).



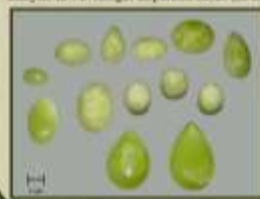
The location of Mastubia, Val Malenco, Sondrio, northern Italy.



An ornamented nephrite (left) and a bead with nephrite (right) obtained from Val Malenco nephrite (photo by Piero Ferris).

RESEARCH AIM

This study aims to provide a review and an update of the nephrite jade from Mastubia, Val Malenco, investigating a series of both cut and rough gem-quality samples by means of X-ray powder diffraction, combined with quantitative phase analysis (XRPD QPA), using the Rietveld method, electron microprobe analysis in wavelength dispersion mode (EMPA-WDS), laser ablation inductively plasma mass spectrometry (LA-ICP-MS), and mid-infrared (IR) spectroscopy.

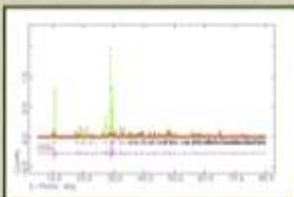


Some of the cut (left) and rough nephrite (right) from Mastubia, Italy (photo by Piero Ferris).

RESULTS AND DISCUSSION

XRPD QPA data

The nephrite jade from Val Malenco resulted constituted mainly of tremolite $[\text{Ca}_2\text{Mg}_5\text{Si}_8\text{O}_{22}(\text{OH})_2]$, with minor amounts of calcite, generally less than 5 wt%, as determined by means of XRPD QPA. An exceptional value of ~30 wt% of calcite was found in the most whitish sample, suggesting a correlation between the base and the calcite amount.



Retrieved refinement of the X-ray powder diffraction pattern (2- θ) through search of our gem-quality sample of nephrite jade from Val Malenco, showing tremolite (1-30 wt%) and calcite (1-30 wt%) as the main constituent phases. The lower pattern represents the best-fit between estimated and experimental values.

The unit cell parameters of tremolite (space group $C2/m$) obtained on the basis of XRPD data collected using NBS-51 as internal calibration are:
 $a(\text{\AA})=9.839(4)-9.842(3)$
 $b(\text{\AA})=18.046(2)-18.054(5)$
 $c(\text{\AA})=5.278(3)-5.279(2)$
 $\beta(^{\circ})=104.73(4)-104.72(2)$
 $V(\text{\AA}^3)=905.62(9)-906.96(8)$

Physical properties

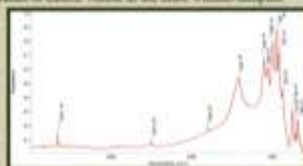
Color: the color commonly ranges from white to white-green, up to green in a few samples.

Microstructure: the samples show a micro-to cryptocrystalline, that consists of a fibrous intergrowth of about 10-20 μm long tremolite crystals, that occur together with other accessory constituents, identified by SEM-EDS as calcite, talc, diopside, apatite, and sporadic iron minerals.



Tremolite (left) and talc (right) in a typical nephrite sample from Val Malenco. The white spots in the right EDS image were assigned by SEM-EDS to calcite.

Infrared features: the mid-IR spectra in transmission mode by KBr pellets are typical of tremolite, with the bands of calcite visible in the more whitish samples.

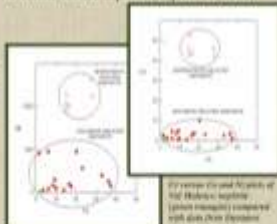


The IR spectrum of a gem-quality white nephrite sample. The absorption bands of calcite (17 and 1450 cm^{-1}) were observed.

Chemical features

Chemical analyses show almost pure tremolite composition (Leake et al., 1997), with a low concentration of most trace elements. All the elements of the first transition series (Sc, Ti, V, Cr, Mn, Fe, Co, Ni, Cu, Zn), as well as the alkaline earth metals (Sr, Ba), and the alkaline metals (K, Rb, Cs) as always less than 0.1 wt%, with the only exception of Na, ranging from 0.12 to 0.22 wt% as Na_2O .

On the basis of the low Fe/Fe+Mg ratio (<0.002) and the low content of Co (0.07-0.27 ppm), Cr (1.85-4.36 ppm), and Ni (0.21-4.36 ppm), this nephrite can be classified as dolomite-related nephrite (Sign et al., 2012).



All the nephrite samples have a low REE (0.15-0.80 ppm), with a major contribution given by L- and M-REE (i.e. La, Ce and Nd).

CONCLUSION

The nephrite jade from Val Malenco is composed of almost pure tremolite, with minor amounts of other accessory constituents, mainly calcite. The color variation is more related to the calcite content rather than the concentration of the chromophore elements (i.e., Fe, Mn, Cr, Li) et al., 2010). The compact and fine-grained microstructure confers to this jade variety an agreeable aspect, making it noteworthy as gem material.

References: Leake, B.E., Woollin, A.R., Arps, C.E.S. (1997) *Am. Min.*, 82, 918-921; Liu, Y., Dong, J., Shi, G., Lu, T., He, H., Ng, Y.N., Zhou, C., Yang, L., Wang, Q. (2010) *Review Geol.*, 40, 259-300; Nichol, D., Grew, H. (2005) *J. Gemmol.*, 29, 305-311; Sign, R., Qian, R., Zhou, S., Guo, F., Dong, M., Han, Y. (2012) *Int. J. Mass Spectrom.*, 308, 306-311.

Manifesto Conferenza Europea di Mineralogia
 Francoforte 2-6 settembre 2012

Gemme

Ricerca, Tradizione e Novità

Firenze, 24-25 settembre 2012



AN ITALIAN JADE: THE NEPHRITE FROM VAL MALENCO (SONDRIO)

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INTRODUCTION



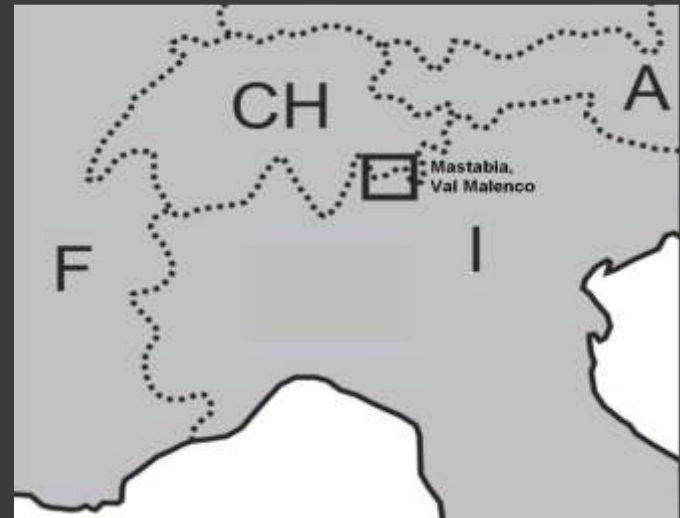
Scortaseo talc mine



Jade beads necklaces and ear-pins made by local craftsmen out of Scortaseo Nephrite and local pink marble.

INTRODUCTION

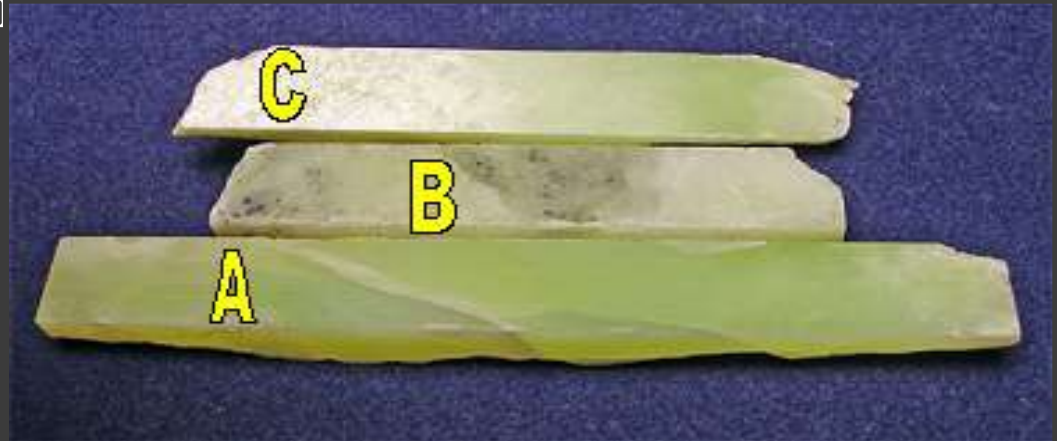
A deposit of gem-quality nephrite jade has been discovered some years ago at Mastabia, in Val Malenco, some 20 km N-NW of the town of Sondrio, northern Italy. The discovery of the nephrite jade is attributed to Mr. Pietro Nana (Sondrio) who first noticed an attractive green stone in the discarded waste materials of an abandoned talc mine situated at an altitude of 2077 m



RESEARCH AIM AND EXPERIMENTAL

The aim of the present study is a multi-methodological investigation of nephrite jade from Val Malenco, in order to provide a full mineralogical-gemmological characterization of this gem-quality material.¹

Gemmological standard testing, X-ray diffraction combined with quantitative full-phase analysis using the Rietveld method, EMP and LA-ICP-MS chemical analyses, mid-IR spectroscopic measurements, were used as analytical techniques.



Polished 1cm wide strips of Mastabia Nephrite Jade showing good translucency and the yellowish-green color (A), localized black inclusions (B) and areas with coarse Tremolite crystals (C)



Cave di Mastabia vista dal lago di Chiesa. Giugno 2012.



Ingresso franato livello 1.



Vecchia discarica con vista panoramica del gruppo del Bernina.



Varietà di Giada della Valmalenco.



Coppa in Giada di Mastabia.



Sculture in Giada di Mastabia.



Pizzo Tremogge



Gruppo Tremogge, Malenco, Entova visto dall'alpe Fora.



Filone di Clinothulite della Cengia del Cavallo.



Collana realizzata con Clinothulite del pizzo Tremogge.



Cuore in Serpentino Nobile (Lizardite).



Pizzo Forno



Pizzo Forno, filone Rodonite. Sullo sfondo, il monte Disgrazia.



Abitante del filone di Rodonite.



Un camoscio sulla cresta del filone di Rodonite.



Val di Scerscen vista dalla capanna Marinelli.





Rodonite del Pizzo Forno,
collane e grezzo.



I Berilli della provincia di Sondrio



Val Sissone, vista dalla cima del Monte Disgrazia.











Berilli della Val di Mello.





Berilli della Val di Mello.















Berillo Acquamarina proveniente dal Monte Vazzeda.













Berillo montato in oro e diamanti della Val Bodengo.



