

After the lecture and questions, the 'practical', in the form of the many mineral stands in the Rock 'n' Gem Show on the floors below beckoned!

KEYNOTE LECTURE The Significance of Inclusions in Garnets

Professor Dr Edward Gübelin provided the keynote lecture after lunch. He firstly introduced the garnet family, its isomorphous replacement relationships, and the influence of parent rocks on their formation and on the inclusions to be found within them. The inclusions themselves and their distribution may characterize a particular garnet variety more precisely than they do in many other gemstones. Each variety was discussed and illustrated. The pyrospite series was first discussed:

Pyrope garnet forms in ultramafic (magnesium bearing magmatic) rocks. The best-known pyrope garnets are from Bohemia and although generally devoid of inclusions do contain some apatite and zircon but not quartz as ultramafic rocks are poor in silica. On the other hand, pyropes from Arizona

contain Mg-bearing chromite, chrome diopside, chrome enstatite, forsterite and some apatite, but no zircon.

Rhodolite garnet is a link between the end members of pyrope and almandine, which is also reflected in its inclusions of apatite, graphite, hematite, monazite, and zircon. The presence of the almandine molecule brings rutile needles as inclusions.

Almandine garnet results from various rock forming events with its inclusions not being specific to any one type. Almandine is very hospitable to a good many alien minerals such as apatite, biotite, ilmenite, monazite, quartz, rutile and zircon.

Spessartine is the commonest garnet in granitic pegmatites and also occurs in some skarns and in Mg-rich assemblages. Albite and apatite are the only occasional inclusions so far identified. Spessartine is marked by healed fissures with striking patterns by which they can be recognized. The Mandarin spessartine garnet is an exception where instead the fibrous tirodite inclusion, a magnesium-manganese-amphibole, reflects its formation in a lepidolite-bearing pegmatite. If the fibres are profuse and parallel a cat's-eye may be fashioned.

Umbalite garnets (often misnamed 'Malaya garnet') are originally from the Umba Valley in Tanzania but have recently also been found at Tranoroa on Madagascar. The mixed crystals of pyrope, spessartine and molecules of almandine have grown in metamorphic rocks embedded in large serpentinite bodies, which are traversed with pegmatite veins and vermiculite mica. Umbalite is typified by combinations of various mineral inclusions, of which several are always present. Many tiny, sometimes larger, crystals of apatite occur from which straight rutile needles dart out in two or three directions. Coarser prismatic rutile crystals are often accompanied by monazite, pyrite, quartz and zircon. This all provides for a typical internal appearance.

Dr Gübelin then turned his attention to the Ugrandite series of garnets.

Ordinary grossular garnet is a transparent yellow to brownish-yellow. Grossular garnet is especially characteristic of both thermally and regionally metamorphosed, impure, calcium-rich silicate rocks at Jeffrey, Quebec (Canada) and Lelatema (Tanzania). It mostly captures apatite, scapolite, and quartz as inclusions. A more saturated colour variety from Orissa in India occurs along the contact of amphibolite and garnetiferous gneiss, which explains the prominent orthoclase feldspar and apatite inclusions. The apatite sometimes acts as nucleation points for sheaves of acicular rutile. These Orissa garnets are the first and only garnets in which three-phase inclusions have ever been observed.

The grossular garnet hessonite also emanates from impure calcareous silicate rocks and skarns, which have undergone metamorphic, contact metamorphic or metasomatic alteration of rocks rich in calcium, alumina, and silica. Contrary to ordinary grossular garnets, hessonite consists of an aggregation of tiny grossular grains, which gives a mosaic structure or granular appearance. Within this roiled or treacly interior apatite and calcite crystals of more or less corroded outlines accumulate, sometime in very dense masses. In a newly found yellow hessonite from Sri Lanka these grains are wrapped by thin calcite foils which under the microscope appear like confused tangles of white threads.

The green grossular garnet tsavolite forms in graphite-bearing metamorphic rocks - usually gneisses, embedded in limestone marble. The inclusions, which normally populate the inside of wavy fractures, consist of white angular fragments of calcite and grains or flakes of black graphite - these being minerals incorporated into the tsavolite from the host rocks. The inclusion scene is diagnostic whether the tsavolite is from the Tsavo Park in Kenya, from the Tunduru area in Tanzania, or from Ilakaka in Madagascar.

Demantoid garnet is the most highly prized of all garnets. It



Keynote speaker Professor Dr Edward Gübelin.

crystallised mainly in serpentinite rocks and chlorite schists at Bobrowka near Ekaterinburg in the Ural Mountains, at Sciumagallé, Eritrea (Ethiopia), in the Haramosh Valley in Pakistan and in Val Malenco in Italy. All the demantoids found in these deposits contain fibres of chrysotile (variety of serpentine) - not byssolite as has been claimed previously. A recently discovered occurrence of demantoid is situated in Damaraland in Namibia, where demantoid grew in a metamorphic limestone, a so-called calcrete. Contrary to all other demantoids it does not have chrysotile fibres but instead extremely small grains of calcite which cover the walls of undulating, partially-healed breaks randomly traversing the gem. These are often accompanied by fluid inclusions, of which demantoids from other deposits are devoid.

Dr Gübelin finished by emphasising the inclusion suites that could be taken as being typical of certain varieties.

Women's self purchase and the coloured stone

Resuming after the break, we were treated to something completely different by Stephen Webster who turned the focus on attitudes to buying certain kinds of jewellery. In particular he described the growing influence of women purchasing their own gems. This was one element in a jewellery world that was developing quickly.

Traditionally the rings, necklaces and earrings were 'safe' - bought by men for women to mark events - there was an air of permanence in the structure of this sequence. But now with the growing awareness of brands, more jewellery is becoming iconic. New people are coming in and creating images, and Stephen Webster drew parallels with the Burberry check and the Jimmy Choo heel!

Diamonds are still important, but more designers are bringing in coloured stones, and Chanel, Christian Dior and Boucheron are all using them.

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Women shop in pairs and benefit from the mutual feedback - this behaviour also helps spread that elusive quality of being in the 'know'. Access to them must be by advertisement of some kind - an expensive option and a major difficulty for a small manufacturer.

Stephen Webster himself employs 28 staff and manufactures some remarkable jewellery for sale both in Europe and the USA. A key element in his jewellery strategy is knowledge of colours on which next season's fashions will be based. Recently turquoise was an 'in' colour and so much of Stephen's jewellery reflected this in his range of rings and bracelets. Gothic style has also

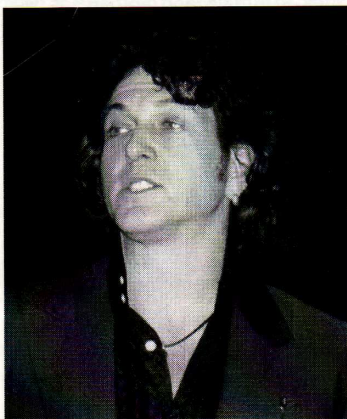
been a winner and a gothic style bracelet was illustrated with rubies set with black stingray skin effect materials and looked stunning.

He also considered in some detail the ideas about pricepoints and the necessity to retain the concept of the 'preciousness' of precious stones even though black sapphires don't cost as much as the blues from Kashmir, Sri Lanka or Burma. The same concept governed his placing blue goldstone in 18ct gold set with small high quality (G, VVS) diamonds!

Finally he described his approach to customizing jewellery. With a half finished piece, he would then discuss with the customer a number of options. Involvement and excitement would contribute significantly to the life of the piece and to that of the customer - who would then be wearing a symbol of those feelings.

Stephen's highly amusing presentation stimulated a number of questions such as: when would coloured stones reach the high street - large companies were becoming aware of colour, what was next year's colour - burgundy, and led to an interesting description of selling jewellery to celebrities through their stylists.

Roger Harding and
Stephen Kennedy



Stephen Webster: following the fashions