An Examination of Red Beryl

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Introduction

Red beryl is a gem that has recently been coming into prominence. Where does it come from? How much is available? What does it look like? How can it be identified? Recent acquisition of a faceted gem prompted these questions. After researching available literature and finding very little gemological information, it became obvious that some personal research was to be done on as much red beryl as could be examined.

Sources

Red beryl is only found in three locations in the United States. No other sources have been reported. It occurs in the Thomas and Wah-Wah Mountain ranges in Utah [1] and in the Black Range in New Mexico [2]. All crystals are small; the largest crystals are found in Utah. The Utah material provides faceted gemstones that are generally less than .5 ct.; common sizes usually range from .1 ct. to .4 ct. Nearly all faceted gems exhibit a high degree of internal fractures and inclusions. The largest faceted red beryl that has been reported [3] is 2.93 ct. The author has not had the opportunity to see or examine this rare gemstone.

In some literature red beryl is listed as bixbite. If you should do a literature survey, you should be aware of both names. In this article it is referred to as red beryl.

Properties

Several faceted specimens of the Utah material were examined for this report. New Mexico material was on display[4] as crystal specimens; it was much too small to be faceted. This material was not available for microscopic examination. It was noted however, that the tone and hue were very close to that of the Thomas Mountain material. The Utah material exhibited differences in transparency, tone, hue, and intensity. They are listed as "T" Thomas Mountains, and "W" Wah-Wah Mountains. The information obtained from examining the Utah materials is listed as follows:

Description:	"T" Translucent, dark orangy-red of medium intensity. "W" Semitransparent, medium red of high intensity, see *Figure 1.*
Crystal character:	Hexagonal.
Fracture:	Conchoidal.
Specific gravity (a):	2.65
Characteristic inclusions (b):	Fingerprint pattern.
Transparency:	Semitransparent to translucent.
Luster:	Polish is vitreous. Fracture is vitreous.
Refractive index (c):	1.561(±.001) — 1.569(±.001)
Birefringence:	.008
Optic character (d):	Uniaxial.
Pleochroism:	Purplish-red and orangy-red.
Ultraviolet fluorescence:	Inert to both wavelengths.
Color filter:	No reaction.
Absorption spectra (e):	No diagnostic spectra.

(a) The value of 2.65 was determined by using heavy liquids. The gemstone tested floated in a liquid of 2.67 specific gravity and sank in a liquid of 2.62 specific gravity. The heavy liquid method was used because there is a possibility for a great variation in determining the specific gravity on small specimens. The examined specimens were all small, consequently, as a secondary method of determination, three faceted gems were used simultaneously to determine the specific gravity by the immersion method. The combined weight of the three faceted gems was .52 ct., and the specific gravity as determined by this method was 2.67. The published value[5] for red and violet beryl lists the specific gravity range to be 2.77 to 2.87.

(b) Red beryl was highly included with secondary inclusions consisting of single phase, gas filled, fingerprint patterns, see *Figure 2.* It also contains bizarre shaped healing voids. Both of these types of inclusions were in planes or curved surfaces. There were more fingerprint patterns present than the planes of healing voids. The fingerprint patterns in red beryl have been characteristic. At 20X, straight sided and round inclusions were intermixed. At 60X, the straight sided inclusions were pointed and the round inclusions appeared to have short straight sides. At 125X, much smaller inclusions began to appear in between the inclusions described at 60X.

When magnified, all faceted gemstones had one or more internal fractures that extended to the girdle.

No other inclusions were noted in all specimens examined up to 125X.

(c) A Duplex II Refractometer

Figure 1. A .20 ct red beryl from Wah-Wah mountains

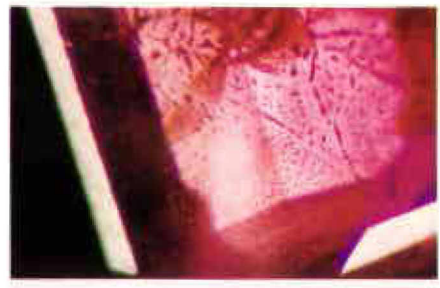

Figure 2. Fingerprint inclusions at 36X, dark field

was used with Monochromatic Yellow Light to determine the refractive index of each gemstone. The published value[5] for red and violet beryl lists the refractive index range at 1.585 (±.006) — 1.594(±.006). Since there was a difference between published and experimental data, high and low standards were used to check the instrument. The reading obtained for sapphire was 1.762 — 1.770 and the reading for quartz was 1.544.

A series of readings were obtained by rotating each gemstone on the hemisphere of the refractometer. Readings were obtained at 0, 45, 90, and 135 degree positions and each was plotted on a chart. This was done to determine the birefringence.

(d) The uniaxial interference figure was obtained using the Illuminator Polariscope set in the cross polaroids position. The magnifier from the refractometer was inverted and placed on top of the analyzer and a small glass sphere was in contact with the specimens. This arrangement showed the gems to have a sharp uniaxial interference figure.

The published value[5] for beryl is uniaxial negative.

(e) The number 808 Spectroscope Unit was used to check the gemstones for the spectroscopic analysis. No diagnostic data was obtained from the use of this instrument. The red color was reported[2] to be caused from the presence of manganese (Mn^{+2}); this has been determined by microprobe analysis. The absorption spectra tests performed on the red beryl specimens that were examined did not indicate any diagnostic absorption.

Photographs

Figure 1 is a photograph of a 4.78 x 3.05 mm emerald cut, .20 ct. red beryl from the Wah-Wah Mountains. *Figure 2* is a photograph of the same .20 ct. red beryl, using dark field lighting at 36X.

Conclusion

If faceting grade red beryl becomes more plentiful it should become a popular gemstone. The red hue of the Wah-Wah Mountain material resembles ruby and ruby red spinel. The red hue of the Thomas Mountain and Black Range material is slightly darker and resembles cuprite. Red beryl is highly included and contains internal fractures, consequently, the durability should be comparable to highly included emerald and should be used in protective type mountings.

References

(1) Ream, Lanny R., *The Mineralogical Record,* P. 261, October 1979, The Thomas Range, Wah-Wah Mountains And Vicinity, Western Utah.

(2) Kimbler, Frank S. and Haynes, Patrick E., *New Mexico Geology,* P. 15, February, 1980, An Occurrence Of Red Beryl In The Black Range, New Mexico.

(3) Barlow, F. John, *Lapidary Journal,* P. 2540, 1979, Red Beryl Of The Wah-Wahs.

(4) New Mexico Minerals Symposium, UNM Campus, Albuquerque, N.M., September 29, 1979.

(5) Gem Identification Course of the Gemological Institute of America.