

A close-up photograph of a large, rough, blue-tinted crystal, likely tanzanite, held between the tips of two fingers. The crystal has a complex, faceted structure with many sharp edges and facets, giving it a jagged, natural appearance. The color is a deep, vibrant blue with some lighter, almost white, areas where the crystal is more transparent. The background is dark and out of focus, emphasizing the crystal. The text "THE RARITY OF TANZANITE" is centered horizontally across the middle of the image, overlaid on the crystal.

THE RARITY OF TANZANITE

In 1967, blue-violet crystals of the mine-species, zoisite, were discovered south of Mount Kilimanjaro in northeast Tanzania. The host rocks of the discovery, which are orders of magnitude older than Africa's highest mountain, form part of the Lelatema Mountains which are located very near the town of Merelani. In 1968, Henry Platt of Tiffany & Co. christened the new and remarkably beautiful zoisite gem, Tanzanite, to honor its single-source discovery in Tanzania. The 50th anniversary of its discovery is marked in 2017 and is the most notable and exciting event of the gemstone industry of the 20th Century.

The most striking feature of Tanzanite is its color. Or colors. It is a pleochroic gemstone. More specifically, a trichroic gemstone simply means that it naturally displays a different color in each direction, or on each axis. The fine crystals display intense, well-saturated and deep colors. The color-causing element (or chromophore) of Tanzanite is vanadium. Think of it the same as the element chromium giving Rubies their red color. The vanadium is responsible for the blue-violet color in Tanzanite. If any geological history needs to be mentioned, it is this because the rare availability of the vanadium during Tanzanite's formation is what ultimately is responsible for what makes this gemstone so



What makes this gemstone even more interesting and unique, and sets this beautiful stone apart from all others, is its remarkable rarity. Crucial in understanding its rarity is that this stone is the only one (or, one of the few) that evolved from a collector's stone, only available to a few, to a commercially available stone. But this is only for a limited time: our generation. Tanzanite is found and mined in only one place on earth: a 7 km<sup>2</sup> area that outcrops near the town of Merelani in northeast Tanzania.

It is found in only one place on earth because of a very complex and unique set of geological conditions that came together during the breakup of the supercontinent, Gondwana, between 1.5 and 2.5 billion years ago. My intention is to not get too technical, but the geological origins are so interesting, and for me, the start of the story that I want to share, creating excitement for current and future owners and highlighting the fact that this gemstone is only available for a single generation: our generation.

beautiful, desirable, and popular.

The vanadium is a trace element that came from the organic (tree and plant) material that was deposited with eroded silica-rich sands and calcium-rich (shell and ocean-life) material in a deltaic/shallow sea environment over millions of years during the gradual break up of Gondwana. This accumulation of layers was subsequently buried and metamorphosed at high temperatures and pressures. The organic material became graphite, the silica-rich sands became the schist and gneiss, and the calcium-rich material became dolomite (an impure marble). All these rocks are seen in the deposit. At 500 million years, a geological event resulted in the crystallization of Tanzanite. Erosion on the surface on the earth and the natural upliftment of continental crust (in respect to the denser and heavier oceanic crust) brought this deposit to the earth's surface where Tanzanite was found for the first time in 1967.

The transition from a collector's stone to being commercially available started in earnest in

*Far Left:* Orthorhombic crystal termination seen on the blue axis of a Tanzanite crystal.  
*Above:* View of Mount Kilimanjaro from Block C overlooking Block D.



**A:** Tanzanite crystal in a pocket in Bravo Shaft.  
**B:** Pocket containing Tanzanite in Bravo Shaft.  
**C:** Self-portrait taken August 2005 from the largest pocket of Tanzanite I have seen in the deposit!

the late 1990s when the Tanzanian government started adequately regulating the deposit by subdividing the 7-kilometer section into Blocks A, B, C, D, and D-Extension, respectively, and granting mining licenses to companies and individuals at different levels of investment ability. Block C, the largest 2 km<sup>2</sup> of the 7 km<sup>2</sup>, was awarded to African Gem Resources Limited (Afgem), a private South African company, after winning the tender in 1998. Only in the early 2000s did the company start investing heavily in geology and mining as production was decreasing and becoming more haphazard after an initial and significant bulk sample that raised millions of dollars for Afgem.

The investment in geology and mining resulted in a better understanding of the deposit's geology and the Tanzanite-bearing structures, and in turn increased the company's production. The increased production resulted in increased revenues that were put back into the mining. More shafts were sunk, more mining faces were created, and from a geological point of view, more geology was exposed on the sidewalls. With all this work, a geological model was created, as well as an understanding that was never in place before. Another result was production areas could now be proactively planned as opposed to a history of reactive mining. Essentially, we were able to get the mining into the right places. As a result, from 2005–6, production from the company improved to more consistent commercial volumes. It must be noted that at no point can a geologist predict the gemstone; we are always predicting the geology in which the gems are formed. From







mid-2000, the consistent production from the mine was a result of having the mining faces in the right areas. If one face was not producing, another one was.

In late 2004, Afgem became a publically traded company, TanzaniteOne Mining Limited (TanzaniteOne), and listed on the London Alternative Market (AIM).

Large-scale mining operations generate not only more production volume, but also more volumes of all grades, more consistently. As a result, a master grading set was created. For the first time, rough Tanzanite could be parceled for size, colour and quality to its sightholders. By definition, this system of product presentation for rough sales could only work with regular and good volumes of production from the mine. This was a direct result of the size of the deposit being professionally mined, with regular production and future exploration.

Afgem initially, but then TanzaniteOne, took a collector's gemstone to one that became commercially available around the world. But the story does not end there. Because it is commercially available does not mean that Tanzanite is any less rare than it originally was. It just be-

came accessible to everyone; but only for a limited time: our lifetime. Found for the first time in 1967, it can be estimated that the gemstone will no longer be accessible, particularly commercially, within a single generation of its discovery. The most common understanding of this is that the deposit gets

physically exhausted (mined out), but the actual concept is that the costs to mine become too high versus the income from sales (i.e., the gemstones are still in the ground but are physically too deep to mine—too expensive). This factor highlights its generational rarity, which the current market and value of Tanzanite do not indicate. The market and consumers think that because there are high volumes of Tanzanite available at the moment this will continue; but this not the case.

The current prices of Tanzanite, particularly at the wholesale level, are actually too low; too low for how rare the gemstone is, and too low for future mining. The amount of Tanzanite on the market currently should be seen as a bubble and temporary; it will not continue. There has been a lot of recent supply due to many miners being in the right areas and producing, with this product subsequently making it to the wholesale market. This is the reason for the low wholesale prices, but with the mines getting deeper, and the natural pocket effect of Tanzanite, this will not continue. The reality is that the deeper the mines get, the more expensive it will be to mine. For future years of supply, the wholesale prices need to increase.

D: Tanzanite crystal in Main Shaft.





*About the Author:* I am geologist by profession having completed my BSc Degree in Geology at the University of Cape Town (UCT), South Africa, in 2002, and completed my post-graduate Honors Degree at the University of Stellenbosch, South Africa, in 2004. My first colored gemstone industry opportunity was in Tanzania in 2003, which has become my specialization and career. I have over 13 years of colored gemstone geology and mining experience in East Africa working specifically with Tanzanite, Tsavorite, Zambian Emerald. In 2016, I graduated as a Graduate Gemologist (GG) from the GIA in Carlsbad, USA. Today, I am based in Los Angeles, and have my own business offering consulting, training and gemstone sourcing. [www.gessnergems.com](http://www.gessnergems.com)

*Above Right:* Trichroic pleochroism of Tanzanite under incandescent light.

Single generation is a phase coupled with Tanzanite since its marketing in the 2000s, and this itself, evokes its own romance, beauty and rarity. Trying to tie the availability to a number of years should not be the discussion point, and according to me, less importance and significance should be given to it. The history of the talk of only available for another 10 years, or 15 years ties in to large-scale public mining at companies attempting to quantify its resource for value purposes and investment, which the previous owners in the 2000s took to the market to create desire and indicate its rarity. There are too many factors that affect a number like this, so it should only be seen as guide and less importance should be given to it. No one asks how many years are left of the Colombian emerald deposit, or the Burmese Ruby deposit. It cannot be defined, so why should the Tanzania Tanzanite deposit be defined? The famous Brazilian Paraiba Tourmaline and Russian Demantoid Garnet deposits are now

jected to. The natural heating has removed the original red/yellow/green on the “brown” axis to colorless, and so the (second) violet color is seen. Technically, this has been achieved by an intervalance charge transfer during heating of  $Ti^{3+}$  to  $Ti^{4+}$ , which is colorless. [As all chemical equations require balance, the second change is a slightly stronger blue-violet (so the  $V^{4+}$  to  $V^{3+}$ ).] The colour change due to heating is a stable change. As this heating takes place naturally, it is impossible to distinguish between post-extraction (or by man). The result of this means that there are only two realities to label a tanzanite gemstone: no heat or no heat treatment by man. The first is that the gemstone in question displays its blue, violet, and brown trichroism, and the second condition is that a strict and traceable provenance of no heating by man exists of a blue, violet, and violet trichroism gemstone directly from the earth, through the trade to the wholesaler/retailer. This second condition may be a potential



mined out, and very little or no material is available anymore; nothing significant in recent years anyway. Old stock or old mined material that do become available command extremely high prices today. We can only look back and say that we should have bought then. This will be the same for Tanzanite. Buy now, as the prices are low—for the moment.

All gemologists know that Tanzanite is trichroic. It is also part of the orthorhombic crystal system. As Tanzanite extracted from the earth is often in its perfect rectangular crystal shape, it is easy to see its trichroism (meaning you can see a color on each axis, or side of the gemstone). These natural rough crystals can show either a 3-colour trichroism combination of blue, violet, and brown (combination of red/yellow/green) or a 3-colour trichroism combination of blue, violet, and violet (so two violet axes, or sides), respectively. The reason for the two combinations of trichroism is due to natural (in the ground) heating that a percentage of the natural crystals were locally sub-

jected to. The natural heating has removed the original red/yellow/green on the “brown” axis to colorless, and so the (second) violet color is seen. Technically, this has been achieved by an intervalance charge transfer during heating of  $Ti^{3+}$  to  $Ti^{4+}$ , which is colorless. [As all chemical equations require balance, the second change is a slightly stronger blue-violet (so the  $V^{4+}$  to  $V^{3+}$ ).] The colour change due to heating is a stable change. As this heating takes place naturally, it is impossible to distinguish between post-extraction (or by man). The result of this means that there are only two realities to label a tanzanite gemstone: no heat or no heat treatment by man. The first is that the gemstone in question displays its blue, violet, and brown trichroism, and the second condition is that a strict and traceable provenance of no heating by man exists of a blue, violet, and violet trichroism gemstone directly from the earth, through the trade to the wholesaler/retailer. This second condition may be a potential

option but is strictly tied to a person’s honesty, because it is scientifically impossible to prove. Another wonderful and valuable characteristic of Tanzanite is that there is only natural Tanzanite in existence. Man cannot create Tanzanite due to its unique formation in the earth and its chemistry. Imitations, by definition any material that looks like a natural gem and is used in its place, do exist but any trained gemologist would be able to confirm whether it’s natural or not with a few simple gemological tests.

Tanzanite is a rare gemstone with both a remarkably unique geological history and a success story in the jewelry market and in our homes; a story of rarity that needs to be shared; a story that is hidden within each piece of Tanzanite worn by its owners. 🌈

By Robert Gessner BSc GG, Gessner Gems

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