Tourmaline Production in the Erongo Region of Namibia 納米比亞的埃龍戈地區產出的電氣石

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雖然納米比亞出產寶石已有近百年的歷史,但 直至上世紀末、本世紀初納米比亞的埃龍戈地 區產出的寶石如高品質的海藍寶石,托帕石和 電氣石等開始對國際市場產生衝擊。作者簡述 埃龍戈區的地質情況,及該地出產的電氣石的 開採及市場情況。

The Gem deposits of Namibia have enticed specimen collectors and gemstone connoisseurs for almost 100 years, however it wasn't until the late 1900's and early 2000's that specimens and faceted stones from Namibia really made an impact in the international market. It was during this time that deposits of high quality aquamarine, topaz, and jeremejevite (Al₆[(F,OH)₃](BO₃)₅]) were found in the Erongo region (Gebhard, 1990). Fine tourmaline in the form of specimen quality schorl and also small quantities of elbaite tourmaline crystals in fine blues, greens, pinks, and reds were discovered as well. The region is the main source of tourmaline in Namibia, and the primary mining areas are located around Usakos, Karibib, and Omaruru. Specimen quality tourmaline crystals in the region are found within small miarolitic cavities in the main volcanic complex and in cavities within pegmatites in the surrounding areas. Though not

found in large quantities, the tourmaline found in Erongo region pegmatites during this time was prized for its size, colour, and clarity.

Geology

The Erongo Volcanic Complex which is some 30km wide, dates to approximately 135 million years ago and is a part of a larger geological area in Namibia known as the Damaraland Alkaline Province. It is a well-preserved caldera surrounded by a granitic ring dyke and a mafic cone sheet, the complex was created by volcanic activity through an underlying layer of granite and metasedimentary rock. This volcanic activity had two phases: a Mafic phase of lavas and a later felsic phase of pyroclastic flows. The Erongo granite then intruded into the area between the granitic ring dyke and the caldera (Piranjo, 2000). This intrusion provided the heat and chemicals needed for the creation of the minerals found in the complex. Boron rich fluids in the granite created hydraulic fracturing and led to veins of tourmaline throughout the area. In this area, Specimen quality schorl, quartz, topaz, fluorite, apatite, and cassiterite can be found in small miarolitic cavities. Surrounding the complex are pegmatites that have intruded into the host



Fig. 1 Elbaite tourmaline, Erongo region, horizontal crystal approx. 12cmx3cm. *Photo Mikola Kukharuk* 埃龍戈地區出產的鋰色電氣石原石晶體。12cmx3cm



Fig. 2 Elbaite tourmaline, Erongo region, crystals approx. 15-20 grams each. *Photo Mikola Kukharuk* 埃龍戈地區出產的鋰電氣石原石晶體。每顆15-20克

schist rock which produce much of the fine gem quality tourmaline that comes from the region.

Production

One of the main mines is located just outside of the town of Usakos and is the source of most of the high quality elbaite tourmaline produced since the early 2000's. It is a pegmatitic deposit located on the southern fringe of the Erongo volcanic complex. The mine is an open pit and the mining is done using drilling and blasting with explosives to expand the area and a loader and a backhoe to clear the rubble. When the miners feel that they are near a pocket, the mining is done by hand with tools and a pneumatic jackhammer. The fine tourmaline crystals are found within these pockets which run throughout the area. However, there are no geological signs that indicate where the cavities might be located, and they are not spread uniformly throughout the pegmatite, so finding them is quite difficult and requires a large amount of manual labour.

This mine produced a small amount of high quality tourmaline in the period from 2002 to 2007, with large clean crystals up to 100 carats. A variety of colours were produced, including Neon Blue, greenish blue "Lagoon", Mint and Peach. Much of this material was heated to remove the brown undertone. Between 2007 and 2016 little material was found at this mine, though production has picked up again recently as several small gem crystal containing cavities have been found. This recent production is mainly the "Lagoon" and Mint colours and heat treatment is not needed for much of this material.

The neon blue tourmaline and the bluish green "Lagoon" are the most popular colours to come out of the mine. The neon blue material has a colour that is reminiscent of Paraiba tourmaline but is slightly less vivid or "electric". This material contains iron and manganese but no copper. The current production of tourmaline has produced mainly "Lagoon" and Mint colours. This "Lagoon" colour is also extremely popular in all major world markets and has been in high demand since the new production began. The limited supply of fine material reaching the market has also driven demand as fine pieces in sizes over 5-10 carats are difficult to find. The continuing strong demand for the Erongo material and the high quality of the material that comes to the market means that Namibia will remain an important source of Tourmaline for the foreseeable future.

Acknowledgements

We would like to extend a hearty thank you to the beautiful people and the miners of the Erongo region who work so hard to bring fine gem material to the market.

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Fig. 3 64ct pear shape mint green Erongo tourmaline. Photo Prangpak Ruahong 64cts梨形薄荷綠色埃龍戈電氣石



Fig. 4 (Faceted stones: left to right) 13ct square cushion, 15ct square cushion, 10ct emerald cut mint Erongo tourmaline. *Photo Prangpak Ruahong* (左1-3) 13cts方形坐墊形琢型、15cts方形坐墊形琢型、

(左1-3) 13cts方形坐墊形琢型、15cts方形坐墊形琢型、 10cts祖母綠琢型薄荷綠色埃龍戈電氣石