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Topaz from Killiecrankie, Flinders Island, and other Bass Strait islands

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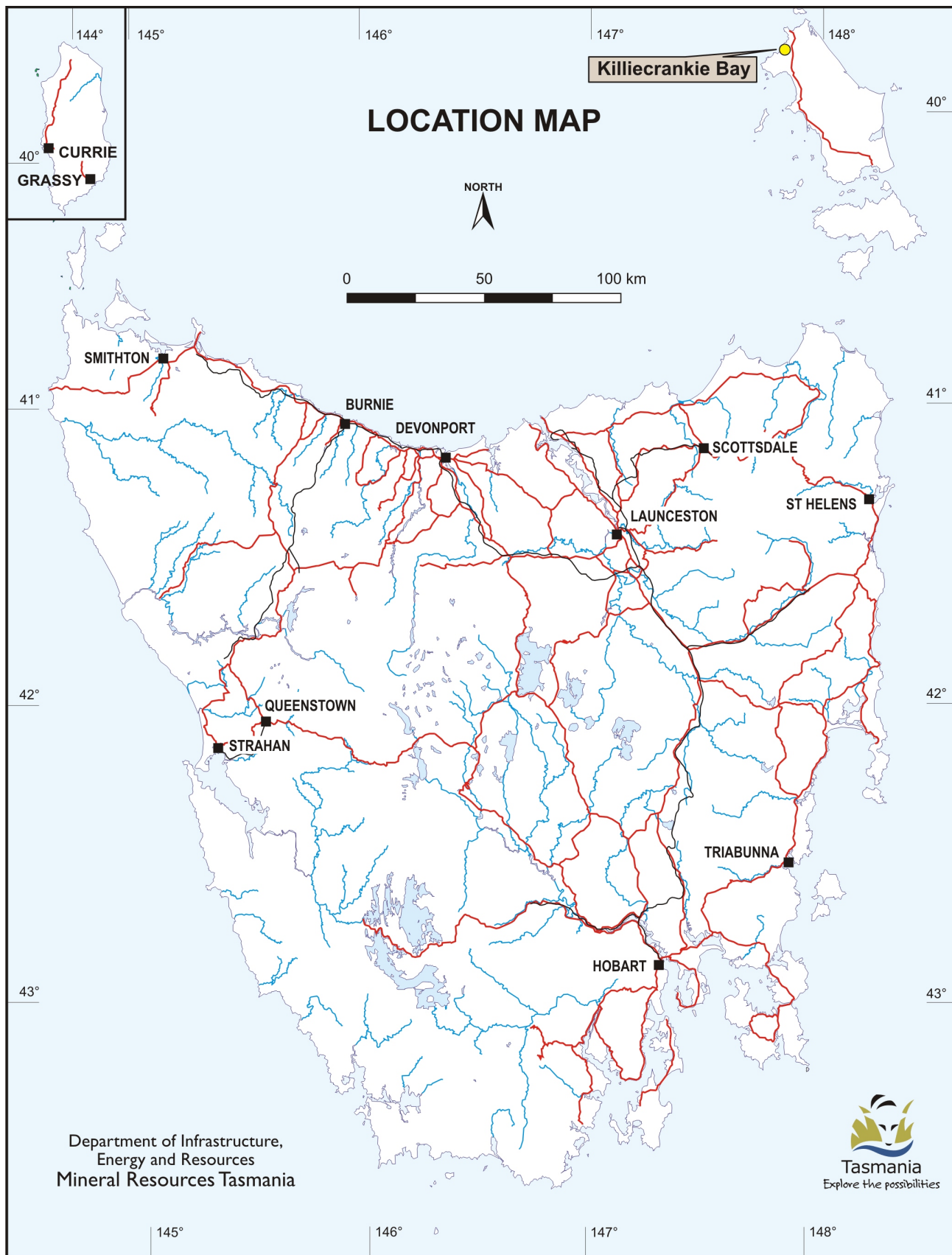


Figure 1

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Abstract

Colourless to pale-coloured gem topaz crystals, locally known as 'Killiecrankie diamonds', have been recovered in some abundance from Killiecrankie Bay, Flinders Island, since at least 1803, and are probably some of the earliest gems recorded and exported from Australia. The crystals derive from weathering of pegmatitic pockets within granite, but most are recovered from alluvial deposits, some offshore. Similar topaz occurs on other parts of the island, and on Cape Barren Island.

Introduction

'Killiecrankie diamonds' are the common name for gem-quality topaz pebbles found at Killiecrankie Bay, Flinders Island (573 000 mE, 5 591 000 mN). The topaz from this site, and other Bass Strait islands, was probably one of the earliest gem or minerals recorded and exported from Australia, but surprisingly little has been published on these deposits. The gems have been the subject of an interesting fiction/quasi-historical book (Crew and Gouldthorpe, 1996), based on their early discovery. This report focuses on the historical side of the occurrence, with some notes on the geology, mineralogy and gemmology.

Location

The Furneaux group of islands lies in Bass Strait, between Tasmania and the Australian mainland (fig. 1). The main occurrence of topaz is on Flinders Island, at the north-eastern end of Killiecrankie (sometimes written as Killicrankie) Bay on the western side of the island (fig. 1, 2; plate 1, 2). It has also been found to be relatively common on nearby Mount Killiecrankie, in the adjacent offshore sediments, and in Mines Creek and Tanners Bay about ten kilometres to the south.

History of discovery and production

Europeans first encountered the Furneaux Group in 1773 when the *Adventure*, under the command of Captain Tobias Furneaux (for whom the islands are named), sailed up the east coast of Van Diemens Land (Tasmania) on its way to a

rendezvous with Captain James Cook (Fowler, 1980). The area achieved some notoriety in 1797 when the *Sydney Cove* was wrecked on Preservation Island, south of Flinders Island. The latter was charted by Matthew Flinders (1774–1814), who originally named it Great Island; his maps are extensive and show both Killiecrankie Bay and Mount Killiecrankie.

The original discovery of the topaz deposits on these islands appears to have closely followed the colonisation of Tasmania. The earliest catalogue of minerals of Tasmania (Petterd, 1910) states that 'Killiecrankie' topaz was first described by Rev. J. J. Bleasdale (1822–1884) (Bleasdale, 1866), but some much earlier references exist. Jameson (1811, 1814) noted that he had acquired topaz specimens labelled as 'Hawkesbury River in New Holland' and 'Cape Barren Island in Basses Strait'. The former area, north of Sydney, has no known topaz occurrences and this is presumably an error. Topaz does occur at Kent Bay on Cape Barren Island, the site of the first permanent settlement south of Sydney, although this occurrence is poorly known and the topaz is apparently relatively uncommon there compared with Flinders Island. As it is unlikely that the topaz occurrences now known in other (more remote) parts of Australia were discovered before the 1850s, it is probable that at least some of Jameson's specimens were from Killiecrankie, the richest deposit in the region.

The Bass Strait topaz was reputedly found by A. W. H. Humphrey (1782?–1829, official NSW government mineralogist from 1803 to 1812) in about 1803 (Jameson, 1811; Vallance, 1981). Humphrey was a member of Lt Gov. David Collins' party that attempted to settle at Port Philip



Plate 1

Mt Killiecrankie and Killiecrankie Bay
[Photo: Ken Bird]

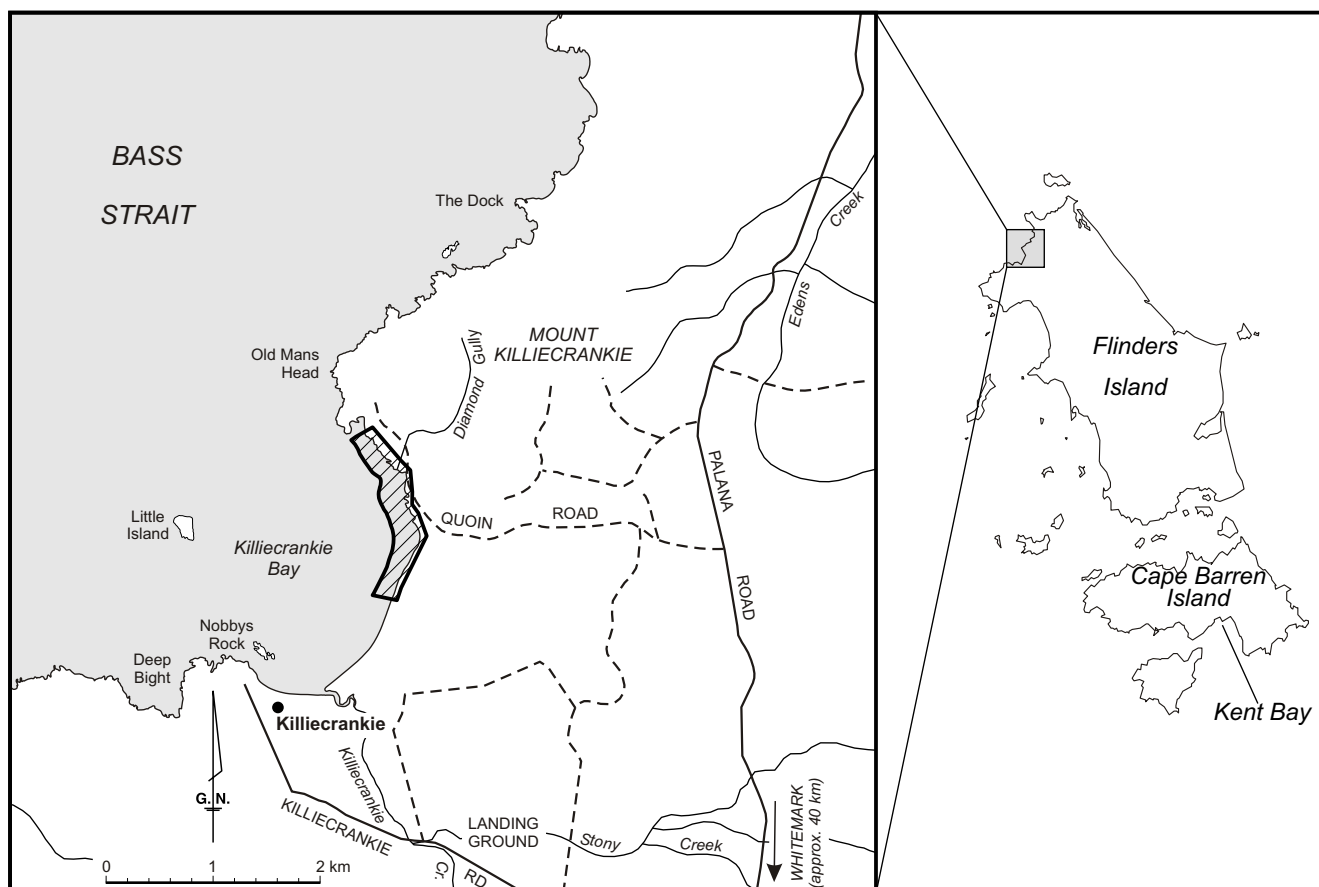


Figure 2

Map of Flinders Island and the Killiecrankie Bay fossicking area (adapted from Bacon and Bottrill, 2012).

(later the site of Melbourne), before settling in Tasmania. Whilst with this party Humphrey fortuitously met with Robert Brown (1773–1852, a naturalist who served with Flinders on the *Investigator*) in Bass Strait in 1803. Together they explored the Bass Strait islands and apparently collected some topaz from Killiecrankie at this time (Vallance, 1981).

It is curious that Humphrey never described the topaz deposit he discovered, but this was perhaps influenced by commercial factors, as he reputedly refused to return from England until he had made his fortune (Vallance, 1981). Similar secrecy on new mineral specimen locations is common to this day with collectors and dealers.

The first export of topaz certainly pre-dated tin mining. The tin mineral cassiterite, associated with the topaz, was not identified until 1871 (Gould, 1872), with mining commencing about 1882 (Mineral Resources Tasmania unpublished records; Blake, 1947). In contrast, Sir Joseph Banks donated topaz from 'New Holland' to the British Museum in 1811 (Vallance, 1981). His specimens may have been collected by Humphrey, who is known to have sent samples of topaz back to his family and private collectors in England (Vallance, 1981), but he may have had other sources as well. Colonel William Paterson (1755–1810, lieutenant-governor of northern Tasmania) reputedly collected good topaz crystals, and a Lieutenant J. S. Tetley is also known to have possessed some, with specimens from both men ending up with John Henry Heuland (1778?–1856, British mineral dealer and cousin of Humphrey, and after whom Heulandite was named; Vallance, 1981). Topaz from

'New Holland' (most probably from Killiecrankie and at least some of it possibly collected by Humphrey) was sold by Heuland in the period from 1820 to 1835 (Vallance, 1981).

Topaz, reputed to be from Killiecrankie, is held by a descendant of Mrs Mary O'Connell, Governor William Bligh's daughter (Diana Hacker, pers. comm.). Mary sailed to Van Diemens Land with her father after his altercation with the Rum Corps in 1808, and the pair is known to have been visited by Humphrey during their stay in Hobart (Rienits and Rienits, 1964). The Hacker collection is referred to as 'Nova Mina diamonds' in Mary's will, and the Nova Mina topaz mine in Brazil may be a more likely source for the stones. Humphrey himself referred to Brazil as a source of topaz as early as 1803 (Vallance, 1981) and the similarity of the Killiecrankie stones to those from Minas has long been noted (*The Mercury*, 3 September 1869).

Topaz may also have been collected by other unrecorded persons during the early years of the 19th century, as the island was not entirely unsettled during this time. Sealers were active on the Bass Strait islands from 1798, but there is no record that they were interested in the local gems. Only a few 'Straitsmen' (descendants between sealers and aborigines) remained after 1810, by when the large herds of seals had been exterminated (Edgecombe, 1986). It has been stated (Edgecombe, 1986) that a convict, Jemmy Campbell, had a 'crystal mine' at Killiecrankie and received a Governor's pardon from Colonel Thomas Davey (Governor of Tasmania from 1813 to 1817) in exchange for a quantity of 'diamonds', but this has yet to be confirmed. Aborigines from mainland Tasmania were moved to



Plate 2

Topaz area, Killiecrankie Bay
[Photo: F. L. Sutherland]

Flinders Island in 1831, and they certainly seem to have acquired some knowledge relating to topaz distribution on the island (see below).

Topaz, probably collected from the Bass Strait area in the early 1840s, seems to have been at the centre of an incident in England in the early 1850s (*Cornwall Chronicle*, 17 March 1852). Dr Henry Jeanneret, superintendent of the Aboriginal establishment on Flinders Island in 1842–43, collected or otherwise acquired some white stones from ‘Cape Barren’ which he claimed were diamonds “as pure as the celebrated Koh-i-Noor itself”. Jeanneret later took some of these stones back to England with him and had them faceted, but doubts about their nature subsequently resulted in the court appearance of a man who was charged with “falsely representing an Australian cut stone as a diamond”. However a jeweller called as an expert witness was unable to determine exactly what Jeanneret’s stones were, and the accused man was discharged. A Tasmanian newspaper columnist lamented the inability to confirm that the gems were indeed diamonds, as it was considered that there would be “little difficulty” in obtaining “a few tons” of the stones.

In 1848 Sir William Denison, the Lieutenant Governor of Tasmania, sent some ‘pebbles’ (including topaz, quartz and beryl from Killiecrankie) to Earl Grey, the Secretary of State for the Colonies, in England (Colonial Secretary’s Office File 24/116/3801). Grey (via Sir Henry de la Beche, first Director of the British Geological Survey) subsequently requested more information about the stones, with a response being provided by Dr Joseph Milligan. Milligan was the superintendent of the Aboriginal establishment on Flinders Island from 1843 until its closure in 1847, and was a renowned natural historian, geologist and botanist. He had almost certainly been involved with the collection of the ‘pebbles’. Milligan suggested that stones “of some value” might be found at Killiecrankie, and that the aborigines, who had recently been resettled at Oyster Cove (south of Hobart) and were still under his supervision, were experienced in locating and excavating the gems. He offered to lead a party of aborigines to Flinders Island to collect “a few of these precious stones” for the forthcoming Great

Industrial Exhibition at London. Permission for Milligan to undertake the journey was granted in July 1850, with his party to travel on a vessel being sent to take supplies to the Bass Strait lighthouses.

Significant quantities of topaz, almost certainly collected by Milligan and his aboriginal party, were subsequently sent to England for the exhibition (Brownrigg, 1872), which was housed in the purpose-built Crystal Palace in Hyde Park. The samples displayed included “300 specimens of the white topazes, 40 of the yellow, and 30 of the pink, and in addition 25 specimens of the rock crystal and 30 of beryls” (Brownrigg, 1872; Murray-Smith, 1979). The exhibition, which was opened by Queen Victoria in May 1851, was organised by her husband Prince Albert to showcase outstanding items of industry and the arts in the British Empire.

This was the first of many official displays of topaz from Flinders Island. Joseph Milligan exhibited some at the Paris Exhibition of 1855 and the International Exhibition in London in 1862, and the Royal Society of Tasmania provided some specimens for the Melbourne International Exhibition in 1866–67 (*The Mercury*, 3 September 1869).

Gould (1872), in a general paper on the Bass Strait islands, described the Killiecrankie topaz deposit in some detail, and also noted that topaz was found on other parts of Flinders Island, plus at Kent Bay on Cape Barren Island and other locations in the Furneaux Group.

It seems that dubious methods may have been used on some occasions to locate deposits of topaz. Edgecombe (1986) wrote that late in the 19th century white entrepreneurs allegedly bribed half castes with bottles of rum to get them to show them topaz occurrences at Kent Bay on Cape Barren Island. These were presumably the Straitsmen, who were moved from Flinders Island to Cape Barren Island in 1881 as Flinders Island was being opened for selection and settlement.

Topaz was almost certainly recovered during tin mining in the Bass Strait islands from about 1882 (Blake, 1947), but no records exist on this.

The Flinders Island deposits were considered as a possible source of industrial topaz by Carey (1945), who estimated that 100 million metres of topaz-bearing gravel up to seven metres deep was present, but as the topaz content was less than 5% mining was considered uneconomic. Some reconnaissance mineral exploration in 1988 indicated significant amounts of topaz in some beach sands of Cape Barren Island, but this was not followed up due to expected environmental restrictions (Cromer, 1989).

There is currently no official mining of topaz or tin in the area, but a small production of the gemstones has occurred for many years, mostly from local fossickers and divers (Plate 3). Much of the onshore topaz-bearing area of Killiecrankie Bay is designated as an official fossicking area (Bacon and Bottrill, 2012; fig. 2).

Geology

The primary topaz deposit is in cavities in granitic pegmatite veins within a Devonian granite (Plates 4–6). The pegmatite veins may be a metre or more wide, and contain well-formed free-growing crystals of topaz with quartz, schorl, beryl and feldspar crystals up to a metre or more in size (Milligan, Colonial Secretary's Office File 24/116/3801; Gould, 1872). Single topaz crystals can be collected from eroded pegmatite pockets in granites that surround the bay, associated with extremely-black smoky quartz, mica books and feldspar crystals. It is almost impossible to recover matrix specimens, as the topaz crystallises relatively late and is one of the first minerals to detach itself from cavity walls, due to decomposition of the feldspar and the cleavage of the topaz. Most of the topaz is recovered from the derived Recent residual and alluvial deposits, some offshore. Quartz, schorl and cassiterite are associated with the topaz in the alluvial deposits, and probably all are granite-derived. Some richer alluvial deposits of tin (cassiterite), which also contain abundant topaz, occur at Tanners Bay, to the south. Blue beryl (aquamarine) was reported to be locally common



Plate 3

*Sieving for topaz, Tanners Bay (south of Killiecrankie Bay).
[Photo: Tony Forsyth]*

to the north of Killiecrankie (Milligan, Colonial Secretary's Office File 24/116/3801).

Scientific descriptions and illustrations of the topaz are few but do include those of Brewster (1827) (including some of the earliest studies of fluid inclusions in minerals), Ulrich (1870), and Anderson (1905; crystallographic studies).

Description of the topaz

General

The topaz may occur as well-formed, pale coloured, glassy crystals, but most are moderately to highly rounded and frosted in the alluvial deposits. The stones may weigh up to several kilograms, but most are no more than a few grams in weight (or a few centimetres in diameter).



Plate 4

*Quartz-feldspar pegmatite vein
(~15 mm wide) in granite, west of
Killiecrankie Bay. Twenty cent coin for
scale. [Photo: F. L. Sutherland]*



Plate 5

*Topaz on matrix, Killiecrankie
(crystal about 30 mm long).*

[Photo: Jim Frazier, Australian Museum]



Plate 6

Close-up of Plate 5.

[Photo: Jim Frazier, Australian Museum]

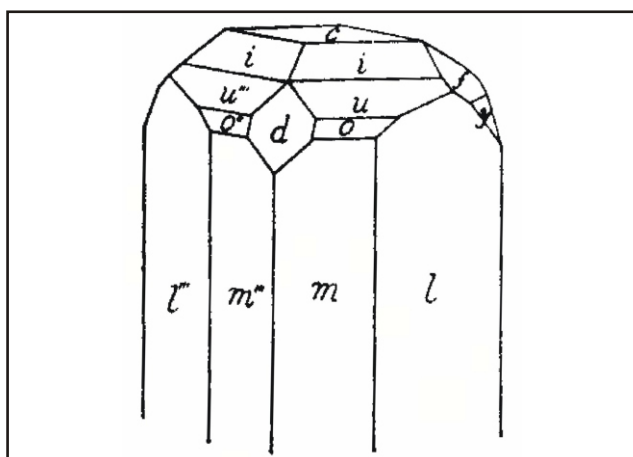


Figure 3

Crystal forms of Killiecrankie topaz (from Anderson, 1905).

Crystal forms

A relatively complex habit was described by Anderson (1905) and is shown in Figure 3. This habit is dominated by two orthorhombic prisms (*l, m*) of about equal size with prominent bipyramids (*o, u* and *i*) and minor domes (*d, f* and *y*) and a basal pinacoid (*c*). Most crystals are somewhat simpler (Plates 7, 8) and the basal pinacoid is uncommon but may be corroded or dimpled (and is often confused with the cleavage). The crystals may be up to perhaps 100 mm in length and are mostly waterworn (Plates 8, 9) but commonly show some recognisable faces. The prism faces are typically striated longitudinally due to regular stepping between the two prism forms.

Colours

The crystals are mostly colourless or limpid white to pale blue (Plates 5–9), some are yellowish to pale brown, peachy or pink, and rarely blue-green tints are also reported.

Lustre

Dull in waterworn stones, but very high on good faces or cut stones (Plate 10), resulting in it being confused by many people, including lapidaries, with diamond. Bleasdale (1866) noted that Flinders Island topaz has great fire and beauty when cut.

Inclusions

Fluid inclusions may be quite large (<2 mm), irregular to negative-crystal shaped, and are common in some poorer stones along growth zones or healed fractures. They are mostly two-phase (probably CO₂ vapour in a brine) and may contain moveable gas bubbles. Solid inclusions are rarer but include mica (muscovite?) in pseudo-bipyramidal crystals to ~1 mm (Plate 11). Plate 11 shows needles of rutile or a similar mineral, which travel through the topaz in no particular orientation. Other topaz crystals do appear to have orientated needles included, although they may actually be hollow tube inclusions. These are usually aligned parallel to the 'c' axis, i.e. along the length of the crystal.



Plate 7

Unworn topaz crystal (15 mm long) from pegmatite, Killiecrankie Bay granite. [Photo: Tony Forsyth]



Plate 8

Topaz crystals (largest crystal about 20 mm long). [Photo: Tony Forsyth]



Plate 9

Rough waterworn topaz from Killiecrankie Bay, (Diamond Gully and Stackhouse Inlet), showing a variety of colouring and colour banding from shades of blue to colourless. Largest piece in view 50 mm. [Photo: Tony Forsyth]



Plate 10

Emerald cut faceted pale blue-white topaz from Diamond Gully (27 cts weight, 13 mm x 8 mm x 8 mm). [Photo: Tony Forsyth]

Diaphaneity: Mostly highly transparent and gemmy.

Specific Gravity: 3.4–3.7 (Gould, 1872).

Cleavage: Basal, perfect.

Hardness: 8.

UV: Much of the topaz fluoresces under long-wave UV light in shades of yellow to dark brown.

Availability

Killiecrankie topaz can be collected without a fossicking permit at the designated Killiecrankie Bay fossicking reserve (fig. 2) (Bacon and Bottrill, 2012). They are also sold in some shops on Flinders Island and a small quantity of stones are available from some specialist Tasmanian gem and mineral dealers.

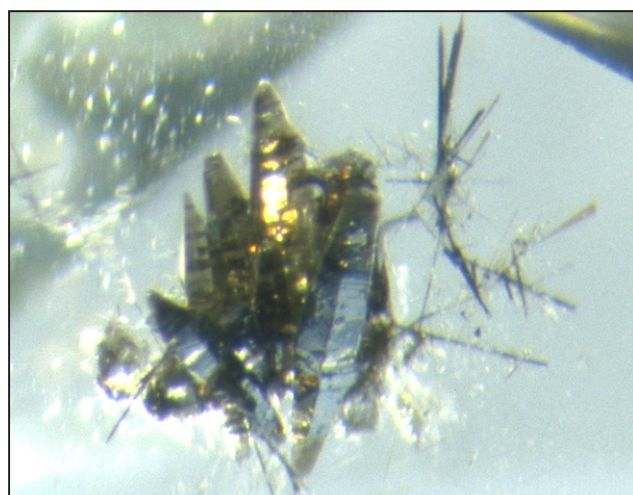


Plate 11

Crystalline inclusions of mica in topaz, Killiecrankie
Field of view ~1.5 mm.
[Photo: Gayle Webb, Australian Museum]

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