

# AUSTRALIAN GOLD!



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# THE DRAGON'S LAIR GOLD

*Beta Hunt Mine, Western Australia*

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*One of the world's great native gold specimens is now on display at the Perot Museum of Nature and Science in Dallas, Texas. Here are the stories of how it was found at the Beta Hunt mine in Kambalda, Western Australia, how it was prepared for display by Collector's Edge Minerals, Inc. in Colorado, and how it was ultimately acquired by Dallas collector Barry M. Kitt.*

## Introduction

Australia is famous for gold. But almost invariably the most famous Australian gold specimens are big nuggets, discovered by prospectors using metal detectors. The remnants of veins long gone and weathered away, the great chunks of gold eventually become stream-rounded into freeform shapes over thousands if not millions of years. After a very long wait they are pulled out of the regolith, where nature has worn the topography down to a flat, dusty plain. The great ones all receive names, of course, like the "Welcome Stranger" nugget (found in 1869; 2,284 troy ounces), "The Hand of Faith" (875 ounces; found in 1980 just 12 inches below the surface), the "Golden Eagle" (found in 1931; 1,135 ounces) "The Heron" (found in 1935; 1,008 ounces), and the "Ausrox Nugget" (found in 2010; 748 ounces) among others. In fact, some years ago the Perth mint issued a whole series of gold bullion coins, each one depicting a different famous Australian gold nugget.

The painful thought occurring to mineral collectors is that, once upon a time, those golds were still *in situ*, showing their glorious original crystalline forms un battered by time and erosion. Recently, however, an occurrence of "big gold" was encountered underground, in its pristine state, encased in protective milky quartz. One of those specimens, preserved by the mining company and carefully released from its covering by expert preparators, now weighs in at a hefty 921 troy ounces of pristine gold. Here is the story of its



**Figure 1.** The "Ausrox Nugget," at 748 troy ounces (23 cm), ranks as the fifth largest gold nugget in the world. Found in Australia in 2010, now in the Barry and Beth Kitt collection, it is on exhibit at the Perot Museum of Nature and Science in Houston, Texas. Thomas DuBrock photo.

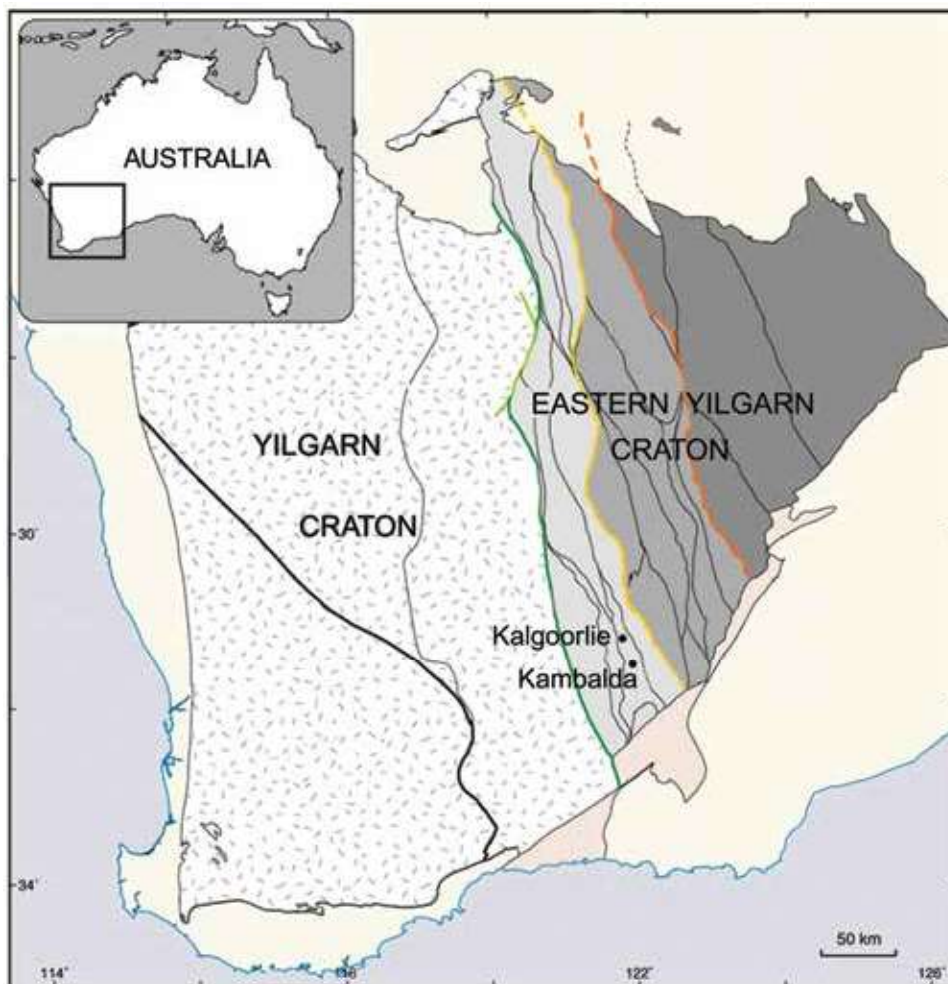
discovery, its travels, its preparation, and its current disposition on public display at the Perot Museum in Dallas, Texas.

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**Figure 2. Regional geology in the area of the Yilgarn Craton, Western Australia. The biggest gold producing districts are Kalgoorlie (85 million ounces) and Kambalda (25 million ounces), with Kambalda actually being more famous for its nickel production. The Beta Hunt mine is the only active underground mine in the Kambalda District today.**

## **The Beta Hunt Mine** by Peter Megaw

### **HISTORY AND LOCATION**

The Beta Hunt mine lies 600 km east of Perth and 75 km south of Kalgoorlie in the State of Western Australia. The deposit was discovered by Western Mining Corporation in 1966 and put into production in 1972. The mine was acquired by Salt Lake Mining Company in 2013; that company was in turn bought by Royal Nickel Corporation in 2016, who continued operating under the Salt Lake Mining name (Devlin and McLeay, 2020). Royal Nickel changed its name to Karora Resources on June 16, 2020.

### **GEOLOGY**

The Beta Hunt mine deposit lies in the Archean Yilgarn Craton in the middle of the Norseman-Wiluna Gold Belt, which has produced well over 150 million ounces of gold from what geologists call “shear-hosted” or “orogenic” gold deposits. The biggest producing districts are Kalgoorlie (85 million ounces) and Kambalda (25 million ounces), with Kambalda actually being more famous for its nickel production. The Beta Hunt mine is the only active underground mine in the Kambalda District today. It lies on the crest of the Kambalda Dome, a broad upward composed dominantly of the Kambalda Komatiite and the underlying 2.71 Ga (billion years) old Lunnon Basalt. Volcanism back in the Archean was dominated by basalt and a primitive style of very high-temperature (over 1200°C) mantle-derived ultramafic lavas called “Komatiites.” Komatiites have extremely high magnesium

contents (over 18%) and very low silica (40–45%), and often have associated nickel and copper sulfide-rich segregates. Komatiites are characterized by dendritic growths of acicular olivine crystals which create “spinifex texture,” named in allusion to their resemblance to a spiky grass common in South Africa where Komatiites were first described.

The Lunnon Basalt was erupted along a series of north-northwest oriented extensional normal faults as several thick flows separated by sediment layers rich in exhalative pyrite. This fault control created north-northwest trending troughs on the surface of the Lunnon Basalt in which nickel-rich (pentlandite-dominant) magmatic segregations related to the Kambalda Komatiite accumulated. About 100 Ma (million years) later the region was subjected to a craton-wide shearing event that reactivated the normal faults, turning them into shear zones with associated gold mineralization that precipitated in roughly the same places as the older nickel ores. This superimposed gold-on-nickel mineralization provides the ore for the Beta Hunt mine, which dominantly produces high-grade nickel ores (4–7% Ni) with a modest gold credit (3 grams per ton Au) (Devlin and McLeay, 2020). Gold “hot spots” running up to a half-ounce of gold (that is, 15 grams per ton Au), including the occasional hand-sample with visible gold, are not rare. Despite this gold “sweetener,” in 2017 nickel prices were down, mining costs were up, the mine was operating at an increasing loss, and the company could not raise funds to survive, so it was put up for sale.

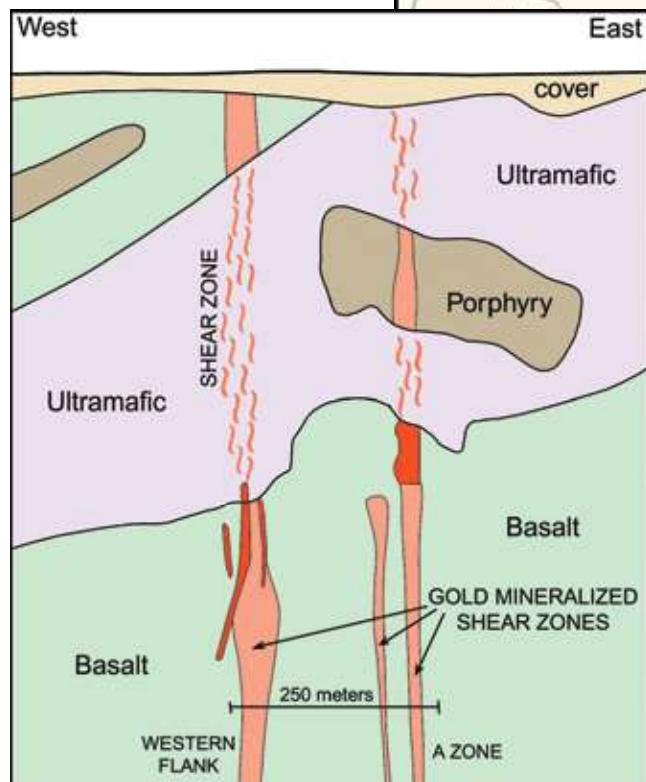
### **THE BIG DISCOVERY**

The tenor of the ore began to change as mining advanced deeper, following one of the shear zones into a pyrite-rich exhalite layer

Figure 3. Location of the Beta Hunt mine in the Kambalda District.



Figure 4. Cross section through the Beta Hunt mine. The red areas of the shear zone contain over 10 grams of gold per ton of ore.



[www.youtube.com/watch?v=RnDQi2DD8ik](https://www.youtube.com/watch?v=RnDQi2DD8ik)). In total, an estimated \$15 million worth of gold was revealed by that single blast, with the biggest pieces being named for the first miners on site, Henry Dole and Warren Edwards, while smaller pieces were named for wives and girlfriends.

The mine geologists who studied the occurrence in detail determined that the physical contrast between the two basalts had caused the generation of extensional “tension gashes” during the shearing event, and the abundant pyrite created a chemical environment favorable for the deposition of pure native gold in those gashes. Exploration for what the mine now calls “coarse specimen gold ore” using this coincidence of geological features has resulted in the discovery of two additional massive gold occurrences, though neither has come close to the size of the Father’s Day Vein pocket (Devlin and McLeay, 2020).

## The Back Story by Barry Kitt

along the contact between the Lower and Upper Lunnon Basalt. The miners had begun to see hints of increasing native gold in the ore, and on September 1, 2018, miner Henry Dole noted gold shavings in the cuttings from one of the blast holes he was drilling into the face. Despite these promising indications, nothing had prepared them for what they encountered the following day on (Australian) Father’s Day.

On entering the stope that morning they were dazzled by jagged white quartz veins laced with gaudy native gold. There was so much gold in the rocks that large blocks that had been blasted loose were seemingly suspended in air, held aloft by the veins and stringers of gold. Needless to say the miners were gobsmacked and immediately called in reinforcements. Within minutes the mine manager and everyone from the engineering offices were in the stope, goggle-eyed and beginning to appreciate what this meant to the company . . . and their jobs. Their overnight celebrity also came as a surprise, as journalists and television crews descended on the mine and word spread through the international media (see

In 1978, after graduating from college, I moved from Sacramento, California to Chicago to work on the Chicago Board of Options Exchange (CBOE). I studied and took the requisite test to become what is referred to as a “market maker,” which just means working as a floor trader in the pits. Once down on the trading floor I was attracted to the Homestake Mining pit (the world’s largest gold mining company at the time and subsequently bought by Barrick Gold in 2001) because of the active trading and the large number of people clustered around that pit. Over the next two years I saw gold go from under \$200 an ounce to over \$800 an ounce. That remarkable growth made me wonder what was so special about gold as an investment, so I began to research the question.

I learned that in 1913, the year the Federal Reserve was created, gold was valued at \$18.92 per ounce. If you define the U.S. dollar as being worth one dollar at that point, some interesting calculations can be made. By 1979, because of inflation, the value of the U.S. dollar had fallen to about 14 cents in 1913 terms. Or, to put it another way, in 1979 it took \$7.33 to buy the same market basket of goods



**Figure 5.** Royal Nickel miners with the “King Henry” (right) and “Warren” (later to become the “Dragon’s Lair”) nuggets shortly after their discovery. Royal Nickel Company photo.

as you could have bought for \$1.00 in 1913. Gold, on the other hand, went from \$18.92 in 1913 to \$459.00 in 1979, increasing by a factor of 23! It made sense that if the U.S. dollar went down by 86% in 66 years and at the same time gold went *up* by 2300%, I should own some gold! Performing that same analysis today, the U.S. dollar is now worth about 3 cents (relative to 1913), so it takes \$33.00 to buy the same market basket of goods today as you could have bought for \$1.00 in 1913. Today gold is at nearly \$1,900 per troy ounce, that is, up by a factor of 100 since 1913, while the U.S. dollar has declined by 97%! This means an ounce of gold today is worth over \$63,300.00 in 1913 dollars!

In 2010, my wife Beth and I visited the Smithsonian Institution (U.S. National Museum of Natural History) and saw, for the first time, beautiful mineral specimens. I started researching these natural treasures and learned of the existence of a mineral dealer in my hometown of Dallas: Rob Lavinsky of the Arkenstone. Rob and I met on June 28, 2010, and on that day, I bought my first nine mineral specimens. While Rob was preparing an invoice, I saw a 35-ounce gold nugget on his desk and I pretty much fell in love with it. Until that time I had not known that big gold nuggets like that even existed. I asked Rob if I could buy the nugget, but unfortunately it was already sold to another collector. However, Rob said he had just returned from Australia where he was researching what was reported to be a gold nugget weighing nearly 800 troy ounces. Twenty-four days later, on July 22, I was able to buy the 748-troy-ounce Ausrox gold nugget (Fig. 1).

Thereafter I remained on the lookout for important gold specimens. The next great opportunity came about in September 2018. Royal Nickel Corporation, a Canadian publicly traded company, owned the Beta Hunt mine in Kambalda, Western Australia, about 600 km east of Perth and 75 km south of Kalgoorlie. The Beta Hunt mine was exploiting a nickel deposit discovered in 1966, but by 2018 extremely low nickel prices and high operating expenses were throttling profitability and Royal Nickel had been trying to sell

the mine for about two years. Royal Nickel had found an interested party, but during the six months leading up to September 2018, this prospective buyer kept renegotiating the price lower and lower knowing that Royal Nickel was in increasingly perilous financial shape. Finally, the two parties were set to meet on September 3, 2018 to close the sale. However, the day before (which was Father’s Day in Australia) fate intervened. Miners working on the 500 meter level of the Beta Hunt mine set off an apparently routine blast in the nickel ore, but when they began clearing the muck, they discovered they had struck an incredibly rich gold-bearing quartz vein (later dubbed “The Father’s Day Vein”). From an area about the size of a living room (60 m<sup>3</sup>), over about four days they recovered about 25,000 ounces of native gold (Devlin and McLeay, 2020)! That same day, Royal Nickel executives, reveling in their unexpected wind-fall—and still smarting from the grinding they had been subjected to—had the pleasure of telling the prospective buyers, in direct and uncompromisingly less-than-gentlemanly language, that they were not going to sell them a gold mine for the price of a nickel mine, and the deal was most emphatically off. The incredible gold strike made worldwide news and Royal Nickel stock skyrocketed by 1000% in just a few days.

Word leaked out that two very large gold-in-quartz specimens had been temporarily set aside, along with many smaller pieces. Upon hearing this, I contacted geologist Peter Megaw—who seems to know almost everyone in the mining world—to see if he knew anyone at Royal Nickel. Peter responded that he had already been contacted by one of their Board Members about figuring out how to determine a value and market the pieces. As it turned out, a different Board Member had a friend who knew Evan Jones (Unique Minerals) and had asked him the same thing. Royal Nickel’s then President, Mark Selby, contacted both Peter and Evan and quickly enlisted them to assist with placing the pieces.

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**Figure 6. Native gold in place in the Father's Day vein, Beta Hunt mine. Royal Nickel Company photo.**



**Figure 7. The “King Henry” nugget, now on display in the Perth Mint Museum. Royal Nickel Company photo.**

### **The Other Back Story** by Peter Megaw

On hearing the news of the Beta Hunt gold discovery, I immediately wondered (as Exhibits Chairman for the Tucson Gem and Mineral Show) how we might get some of the biggest pieces brought to Tucson for exhibit. I was at a loss about where to begin, but soon I was contacted by a business associate who happened to be a member of the Royal Nickel board of directors. He had been told I knew something about specimens and he put me in touch with Royal Nickel's then-CEO, Mark Selby, who sent me a number of photographs of the pieces as well as links to news broadcasts about the find. It was immediately clear that the gold specimens

were impressive in size, with excellent color, though apparently not crystallized, and the gold was fully encased in quartz. Royal Nickel already knew the gold ran over 950 fine, which explained the magnificent color, and had run standard specific gravity tests to determine the gold content of the pieces. To my delight, Mark almost immediately agreed that they should be shown at the Tucson Gem and Mineral Show prior to being auctioned off in the spring. He invited me to come and see the pieces—to which I readily agreed!

That turned out to be a marvelous cloak-and-dagger escapade. After being sworn to secrecy about my travel plans, I was flown to Toronto, Canada, arriving around dusk in a typical chilly December drizzle, and was promptly whisked off into the gloom. On reaching what seemed like a dodgy industrial neighborhood, I was dropped

off in front of a nondescript and seemingly unoccupied warehouse/office building. Even though it was the headquarters of a supposedly high-security international transport company, there was no one to meet me at the door—which was unlocked!

I stuck my head in to announce my arrival, immediately bringing forth several heavily armed guards, an unusual sight for Canada. They were followed by a grinning Mark Selby, who introduced himself and ushered me down a narrow hall, past even more armed guards, to a thick steel security door. This opened into a stark room furnished with nothing more than a steel table on which were four large shipping crates placed directly beneath the overhead can lights. Jason Mirams, the company's ex-Australian military security coordinator, came in wielding an electric screwdriver and, after a terse introduction, proceeded to open the crates one at a time, revealing one chunk of gold-laced quartz after another.

The first two crates each held two or three pieces about 30 cm across, only one of which had enough of the quartz picked off to show the color and texture of the gold. Although it wasn't exactly crystallized it had a coruscating surface, like an insect's compound eye, the gold having grown against medium-grained crystalline quartz which had left its impression. I was allowed to handle and examine the pieces closely . . . noting immediately that bits of quartz rained off the pieces. These were carefully swept up into a container that was already nearly half full.

After perhaps 15 minutes examining the "little bits," Jason undid the screws on the remaining two crates and made a show of removing the lids to reveal the pieces in their shipping cradles. Several support struts had to be removed to "free" the pieces, but they were too heavy to do more than push them around a bit on the table. The largest of the two specimens (containing 1,203 ounces of gold) had been nicknamed "King Henry," and the next largest (892 ounces of gold) was nicknamed "Warren," after Henry Dole and Warren Edwards, the miners who had first made the find.

Although King Henry was clearly bigger and contained more gold, it was obvious that the gold in Warren had grown along big fractures and had much higher potential for being a coherent and aesthetic crystallized specimen. We already knew that King Henry, the largest piece from the find, would almost certainly have to remain in Australia, but that didn't look like it was going to be a tragedy for the specimen market.

After a half hour or so of careful examination and appropriate expressions of awe, Mark and I headed off for dinner. The crowd of armed guards was still there and seemed very eager to have us gone. Mark explained that they all knew what was "in the house" but they had to wait for the clients to leave before they got their chance to ogle the golds!

At this point I knew, as did Evan Jones (who had been brought in separately to see the pieces), that there were only a few possible buyers for the biggest pieces, and that Royal Nickel's idea of auctioning them off at the annual Prospectors and Developers Association of Canada Convention was unlikely to work very well. Ultimately, we felt it came down to either someone named Barry or a wealthy Chinese collector, but in any case the pieces needed to be seen! For the upcoming 2019 Tucson Gem and Mineral Show, this would mean exhibiting them in "as is" condition, in a set of exhibit cases that Royal Nickel had commissioned, but that unfortunately did not show them off particularly well . . . although they were certainly secure!

The pieces arrived in Tucson in the dead of night and were spirited off to the Tucson Convention Center in the biggest armored car I have ever seen. Installation required that Royal Nickel's security people be present, as well as Tucson Police Department officers, who were a little leery of well-armed outsiders on their turf. As it turned out, everyone got along famously and the police officers



**Figure 8. The Warren specimen on exhibit at the 2019 Chengzhou Show in China. Royal Nickel Company photo.**

made the most of their opportunity to play around with the smaller pieces. The exhibit was very well received, but because of the display limitations the video of the recovery seemed to get more attention than the specimens themselves—except, that is, for two parties who paid special attention. One was Barry Kitt, who couldn't take his eyes off Warren, and the other was Rob Lavinsky, who believed we could find a home for Warren in China.

The pieces had left Australia under a Temporary Export Permit and Royal Nickel was interested in getting as much publicity out of them as possible during the process of finding a buyer. As it turned out, there were two nearly simultaneous events that spring where the pieces were to be displayed—a Gold Investment Conference in London, England, and the 2019 Hunan Mineral and Gem Show in Chenzhou, China, where Rob had convinced the organizers they could exhibit the "world's biggest gold specimen." (I benefitted from this because it meant my family and I were invited as VIP guests to that show!) However, this meant that the gold "team" got broken up into two traveling exhibits and without consulting their advisors, Royal Nickel sent King Henry to London, leaving Warren to go to China. Warren was a major hit, drawing huge crowds, but no buyers . . . the Chinese collectors apparently wanted the biggest gold or nothing.

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*(Continued from page 118)*

## **Barry's Backstory**

Royal Nickel had obtained Temporary Export Permits to enable them to show the pieces off in Canada and elsewhere, but they knew the Australian Government would invoke the *Protection of Movable Cultural Heritage Act of 1986* to prevent the sale of "King Henry" outside of Australia (it now resides permanently in the Perth Mint Gold Exhibition Museum). That still left "Warren," so I asked Peter to keep in close touch with Royal Nickel about it. Finally,

**Figure 9. Warren, King Henry and other Beta Hunt mine gold specimens on display at the 2019 Tucson Gem and Mineral Show. Ellen Alexander photo.**



**Figure 10. X-raying the “Warren” specimen at the Evergreen Animal Hospital, under the watchful eye of security guards. Bryan Lees photo.**



on March 19, 2019, the mining company and I came to a verbal agreement on a sale price, with the transaction to be finalized in the not too distant future.

Royal Nickel underwent some corporate reshuffling and pursued other priorities over the next few months, so nothing was done to finalize the agreement. By June of 2019 Evan, Peter and I were

convinced that Warren needed extensive preparation to reveal its real value and beauty and that Collector’s Edge was the best place to have it done under the kind of security we knew Royal Nickel would require. However, I was concerned that in the process of removing the quartz to expose more of the gold, it was possible that the specimen might fall apart into several smaller pieces. If that were to happen its collector value would drop significantly, and the agreed upon price would be higher than I would want to pay. It occurred to me that perhaps I should try negotiating an option agreement under which I would pay a fee to Royal Nickel for the option to buy the specimen after preparation was completed by Collector’s Edge. Those monies would be used to pay the preparation fee and if the finished product were to my liking, and if the gold all held together, then I would agree to pay the pre-negotiated price. If, on the other hand, the gold fell apart when the quartz was removed, I could choose to not buy the gold, and Royal Nickel would be free to sell what was left of Warren to someone else. After some weeks of negotiation an agreement was reached on a contract, including the purchase option, and it was signed in late July 2019. Arrangements were then made for Warren to be transported to Collector’s Edge in Golden, Colorado where the quartz removal process began in early October.

Of course a great specimen needs a great name, and “Warren” didn’t sound too exciting, so I began thinking about what to rename it after the removal of the extraneous quartz had been completed. Bryan Lees suggested that we wait to see what the gold looked like once it had been fully revealed in all its glory. On December 12, 2019 I traveled to Collector’s Edge to see the progress. Bryan had told me that he believed he knew what a suitable name might be and when I saw the progress, I was stunned to see the shape of a dragon sitting on the top of the piece. When I described this to Peter Megaw, he pointed out that everyone knows that a dragon sits on its golden hoard in its lair, so maybe the name should be the “Dragon’s Lair Gold.”

The “Dragon’s Lair Gold” avatar of “Warren” was first displayed





**Figure 11. The Dragon's Lair gold mounted in its new base and shipping harness. Bryan Lees photo.**

at the 65th annual Tucson Gem and Mineral Show in February 2020 where it was constantly surrounded by admirers. After the show, it went back to Collector's Edge for secure storage pending receipt of a Permanent Export Permit from the Australian government. As I had learned with the Ausrox Nugget, getting a permanent permit can be a time-consuming bureaucratic process, which certainly looked like it could be prolonged because of the then-emerging realities of Covid-19. Fortunately I was able to enlist Australian mineralogist Penny Williamson of Wollongong University to assist in shepherding the Dragon's Lair through the process. Her characteristic persistence paid off and we received the Permanent Export Permit in late April, 2020. Collector's Edge immediately began more quartz removal and by June of 2020 had put in another 100 hours of tedious preparation work. With their work finally done, the Dragon's Lair Gold was transported to Dallas where it is now on display at The Perot Museum.

Royal Nickel is to be commended for realizing that amazing specimens like King Henry and Warren should be preserved and not melted down for quick cash. It would have been a huge loss to not have these fantastic specimens in museums for everyone to enjoy and marvel at.

Collector's Edge did a superb job in determining how best to remove the quartz and turn "Warren" into "The Dragon's Lair Gold." I do not believe there is anyone else in the world who could have done such a thorough and skillful job. The strategic thinking required, the hundreds of hours of metal scribe work, and the careful use of hydrofluoric acid while protecting selected parts of the specimen, as well as the construction of a mounting system and a transportation system to assure safe passage, was truly a labor of love.

### **Preparation of the Dragon's Lair by Bryan Lees**

In early April 2019, Evan Jones and Peter Megaw urged Royal Nickel Corporation to approach Collector's Edge Minerals, Inc. to assist in unlocking the specimen potential of the big gold-in-quartz mass that had been nicknamed "Warren." Everyone here was eagerly looking forward to seeing it and Alger St-Jean of Royal Nickel called me to discuss the logistics involved in delivering the piece to Collector's Edge for examination. Warren was already on "world tour" from Australia under a Temporary Export Permit issued by the Australian government, but it still required special courier service from door to door. By late April, all permits, insurance and transportation issues had been worked out and, on the 19th of that month, Warren arrived in Colorado.

For the initial examination we wanted a standard medical X-ray of the specimen to determine the configuration of gold hidden within the encasing cover of quartz and other minerals. X-raying is often used when preparing slabs of milky quartz riddled with gold crystals from localities like the Eagle's Nest mine in California. We hoped this peek inside would give the preparators an idea of how best to expose the beautiful gold leaves.

Warren was transported by armored truck straight to a local veterinarian, Evergreen Animal Hospital, where a large X-ray machine was put at our disposal. The box containing the gold was opened and Warren was placed on the X-ray table, under the close supervision of armed security personnel.

It was immediately obvious that there might be a problem with this approach. Visual examination suggested that there might be too much gold within Warren to allow enough X-rays to pass through and

**Figure 12. Zach Giuliani (left) and Robert Lorda conducting a specific gravity measurement in order to determine the gold content. Bryan Lees photo.**



**Figure 13. Zach Giuliani (left) and Robert Lorda delicately removing quartz from two sides of the specimen at the same time. Bryan Lees photo.**

create a usable image! The test went ahead anyway, and the results were as we had feared—images showing only blurry, light-colored, out-of-focus smudges. It was impossible to “see through” Warren because it was mostly a mass of solid gold, which blocked all X-rays. The specimen’s golden secrets would have to stay hidden for a while longer as Warren took a plane back to Australia and then China for the 2019 Hunan Mineral Show.

Throughout the summer, negotiations between the Australian government, Royal Nickel and potential buyers continued, resulting in Warren’s visiting Colorado again: the specimen would go to the Collector’s Edge laboratory in Golden for preparation. It was stipulated that Warren should not be altered in any way that might diminish its cultural significance, which was a problem if that meant not trimming off significant amounts of quartz to expose the underlying gold. After a few more discussions, Royal Nickel finally agreed that Warren’s appearance could be changed, and hopefully enhanced, without diminishing its cultural importance.

On October 10, 2019 Warren arrived at Collector’s Edge and the preparation gurus, Robert Lorda and Zack Giuliani, went straight to work. Our idea was to remove quartz from certain areas, and leave others intact, thereby creating a beautiful contrast between gold and white quartz when finished. This is an art, and you only get one chance at doing it right! After a few days of careful examination, the idea took hold to begin removing quartz in a few areas to firm up the final orientation. It was important to choose wisely where to start removing parts of the quartz matrix, as this would permanently define Warren’s “base” and thereby create the foundation for all further quartz removal.

When Warren arrived in Golden it weighed 63 kilograms (138.8 pounds) and we knew that a mass balance would be required by the Australian authorities so it was essential that everything removed be saved for comparison and analysis at the conclusion of the project. This meant repeated and careful recording of the specimen’s weight as quartz, small bits of gold and other gangue minerals were removed throughout the preparation process.



**Figure 14. The dragon's head configuration on the top end of the Dragon's Lair gold. Barry and Beth Kitt collection; Tom Spann photo.**

The “sculpting” of Warren began with the careful removal of little bits of quartz using a pneumatic, steel-tipped stylus. In starting such a process one never knows what to expect; it was hoped that after most of the quartz was removed, the gold leaves would be thick and strong, but would removing the quartz weaken the specimen? For two weeks, Rob and Zack worked carefully at removing quartz, milligram by milligram using special magnifying glasses, slowly exposing the incredible-looking, heavy gold leaves! To our relief, Warren held together strong and sturdy as his final orientation gradually became clearer.

By the end of preparation week three, Warren's weight had been reduced by 9 kilograms to 54 kilograms and Warren was ready for his first hydrofluoric (HF) acid dip. This critical step would dissolve and remove small bits of quartz that were impossible to remove with the pneumatic stylus and would also loosen quartz deeper in the specimen's crevices, facilitating further stylus work.

Although hydrofluoric is not a particularly strong acid, unlike other acids it has the unique ability to dissolve quartz (or glass made from quartz sand). Working with hydrofluoric acid is very dangerous, so careful handling and follow-through were essential as even a single drop can have an extremely damaging effect on the human body. To prevent the acid from attacking areas we wanted to preserve, melted wax was applied to about 30% of the lower area of the specimen. The wax seeped into and coated the quartz, selectively protecting it from the acid.

Rob and Zack donned hazmat suits and used a fork lift to lower Warren into a vat of warm, 10% HF. Hazmat suits are essential as even the vapor from HF is highly dangerous to humans. After soaking for some time in the acid, Warren was carefully lifted out and immediately immersed in a large vat of ammonium hydroxide to neutralize any residual acid. We let it soak in the deacidifying solution overnight, then removed and thoroughly washed it the next day.

Wow! The result was spectacular! The dusty-looking, quartz-riddled gold leaves now glistened with that look that only gold has. The specimen was then immersed in warm water for several days to remove the wax coating. Warren had lost 1 kilogram on its trip through the HF but the process showed that the matrix also contained some feldspar, calcite and pyrite that the acid had attacked. It turned out that the dissolution of the pyrite left a brown residue on the quartz, which necessitated an extra cleaning step. So, Warren was immersed in a weak chemical bath designed to remove iron staining and after a few trips through this process, he was iron-free, glistening with gold contrasting against bright, white quartz. Warren was ready for his first official inspection.

On December 12, Barry and Beth Kitt, the prospective buyers, arrived in Golden to review progress and offer advice on how best to complete Warren's preparation. It was important to decide whether more quartz should be removed, and exactly how Warren would finally be oriented. By now it was clear that Warren was taking shape beautifully and there was one particularly fine viewing perspective. Both Barry and Beth were excited to see the “new” Warren and discussed details with us for the next step in its evolution. Ideas were also discussed for a final nickname.

Now that the ideal orientation for Warren had been decided, a base was designed and constructed to secure it for transportation. Graham Sutton and his team, Craig Wibirt and Jennifer Quist, worked for a month designing and fabricating a cradle strong enough to protect Warren during transport and provide a permanent mount for future public display. A threaded, high-strength steel rod was inserted into the base of the specimen and used to cinch it down to a stout metal base. Removable supports were added and a special box was constructed to hold and protect the specimen. Royal Nickel had given permission for Collector's Edge to display Warren at the 2020 Tucson Gem and Mineral Show®, so we also designed and built a special display case just for that purpose.

Following another HF dip in late December, some additional quartz removal was necessary because acid treatment leaves quartz looking pitted and unsightly. Rob and Zack took turns with the stylus to freshen up the quartz surfaces and continue exposing still more gold leaves. Another 1.5 kilograms of quartz was removed, and in late December, Barry Kitt again visited Golden for a final inspection. Warren had been significantly transformed and now looked distinctly like a dragon. A new name emerged: “The Dragon's Lair”!

A few final details remained before the Dragon's Lair could be shipped to the Tucson Show. First, the remaining quartz matrix had to be stabilized with high-strength epoxy to make sure that the internal supporting rod would not rip out the side of the Dragon's Lair if it was accidentally dropped during shipment or while it was being set up for display.

Lastly, the Dragon's Lair needed a final calculation of its net gold content. The gold content had been a constant source of discussion during the preparation process since it was a combination of gold and quartz and there is some art in making the determination. When discovered, Warren was sent to Intertek laboratories in Western Australia where a specific gravity test was conducted, and a simple calculation was applied to determine the contained weight of gold in the specimen. The initial specific gravity test (conducted September

**Figure 15. Gold leaves uncovered by the removal of white quartz. Barry and Beth Kitt collection; Tom Spann photo.**



**Figure 16. Gold leaves uncovered by the removal of white quartz. Barry and Beth Kitt collection; Tom Spann photo.**



10, 2018) indicated that Warren contained 27.771 kg of gold, or 893 troy ounces, out of a total specimen weight of 63.375 kg.

By January 2, 2020, 12.075 kg of quartz had been removed mechanically and chemically and the newly christened “Dragon’s Lair” underwent another specific gravity measurement at the Collector’s Edge facility. With kilograms of matrix removed, pre-

dominantly quartz but with trace amounts of other minerals, it was hoped that a more accurate gold content could be established. The new measurement indicated a revised gold content of 28.659 kg, or 921 troy ounces, from a specimen weight of 51.3 kg.

Shipment and insurance logistics were concluded by mid-January, and the transformed Warren was sent by armored car to Tucson, Arizona for its debut as The Dragon’s Lair Gold at the 2020 Tucson Gem and Mineral Show. The Dragon’s Lair was unveiled to a mesmerized public on February 13, 2020 and it was hard to get near the case for the rest of the Show.

Following its Tucson debut, the Dragon’s Lair made its way back to Collector’s Edge. It had been decided to remove a little more quartz to expose more gold and remove more of the brown iron-oxide coating, but no work could be done until the Permanent Export License was finally granted in late April, 2020. During May and into June, the Dragon’s Lair was subjected to additional stylus and HF work. This extra work really paid off, improving the piece even more. The magnificent specimen had slimmed down further, losing another 1.859 kg to leave a final gross weight 49.441 kg. The gold content was unchanged at 28.659 kg, or 921 troy ounces. On June 29, 2020, the Dragon’s Lair left Collector’s Edge for the last time and moved to its next nesting place at the Perot Museum of Nature and Science in Dallas, Texas. Approximately 300 hours of painstaking preparation time had gone into perfecting this golden masterpiece!

The Dragon’s Lair Gold will be on Display at the Perot Museum of Nature and Science in Dallas, Texas for the foreseeable future. If you should find yourself in Dallas, please take some time to visit the museum, as it is one of the great museums in our country.

#### REFERENCES

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