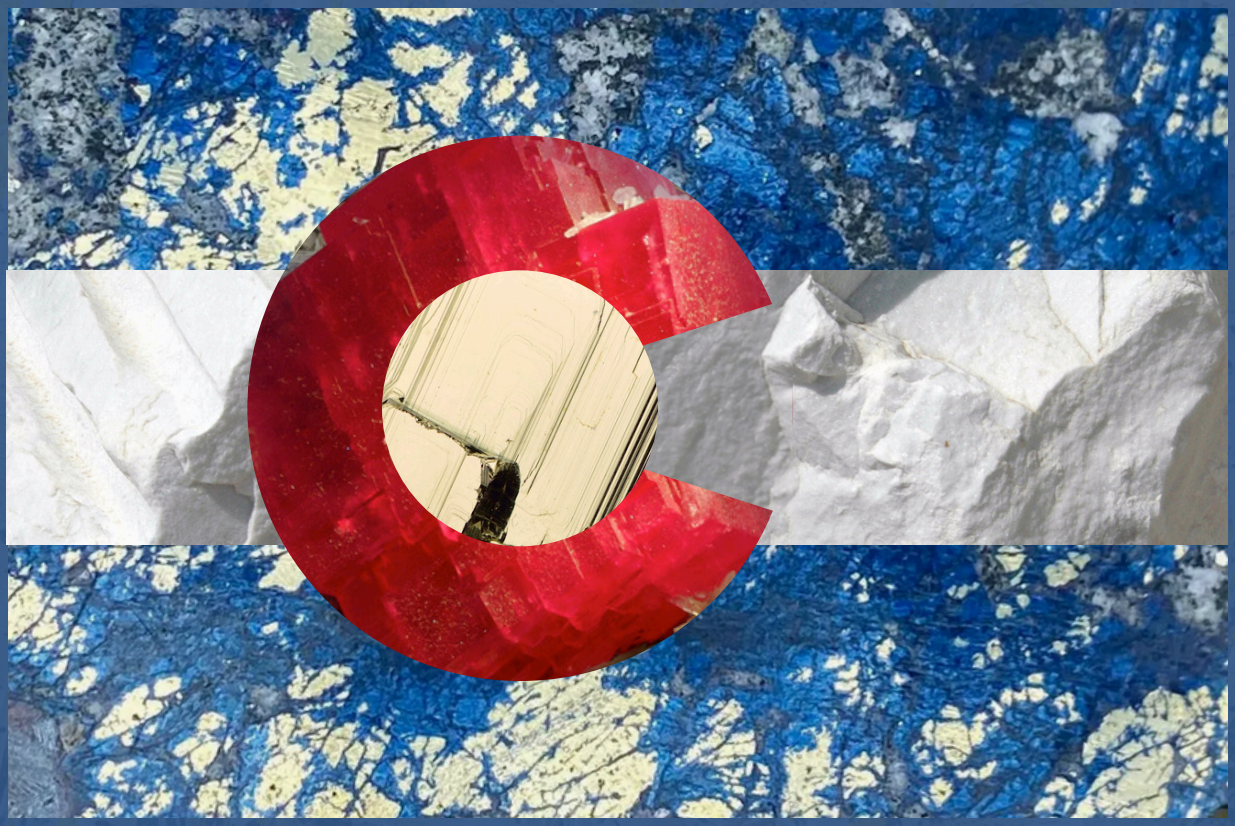
JUNE 11 - 14, 2026

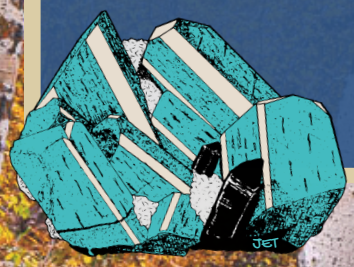
COLORADO 150

Celebrating 150 Years of Colorado Statehood



Symposium Program & Abstracts

Mines Museum of Earth Science &
Berthoud Hall
Colorado School of Mines
Golden, Colorado



Sesquicentennial. Semiquincentennial.
Sesquisemiquincentennial.

In 2026, the United States will mark the 250th anniversary of the Declaration of Independence—our nation's semiquincentennial. At the same time, Colorado will mark the 150th anniversary of our entrance into the Union—our state's sesquicentennial. As the Centennial State, Colorado is the only one who will observe twin anniversaries—our **Sesquisemiquincentennial**.

2026 will be an opportunity for us to come together as we celebrate Colorado by acknowledging our complete shared history, honor what makes Colorado unique, and recognize our shared destiny as we strive toward a more perfect union.

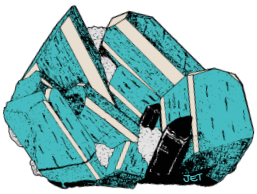
We acknowledge that the land currently known as Colorado has been the traditional homelands of Indigenous peoples since time immemorial.
(historycolorado.org)

COLORADO 150

JUNE 11 - 14, 2026

Berthoud Hall &
Mines Museum of Earth Science
Colorado School of Mines,
Golden, Colorado

Sponsored by:



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COLORADO CHAPTER

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Editor: Anne Fulton

Symposium Planning Committee Members:

Benjamin Murphy
Christopher Clark
Jeff Kuhn
Anne Fulton
Brian Kraft
Caleb Chappell

Acknowledgements:

Samara Rhett Tebo
Ed Raines
Renata Lafler
Mark Jacobson
DMNS (James Hagadorn, Nicole Neu-Yagle, Eva Jorn, and Emory Pollatsek)
& everyone else who helped make this symposium possible
Thank You!

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Path By North Table Mountain 3, John Fielder's Colorado Collection; History Colorado. 2023.1.2575

WELCOME

Welcome to the 2026 Friends of Mineralogy Colorado Chapter Symposium: "Colorado 150"!

During the year of the Sesquisemiquincentennial (America 250 - Colorado 150), we are pleased to celebrate 150 years of Colorado statehood with an event dedicated to the unique and spectacular mineralogy of our state. Pursuant to the goals of Friends of Mineralogy, we aim not only to appreciate aesthetic mineral specimens from Colorado's most iconic localities, but we also seek to appreciate and to better understand the diverse mineralogy of the state. We are tremendously grateful to our speakers for their willingness to present on a wide range of topics pertaining to Colorado mineralogy at the symposium.

We also acknowledge that we are only the latest collectors to value the amazing rocks, minerals, and fossils of Colorado. Humans have been living in the place that we now call Colorado for thousands of years, and all residents of this land, from its earliest inhabitants up to now, have appreciated the mineralogical wonders spread far and wide across the mountains and plains. We are not the first to appreciate Colorado mineralogy, and we will not be the last. We encourage attendees to visit the History Colorado Center, located near the capitol in Denver, to learn more about the long history of the lands that now are Colorado.

We are also pleased to offer specimen preparation demonstrations, several field trips to iconic Colorado mineral localities, and behind-the-scenes tours of the Denver Museum of Nature & Science (DMNS) collections as part of our symposium this year. We are grateful to Collector's Edge; to Mark Jacobson and Phil Persson; and to James Hagadorn, Nicole Neu-Yagle, Eva Jorn, and Emory Pollatsek at DMNS for facilitating these additional program features. We also thank Collector's Edge for their continued support of the symposium.

Our symposium this year was once again organized as a joint effort by the Mines Museum of Earth Science at Colorado School of Mines and the Friends of Mineralogy Colorado Chapter. We thank Renata Lafler, Samara Rhett Tebo, and Ed Raines, our colleagues at the Mines Museum, for all their efforts in helping us to organize this event.

The Mines Museum of Earth Science features a prestigious collection of minerals from Colorado, many of which date to the early 1880s and were acquired by pioneers of Colorado mineralogy, in addition to an impressive collection of specimens from around the world. We hope that you enjoy your time in the Mines Museum during the opening reception on Friday evening, and we invite you to visit the Museum again in the future to explore their spectacular collections and displays. (Additional information can be found at https://www.mines.edu/museumofearthscience/)

The Friends of Mineralogy Colorado Chapter was founded in 1977-1978 as a service organization with the purpose of increasing knowledge about minerals and their deposits. Our overarching goal is to promote, support, protect, and expand the collection of mineral specimens and to further the recognition of the scientific, economic, and aesthetic value of minerals and collecting mineral specimens. Our organization comprises collectors, professionals, and curators who share a love of mineral specimens and the desire to promote understanding and appreciation of mineralogy. We welcome all who may be interested to join our organization. (Additional information can be found at https://friendsofmineralogycolorado.org/)

Thank you for joining us at our symposium this year, and we hope you enjoy the event!
On Behalf of the Organizing Committee,

Benjamin S. Murphy
President, Friends of Mineralogy Colorado Chapter

PROGRAM SCHEDULE

Thursday, June 11th

1:30-2:30 PM	**Denver Museum of Nature and Science Behind the Scenes Tour** 2001 Colorado Blvd, Denver, CO 80205
All Day	**Field Trip to Carlsbad-Twinned Feldspar Localities** Lake County, Colorado
All Day	**Field trip to pegmatites in the St. Peters Dome area**
6:00-9:00 PM	**Open House at Dan Zellner Minerals** 6893 Joyce St. Unit A, Arvada, CO 80007

Friday, June 12th

1:30-2:30 PM	**Denver Museum of Nature and Science Behind the Scenes Tour** 2001 Colorado Blvd, Denver, CO 80205
10:00AM-12:30PM & 2:00-3:30 PM	**Mineral Specimen Prep Demo at The Collectors Edge**
5:00 PM-8:00 PM	**Reception at the Mines Museum of Earth Science - 1310 Maple St, Golden, CO 80401** Drinks, Food, & On-site Registration **Silent & Live Auction**

PROGRAM SCHEDULE

Saturday, June 13th

Berthoud Hall, Room 241 - 1516 Illinois St, Golden, CO
(all presentation times are inclusive of Q & A)

8:00-8:45 AM	Badge/Program Pickup, Walk-in Registration, Coffee & Tea
8:50 AM	WELCOME REMARKS
9:00 AM	**Bryan Lees:** *The Detroit City Mine Rhodochrosite Mining Project.*
9:50 AM	MORNING BREAK 1
10:10 AM	**Jasper Bertisen:** *Mineral Collecting Adventures in the San Juan Mountains*
11:00 AM	MORNING BREAK 2
11:20 AM	**Ed Raines:** *The Colorado Mineral Belt*
12:10 PM	TACO BUFFET LUNCH
1:30 PM	**Howard Coopersmith:** *Geology and Mineralogy of Colorado Diamonds*
2:20 PM	AFTERNOON BREAK 1
2:40 PM	**Chris Emproto:** *Secondary Minerals of the Colorado Plateau Uranium-Vanadium Mines*
3:30 PM	AFTERNOON BREAK 2
3:50 pm	**Dan Kile:** *55 Years of Colorado Mineral Collecting Antics*
6:00-9:00 PM	**Symposium Social at Persson Rare Minerals** 4890 Van Gordon St., Unit 102, Wheat Ridge, CO 80033

PROGRAM SCHEDULE

Sunday, June 14th

Berthoud Hall, Room 241 - 1516 Illinois St, Golden, CO
(all presentation times are inclusive of Q & A)

8:30 AM	Coffee & Tea
9:00 AM	**Mark Jacobson:** *The Pegmatites of Colorado: A Survey of Localities*
9:50 AM	MORNING BREAK 1
10:10 AM	**Jason Roys & Ian Schimpfle:** *Blue Fever: Adventures in Prospecting For Aquamarine and Other Gems on Mount Antero*
11:00 AM	MORNING BREAK 2
11:20 AM	**Benjamin Murphy & Jonathan Caine:** *Tectonomagmatic Controls on the Formation and Localization of Mineral Occurrences in Colorado and Reassessment of the Origin of the 'Colorado Mineral Belt'*
12:10 PM	CONCLUDING REMARKS

GRL201 (classroom across from Mines Museum)
1310 Maple St, Golden, CO 80401

1:30 - 4:00 PM **Micromineral Summit** (Sponsored by Rocky Mountain Micromineral Association)

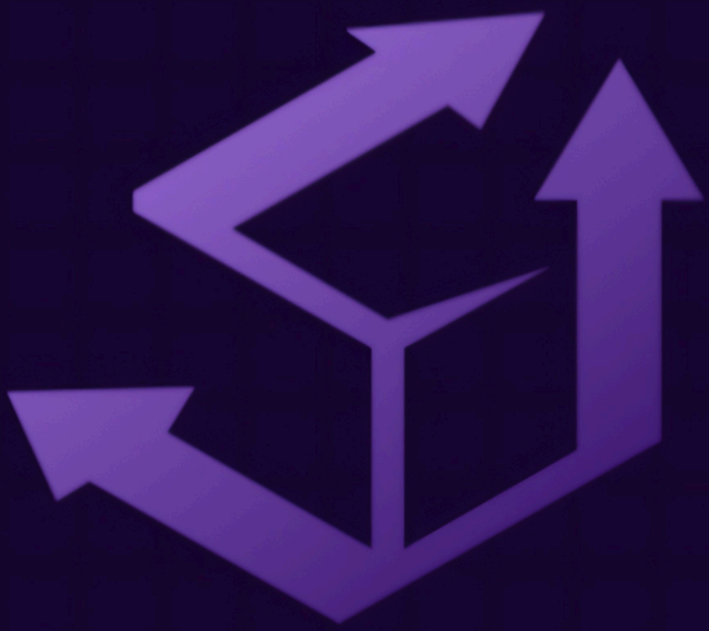
150 YEARS OF STATEHOOD
TIMELESS GEOLOGY

Snapshots from John Fielder's Colorado Collection

Camp Hale Sunlit Mountains,
John Fielder's Colorado Collection; History Colorado. 2023.1.157

Colorado National Monument 4,
John Fielder's Colorado Collection; History Colorado. 2023.1.295

ABSTRACTS
&
AUTHOR BIOS



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"EVERY ROCK NEEDS A BOX"

The Detroit City Mine Rhodochrosite Mining Project

Bryan K. Lees
President
Collector's Edge Minerals, Inc.
Golden, Colorado

Abstract: The talk will focus on specimen mining activities at the Detroit City portal of the famous Sweet Home mine near Alma, Colorado, and the effort required opening a new portal 200 feet in elevation above the old Sweet Home mine portal. Slides and stories will chronicle the 6-year-long effort to follow the original rhodochrosite ore body upwards into Mt. Bross.

Biography: Bryan began collecting minerals while growing up in Michigan. Later, at the Colorado School of Mines as a Geological Engineering student, Bryan honed his collecting skills by organizing mineral specimen mining ventures. After graduating in 1985, he and his wife Kathryn, founded Collector's Edge Minerals, Inc. and embarked upon a life-long quest to explore for exotic and beautiful mineral specimens.

Bryan has explored for minerals on 5 continents encompassing 50 mining exploration projects during the past 40 years. His company has won awards for the preservation and conservation of mineral treasures; most notably the Carnegie Mineralogical Award and the Colorado School of Mines Medal. The company's mineral discoveries are exhibited at mineral museums and mineral shows throughout the United States, Europe and most recently, China. Many are exhibited in the company's showroom in Golden, Colorado.

Bryan is an accomplished author publishing mineral specimen articles for more than a dozen mineral magazines world-wide. He sits on the advisory boards of two Colorado museums and worked with State legislators on the project to create Colorado's official State mineral: Rhodochrosite.

Mineral Collecting Adventures in the San Juan Mountains

Jasper Bertisen

Abstract: The San Juan Mountains of southwestern Colorado have a rich mining history dating back to the 1860s. Several major mines — most notably the Camp Bird Mine, Sunnyside Mine, and Idarado Mine — operated for many decades, with the last of the district's large-scale operations closing in 1991. Many of these mines were important specimen producers, and collectors are well acquainted with classic rhodochrosite, fluorite, quartz, and other minerals from the region.

Although large-scale mining ceased decades ago, the district continues to yield noteworthy material, and new discoveries are still being made. This presentation will provide an overview of the geology and mining history of the district, followed by a look at recent finds — both from classic, well-known localities and from newer discoveries that continue to add to the San Juans' mineral legacy.

Lewis Mill

Biography: Jasper Bertisen spent the majority of his career in mining private equity, providing growth capital to mining companies across a range of commodities and global markets. He currently serves on the board of directors or advisory boards of several mining and mining technology companies. In addition, he is an Adjunct Professor at the Colorado School of Mines and holds M.Sc. degrees in Mining Engineering and Mineral Economics.

Jasper has a longstanding passion for field-collected Colorado minerals. Since 2012, he and well-known collector and dealer Robert Stoufer have collected extensively in the San Juan Mountains of southwestern Colorado. Together, they have contributed several articles on recent discoveries to *Rocks & Minerals* magazine.

The Colorado Mineral Belt

Ed Raines

Abstract: The Colorado Mineral Belt is home to most of the state's metallic mineral deposits, from those discovered during the 1859 Pikes Peak Gold Rush to today's molybdenum deposits at Climax and Henderson. While the mines in the Mineral Belt are usually thought of as home to aesthetic specimens of the ore minerals containing gold, silver, copper, lead, and zinc, these deposits are also sources of many gangue minerals that are very much in demand in the collector's market. The outstanding example of this phenomenon is of course rhodochrosite from the Sweet Home Mine near Alma, where crystal quality and clarity elevated a gangue mineral to the status of ore to feed both the gemstone and collector markets for several decades.

The Mineral Belt (also known as the COMB) has been world famous for more than a century, but it really wasn't until the late 1960s that Plate Tectonics began to offer explanations for the origin of the Belt. Since then it was realized that the North American Plate was sutured together from the collision of many smaller plates between three and one billion years. The collision of an unnamed smaller plate with the Wyoming plate resulted in a belt of crumpled up ocean crust, the remains of which can be detected today. This crumpled pile has turned out to be a zone of weakness through which magmas passed into the near subsurface providing both the elements and fluids from which the mineral deposits of the COMB were formed. And the rest is history.

Biography: Ed is the Curator for the Colorado School of Mines Museum of Earth Science. He is a past president of both the Mining History Association and the Colorado Chapter of Friends of Mineralogy. He has written numerous papers on the geology, mineralogy, and mining history of many Colorado mining districts, several of which have received special awards from Friends of Mineralogy. In 2009, his book Historic Photos of Colorado Mining was published by Turner Publishing. In 2019, received the Rodman Paul Award for Outstanding Contributions to Mining History.

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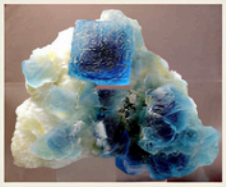

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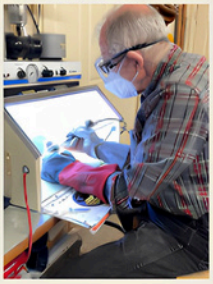

My next show is the Just Minerals & Crystals Event
Opening Labor Day at The DoubleTree, Thornton, CO.

Visit our Monument, CO showroom and lab, by appointment.
See LHimesFineMinerals.com for details and more.

Geology and Mineralogy of Colorado Diamonds

Howard G. Coopersmith
Consultant in Economic Geology – Diamonds
1205 Steeplechase Ct. Fort Collins, CO 80524 USA
1-970-217-1008 hcoopersmith303@gmail.com

Abstract: Diamonds occur in kimberlite in the northern Front Range of Colorado and into southern Wyoming in what is referred to as the State Line Kimberlite District.

While kimberlite was identified in the mid-1960's, the diamondiferous nature was not recognized until 1975 through systematic testing by Colorado State University and a few mining companies. While diamond occurs in almost all tested kimberlites in the district, only a few deposits have received large scale testing (Sloan, Schaffer, George Creek) and only one (Kelsey Lake) produced diamonds commercially.

The State Line Kimberlites intrude Proterozoic crystalline rocks, with evidence of Archean basement at depth. These intrusions occurred primarily in the early Devonian (approximately 390 million years ago) with a few approximately 600 million years ago. The kimberlites represent deep-seated volcanism originating at least 140 to 200 km deep, sampling and incorporating pieces of the lithospheric mantle. These included xenoliths are primarily lherzolitic and harzburgitic peridotite, eclogite and lesser websterite. Fragmentation of these mantle xenoliths supplied pyrope garnet, olivine, various pyroxenes, chromite, ilmenite and, notably, diamond. Geologically interesting crustal xenoliths also included in the kimberlites are basement granulites, and now absent, primarily marine, sediments of Cambrian through Devonian age.

Diamond is the stable form of carbon under pressure and temperature at these depths in the upper mantle. Through the rapid ascent, low temperature and low oxygen environment of the kimberlite emplacement many diamonds survive their journey to the Earth's surface. The primary crystal form of diamond is the octahedron, with lesser cubes. These forms are typically modified both in the mantle and during kimberlite emplacement. Modifications include distortion of the crystal form, and dissolution (resorption) and etching of the crystal surfaces.

The Colorado diamonds range in size from less than 1 mm (hundredths of a carat) to 20 mm, close to 30 carats. Colors include colorless, brown, grey, and yellow. Forms include pristine to modified octahedrons, minor cubes, macles, tetrahexahedrons, and "rounded dodecahedrons", along with irregular and broken stones. Clarities include clean (flawless) to included, fractured/feathered and broken to various extents. Each deposit has an unique assemblage of diamonds, with gem quality content ranging from 0 to 40 percent. Various studies of Colorado diamonds give insights into their petrogenesis and emplacement history, and importantly, to the nature of the lithospheric mantle beneath northern Colorado and southern Wyoming.

Colorado Diamonds® were mined from the Kelsey Lake kimberlites from 1996 through 2001. These were polished and marketed as Colorado Diamond® through select Colorado jewelers to great success. This represented the first time United States consumers could buy and own a certified USA diamond, and the first time globally that diamonds were branded by locality.

14.2 Carat octahedron from the Kelsey Lake kimberlite, Colorado

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Biography: Howard Coopersmith, RPG, specializes in diamond projects, having worked on five continents over more than 40 years. He has participated in virtually every aspect of diamond deposits – area selection, heavy mineral sampling, lab analysis, prospecting, discovery, geology, bulk sampling, evaluation, feasibility, development, mining, processing, and marketing.

Coopersmith graduated in Geology from Colorado State University, where he continued with graduate studies in Economic Geology and Diamond Deposits. These studies led to the discovery and evaluation of many diamond deposits, and the eventual development and mining of Colorado's Kelsey Lake Mine – resulting in the first marketing of diamonds branded by origin.

Previously an officer/director of several diamond explorers and miners, he currently consults for select clients, various international engineering consultancies, and the financial industry.

Secondary Minerals of the Colorado Plateau Uranium-Vanadium Mines

Chris Emproto

Abstract: The Colorado Plateau hosts numerous so-called "roll-front" deposits with high-grade zones of uranium, vanadium, and other metals. These metals are soluble in their oxidized forms, but are transformed into their insoluble reduced forms in the presence of carbon-rich organic material that occurs sporadically within Mesozoic-aged sandstones in the Colorado Plateau region. The same processes that formed these roll-front systems play out in reverse when unoxidized primary ore is exposed to water and oxygen in damp mine tunnels, generating incredibly diverse assemblages of exotic and, in many cases, novel minerals. While post-mining minerals certainly incorporate some extent of human influence on their formation and therefore lack some degree of "naturalness" compared to other minerals, the diversity, rarity, beauty, and scientific intrigue of these minerals offers an enticing bounty for mineral collectors.

This talk will cover the geologic context of secondary minerals in the Colorado Plateau including the reasons for the extreme diversity of their post-mining minerals and cover some recent finds of new species.

**Red hewettite with orange magnesiopascoite from the Burro Mine, Colorado.
FoV: 3.0mm.**

Biography: Chris Emproto is a postdoctoral fellow in Minerals and Earth Sciences at the Carnegie Museum of Natural History in Pittsburgh. His research focuses on critical minerals, crystallography, and the description of new mineral species.

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Fluorite with Baryte, Annabel Lee Mine, Harris Creek, Hardin County, Illinois, USA. Size 10cm

55 Years of Colorado Mineral Collecting Antics

Daniel Kile

Abstract: Dan and Dianne Kile have been collecting minerals for the past 55 years, throughout Colorado and in 10 other states, as well as Ontario. They have spent more than 2,300 days in the field (not counting travel). This program will highlight some of their antics, from disassembling pegmatites and concretions to underground mining. Places long since closed or otherwise presently inaccessible will be covered, as well as sites that are currently accessible. Localities will include Grand Junction, Lake George, Mt. Antero, the San Juan Mountains, the Stoneham and the southeastern plains, North Table Mountain, and other Front Range localities. Their field collected minerals have been documented in the *Mineral Collections in Colorado* and the *Eureka* Supplements to the Mineralogical Record.

Photos clockwise from upper left: Amazonite & smoky quartz from the Crystal Peak area; Barite from Otero County; Quartz from the Ohio mine, Ouray, Colorado

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Biography: In addition to field collecting since 1971, over the past 25 years Dan has taught optical mineralogy at a number of venues, including the Colorado School of Mines, the Hooke College of Applied Sciences (Chicago), and the U.S. Geological Survey in Denver. He has authored numerous articles pertaining to environmental and mineralogical sciences in both professional journals and popular magazines, as well as a monograph on *The Petrographic Microscope* published by the Mineralogical Record; he was a co-author of the update to Ed Eckels' *Minerals of Colorado*. He is retired from the U.S. Geological Survey, where his last position as a research geochemist entailed studies on crystal growth mechanisms and clay mineralogy, including clays from miarolitic cavities in the Pikes Peak batholith.

The Pegmatites of Colorado: a survey of localities.

Mark Ivan Jacobson
1714 S. Clarkson St.
Denver, CO 80210

E. Wm. Heinrich, one of the geologists who mapped Colorado's pegmatites during World War II, wrote that "Colorado should have been named The Pegmatite State" (Heinrich and Simmons 1986, p. 68). Although other states have more lithium-bearing gem pegmatites or more economic pegmatites, Colorado probably has the greatest pegmatitic diversity and wide spread distribution in the USA (Hanley, Heinrich and Page 1950).

In Colorado, pegmatites are found external to granitic plutons and batholiths in metamorphic rocks without crystal cavities as well as within their parental granites, frequently with crystal cavities. To understand the cause of these differences, an earth scientist or collector must start from first principles of how pegmatites are related to granitic and metamorphic rocks. Evaluating these principles ends with classifying the Colorado pegmatites into the predominant two pegmatite families of LCT and NYF and describing what minerals can be found in them based on their crystallization temperature and pressures.

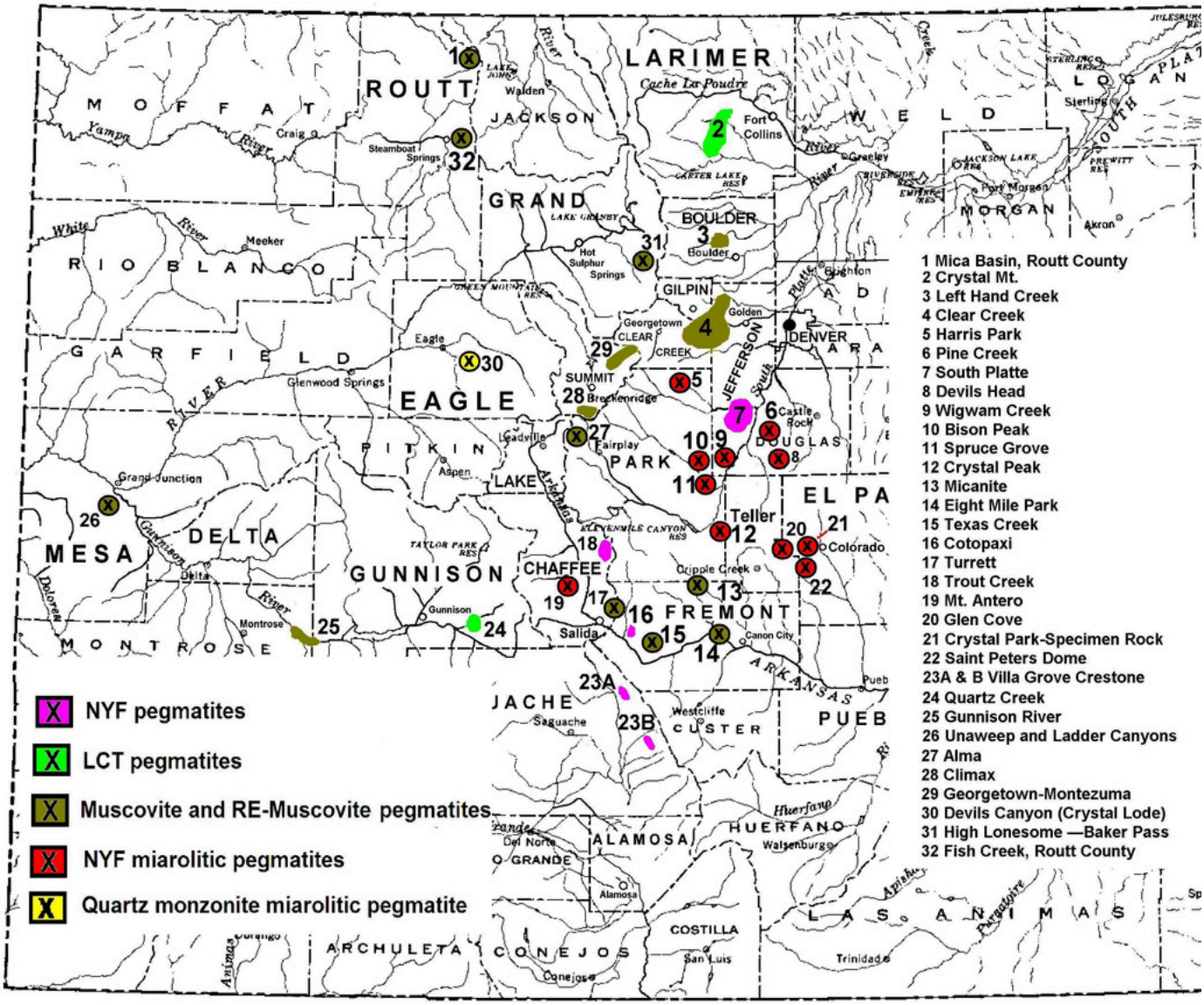
Plutonic granitic rocks (granites, quartz monzonites, diorites, etc.) are igneous rocks with a narrow range of grain sizes, usually less than ½ inch, composed dominantly of quartz, feldspar (Ca, Na and K), amphiboles, and mica (biotite and/or muscovite). Other minerals, representing less than 15% that are sometimes present are schorl, garnet, zircon, apatite (commony fluorapatite), sphene, titanium and iron oxides, allanite, monazite, and xenotime.

A pegmatite is an igneous rock with extremely coarse but variable single-crystal grain sizes from sugary to more than 1 meter in diameter. Granitic pegmatites are rocks also composed dominantly of quartz, feldspar and mica with the same minor minerals as plutonic granitic rocks. Pegmatites have the same bulk composition as granitic rocks to which they are frequently derived from.

Currently (in 2025), the most accepted, but not only, pegmatite classification system is based on family (the gechemical inheritances – pegmatite "bloodlines" from their parental melts or source metamorphic rocks) and class (the environment of where pegmatites are formed and how far they have traveled from their origin until crystallized) (Černý and Ercit 2005; Černý 1986, 1991). A later system of pegmatite classification has been advanced to include anatectic pegmatites and pegmatites of unusual composition (Wise, Muller and Simmons 2022). Pegmatites, like their parental source material can be relatively enriched in one or more of the elements of niobium – fluorine– yttrium (NYF) OR lithium – cesium – tantalum (LCT). The parential source material for NYF pegmatites is usually A- type (meaning anorgenic) and I- type (meaning igneous) granites whereas LCT pegmatites are usually sourced from S- type (meaning sedimentary or metamorphic rocks) and A- type granites.

The NYF pegmatites of Colorado may contain niobium, yttrium and fluorine-bearing minerals of fluorite, samarskite, euxenite, fergusonite, or aeschynite. Where these three elements are not obvious in the minerals, other typical NYF pegmatite minerals are albite (frequently the cleavelandite variety), microcline, biotite>> muscovite, zircon variety cyrtolite, topaz, apatite (rare), beryl (rare), allanite, gadolinite, monazite, columbite>> tantalite, and xenotime.

The LCT pegmatites of Colorado may contain the lithium, cesium and tantaum-bearing minerals of lepidolite, elbaite, spodumene, petalite, eucryptite, pollucite, microlite or tapiolite. Where these three elements are not obvious in the minerals, other typical LCT pegmatite minerals are albite (frequently the cleavelandite variety), microcline, muscovite>>biotite, topaz (rarely), beryl, schorl, triphylite-lithiophilite, ferrisicklerite–sicklerite, heterosite-purpurite, amblygonite-montebrasite, graftonite, alluaudite, apatite (fluorapatite), triplite, and tantalite>> columbite.



Pegmatite districts of Colorado

Figure 1. The significant pegmatite fields within Colorado and their classification.

Family	Class	Subclass	Types
	Abyssal (AB)	AB-HREE	high field strength rare earth element minerals
		AB-LREE	low field strength rare earth element minerals
		AB-U	uranium minerals
		AB-BBe	beryllium minerals
	Muscovite (MS)	MS	muscovite
NYF	Muscovite - Rare-element (MS-REL)	MSREL-REE	muscovite plus allanite, monazite, or euxenite
LCT		MSREL-Li	muscovite plus lepidolite, beryl or elbaite
NYF	Rare-element (REL)	REL- REE	allanite-monazite
NYF		REL- REE	samarskite or euxenite
NYF		REL- REE	gadolinite
LCT		REL-Li	beryl -columbite
LCT		REL-Li	beryl-columbite-phosphate
LCT		REL-Li	complex-spodumene
LCT		REL-Li	complex-petalite
LCT		REL-Li	complex-lepidolite
LCT		REL-Li	complex-elbaite
LCT		REL-Li	complex-amblygonite-montebrasite
LCT		REL-Li	albite-spodumene (unzoned)
LCT		REL-Li	albite
NYF	Miarolitic (MI)	MI-REE	beryl or topaz
LCT		MI-Li	beryl, topaz, elbaite, spodumene, petalite, or lepidolite

Figure 2. Summary of the family and class system of pegmatite classification, adapted and modified from Černý and Ercit (2005) and Černý (1986).

Pegmatite classes are based on the environment of where pegmatites are formed and how far they have traveled from their melting origin until crystallized. This means the temperature and pressure (depth below the surface) of crystallization. From deepest and highest temperature the classes are the Abyssal class (AB) – created at the highest pressures and temperatures, the Mica class (MS), the Mica – Rare Element class (MS-REL), the Rare Element class (REL) containing lithium, cesium and tantalum minerals and the shallowest and gem-bearing Miarolitic class (MI). Miarolitic LCT pegmatites are not known to be present in Colorado, although Miarolitic NYF pegmatites are common in the Mount Antero Pluton and in the Pikes Peak Batholith

Compositionally, Colorado pegmatites are granitic to quartz monzonitic, alkalic granitic, tonalitic, gabbroic, diorite, nepheline syenite, syenite, and alkalic proxenite. This presentation will not examine the tonalitic, gabbroic, diorite, nepheline syenite, syenite, alkalic proxenite pegmatites. In Colorado, generally LCT pegmatites are found external to plutons and batholiths in metamorphic rocks without crystal cavities whereas the NYF pegmatites crystallized within their parental granites, frequently with crystal cavities.

Most of Colorado's significant pegmatites fall into the rare-element and miarolitic classes. They are found within restricted age ranges related to specific magmatic events. The oldest was during the Paleoproterozoic Routt plutonic orogeny, formerly named Boulder Creek orogeny, where new continental crust was formed by metamorphism associated with volcanic to plutonic magmas (1810-1610 Ma). This was followed by the Mesoproterozoic Berthold plutonic thermal event, formerly named Silver Plume, where later remelting of the lower continental crust formed anorgenic peraluminous magmas (1450-1350 Ma). The late Mesoproterzoic to Neoproterozoic Pikes Peak plutonic anorogenic thermal event from melting of the upper mantle and lower crust (1040-1090 Ma) formed the Pikes Peak batholith and associated sodic and alkalic plutons. The youngest granitic magmas and associated internal NYF pegmatites formed as a result of the Late Cretaceous to Tertiary volcanic fields related to basement-crustal shearing

events across the state (70-30 Ma). The Colorado Mineral Belt represents metallic mineralization within the shallow volcanics and overlying sediments. The plutons and associated pegmatites represent the rarely unroofed roots of this volcanic activity.

Colorado has 32 clusters of pegmatites that can be referred to as districts or using modern terms pegmatite fields. Within the Pikes Peaks Batholith, 10 clusters of miarolitic pegmatites can be recognized, which are included in the 43. Not all of them will be discussed in the presentation (Heinrich 1957, Jacobson 1986b).

The **Crystal Mt. district**, Larimer County, (possibly the Routt plutonic suite) is classified as an LCT beryl-columbite-phosphate pegmatite district. The district has abundant iron-manganese phosphates, several notable occurrences of chrysoberyl with several lithium-bearing pegmatites containing amblygonite, triphylite, spodumene and lepidolite. The district at different times was mined for muscovite, beryl and crushed aggregrate (Thurston 1955, Jacobson 1986a, 1987). Only the Kings Kanyon pegmatites in the district are unzoned albite-spodumene pegmatites (Jacobson 1985). Nearby this pegmatite grouping to the northeast is the undescribed **Mt. Ethel pegmatite field** (Gilkey 1960, figure 1).

Left Hand Creek district, Boulder County, can be possibly classified as an Muscovite-REE pegmatite district. The district is best known for the discredited occurrence of cerite which was recently more properly identified as fluorbritholite associated with allanite (Allaz, Raschke, Persson, and Stern 2015). The district at different times was mined for muscovite (circa 1890) and beryl (during World War II).

The **Clear Creek district**, within Clear Creek, Jefferson and Gilpin Counties, possibly has several different types of pegmatites of possibly different ages. The pegmatites within this group which are located in a migmatite terrane, may not even have been derived from granites but may have had an anatectic origin, via the direct melting of the country rock and its upward intrusion into colder schists. As an entity, the field exhibits Muscovite-REE pegmatite characteristics. But individually, the most mineralogically evolved pegmatites exhibit LCT beryl-columbite pegmatite and NYF euxenite-samarskite pegmatite characteristics. The field had several pegmatites that were mined for muscovite (Gilpin Observer 1909) and beryl. The Bald Mt. Tourmaline pegmatite is the only known lithium-bearing pegmatite in the district, containing green elbaite and lepidolite (Boos 1954, Sheridan 1964, Jacobson and Tilander 1982). Chrysoberyl has been found as significant specimens in several pegmatites. The district at different times was mined for muscovite, feldspar, beryl and crushed aggregrate.

The **South Platte district**, Jefferson County, is classified as a NYF rare-earth element district, with subtypes of allanite-monazite and gadolinite. All of the pegmatites contain white quartz cores with intermediate zones of microcline feldspar and a wall zone with giant biotite books (Simmons and Heinrich 1980). Scattered vugs in the pegmatites have yielded quartz crystals, and fluorite. Giant euhedral crystals of granular topaz in matrix has been found in a few. Cyrtolite (metamict radioactive zircon), allanite, xenotime, monazite, samarskite, fluocerite, fergusonite, thorite and other rare-earth minerals

are conspicuous in these pegmatites. The pegmatites are found within their parental granite, the Pikes Peak Batholith, and were economically mined at different times for their potassium feldspar, white quartz, rare-earth elements, decorative rock, and decorative gravel.

The **Eight Mile Park district**, Fremont County, is classified as an LCT beryl-columbite-phosphate district (Heinrich 1948). Most of the pegmatites only have a few zones or no zones at all. The Meyers pegmatite is the only known lithium-bearing pegmatite with a core-margin cleavelandite unit containing lepidolite, green and pink elbaite, montebrasite and the now discredited natromontebrasite (montebrasite with a surface alteration coating of lacroixite, goyazite and wardite). The Mica Lode pegmatite, just to the west, is known for its triplite, columbite with radioactive secondary minerals, and white alkali (Na-rich) beryls in a red albite matrix. The separation of the Mica Lode pegmatite by only 35 meters from the western end of the Meyers pegmatite has caused the erroneous reporting of lithium minerals from the Mica Lode which are actually from the Meyers pegmatite. The district at different times was mined for muscovite, beryl gemstones, potassium feldspar, and decorative gravel.

The **Texas Creek** (or **Devils Hole**) **district**, Fremont County, is classified as an LCT beryl-columbite district. Most of the pegmatites only have a few zones. The Chief Lithium pegmatite is the only known lithium-bearing pegmatite in the district with a cleavelandite unit containing lepidolite, green elbaite, beryl and topaz (Heinrich and Vian 1965). The Devils Hole pegmatite is known for its incredibly deeply-colored rose quartz, giant beryls used for ore during World War II and ferrocolumbite. This pegmatite was discovered by James D. Endicott of Cañon City circa 1908, named the Wild Rose, and mined for muscovite mica, deep rose quartz, and aquamarine (Sterrett 1923). The district at later times was mined for beryl ore, decorative rose quartz, potassium feldspar and decorative gravel.

The **Trout Creek Pass district**, east of Buena Vista, are NYF pegmatites of the euxenite class. The two most prominent, the Yard and Clora May pegmatites, contain aeschynite-(Y), allanite-(Ce), xenotime-(Y), monazite-(Ce), zircon variety cyrtolite and polycrase-(Y). These pegmatites were prospected and mined for microcline feldspar in the 1920s.

The **Quartz Creek district**, Gunnison County is classified as an LCT rare-element complex-lepidolite pegmatite district (Doten 1936, Staatz and Trites 1955). The district contains 1,803 mapped pegmatites which seem to surround the centrally located Black Wonder pegmatitic granite. The most famous pegmatite in the district, the Brown Derby was mined during and just after World War II for its lepidolite (Li) and microlite (Ta). Opaque green, blue, pink and watermelon elbaite are common from this pegmatite as well as curved lepidolite plates and the rare granular and slightly altered pollucite. The nearby Bazooka pegmatite has produced lepidolite, and rarely spodumene, pink elbaite and amblygonite. Beryl, columbite, and monazite, are found in other pegmatites. No crystal pockets are known from the district.

The **Unaweep Canyon district**, Mesa county, is classified as an LCT beryl-columbite district (Jacobson 1990). The area has had very little mining. Blue beryl has been mined for specimens from the Blue Bird Claim and nearby pegmatites on the north side of the canyon. From the south side of the canyon, prospecting of the pegmatites around Thimble Rock has also produced beryl and a report of lepidolite. The Grady pegmatite in nearby Ladder Canyon was prospected for muscovite mica in the 1910s.

The **Pikes Peak batholith**, almost immediately after the gold rush days of 1859, was recognized as containing valuable minerals both as gemstones (facetable "smoky topaz", AKA smoky quartz at $2 per pound) and scientific mineral specimens. Smoky quartz and amazonite were soon found near Elk Creek at Harris Park by 1866, Crystal Peak in 1866-72, and Cameron's Cone near Pikes Peak in 1820 with its rediscovery in 1873. Topaz at Devils Head was discovered in 1883. Other prospective areas with topaz, zircon, alumino-fluorides and other rare-earth minerals were recognized in later years: St. Peter's Dome, Bear Creek-Specimen Rock-Crystal Park trend, Redskin pluton (AKA the Tarryalls or Spruce Grove area), Bison Peak in the northern Tarryall Mountains, Wigwam Creek, Pine Creek and Glen Cove. Active digging in the Pikes Peak batholith continues to uncover excellent specimens with new discoveries still being made. The discovery of large sherry topazes from near Cameron's Cone at a new location different from Ed Over's older find are the most recent.

The gem minerals from **Mount Antero** and **Mount White**, aquamarine, phenakite, bertrandite and the rarer topaz, are found in Tertiary-aged (+ 30 Ma) NYF miarolitic pegmatites and associated hydrothermal veins. Their occurrence is related to the widespread Tertiary-aged igneous intrusions and associated surface volcanism in Colorado. Prospecting activity for these deposits remain restricted around Mount Antero, although other leucogranitic plutons are exposed nearby in the Sawatch Mountains (Jacobson 1993; Toulmin III and Hammarstrom 1990, p. 17 at the Hoffman Park Granite; Ranta 1974).

The **Devils Canyon miarolitic pegmatite**, also known as the Crystal Lode pegmatite, is found within the Fulford Quartz Monzonite pluton as mapped by Gabelman (1949). This pluton has been dated at about 63 Ma. Gabelman (1949) mapped the pegmatite as a thirty foot thick body that might extend along strike more than 400 meters. Young and Munson (1966) described the gemmy apatites. The pegmatite is located north of the Fulford mining district, west of the Holy Cross Wilderness and southeast of Eagle. Prospecting since the 1980s have been particularly successful in producing specimen and gem quality equant yellow apatites, usually loose but associated in the vugs with smoky quartz crystals, plagioclase and titanite.

Although, Colorado's pegmatites have been heavily explored, future mineral discoveries will be made, especially by those people willing (to hike) to inspect new areas. The years 2000 to 2025 were particularly successful by a new generation of collectors finding pocket topazes, aquamarines, amazonite as well as excellently crystallized rare-earth minerals such as fluocerite, and aeschynite-(Y).

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Biography: Mark Ivan Jacobson is a geologist-mineralogist specializing in pegmatites. He obtained a BS in mineralogy-geochemistry from Pennsylvania State University in 1973 and a MS in sedimentary geology from the University of California at Berkeley in 1976. After graduate school, he worked for Amoco and Chevron in oil and gas exploration and development as an earth scientist, completing 35 years with Chevron before retiring in 2013. He has collected in pegmatites in Canada, Norway, Czech Republic, China, Australia as well as most of the pegmatite districts in the United States. Besides collecting minerals, he has had numerous articles published on the geology, mineralogy, and mining-collecting histories of pegmatites since 1978 as well as three major books: "The Gems of Hiddenite, North Carolina: mining history, geology and mineralogy (2021)," "Guidebook to the pegmatites of Western Australia (2007)" and "Antero Aquamarines: Minerals from the Mount Antero - White Mountain region, Chaffee County, Colorado (1993)." He has been a consulting editor for Rock & Minerals since 1984, a member of the Friends of Mineralogy-Colorado Chapter since 1982, their president (2014-2016), and also the FM National president (2017-18, 2021-22).

Blue Fever: Adventures in Prospecting For Aquamarine and Other Gems on Mount Antero

Ian Mark Schimpfle & Jason Camilo Roys

Abstract: In the heart of Colorado's Rocky Mountains, sits Mount Antero. At 14,269 feet, it is the highest peak in the Sawatch Range. As a "fourteener", it is a popular destination for hikers, and for off-road enthusiasts who enjoy driving the road that extends most of the way to the summit.

Long before anyone was hiking or driving the mountain for recreation, it was known for something else: world-class aquamarine. After its discovery there before the turn of the century, many intrepid prospectors have braved what is now known as the highest elevation gem collecting locality in North America, in search of the blue stone.

Among those are Jason Roys and Ian Schimpfle, lifelong friends and seasoned prospectors, who have spent years on the mountain making significant discoveries of aquamarine, and other minerals such as topaz, phenakite, fluorite, stellerite, smoky quartz, microcline, and more.

We began prospecting together in 2007, after hearing stories of gemstones being found in areas we already enjoyed camping, fishing, hiking, and backpacking in. We began looking for minerals for fun, which eventually led to our own mining claims, and starting a minerals business together. Since then, we have been on many adventures digging in the United States, and even in Africa. From the beginning, we always wanted to go to Mount Antero to find aquamarine, and it is still our most favorite collecting locality, for both its challenges and its rewards. We will talk about the geology and mineralogy of the mountain, its mining history, and of our experiences collecting there. Also give how we take care of the mountain, reclaiming and being good stewards of the land.

Biographies:

Ian Mark Schimpfle is a Colorado native and lifelong resident, and self-taught prospector. Growing up in the Colorado Rocky Mountains, on many camping trips with family, gave him a great appreciation and love for the outdoors and natural world. He was always fascinated by rocks and minerals, but didn't come into the collecting world until many years later. Since 2007, he has been on countless collecting trips, mostly on his own mining claims and other locations in Colorado, but also other locations in the United States and even overseas. Also has found significant finds as well, some of the finest crystals one of the biggest topaz pockets on Mt Antero. He co-founded Lost Creek Mining with Jason in 2015.

Jason Camilo Roys is a Colorado Native and self-taught prospector, Who has been digging since 2007. He has an incredible sense for locating exceptional minerals, and has made significant discoveries in Colorado, including exceptional green and purple cube-octohedral fluorite, a large and unique Monazite crystal that now resides in the Colorado School of Mines Mineral Museum, and some of the best aquamarine to be found on Mount Antero in many years. He continues the legacy of hard mining work started by his grandfather, who was a mineral collector and coal miner in Southern Colorado. He continues to lead Lost Creek Mining, the company he founded with Ian in 2015.

Tectonomagmatic Controls on the Formation and Localization of Mineral Occurrences in Colorado and Reassessment of the Origin of the "Colorado Mineral Belt"

Benjamin S. Murphy[1] and Jonathan Saul Caine[2]
[1] Moombarriga Geoscience, Golden, Colorado
[2] U.S. Geological Survey, Denver, Colorado

Abstract: The unique mineral occurrences of Colorado are the result of nearly two billion years of evolving and successively overprinting tectonic regimes and geodynamic processes. From the formation of the earliest rocks that now comprise the crust of modern Colorado approximately 1.8 billion years ago, through post-Laramide magmatic-hydrothermal activity and recent basinal fluid flow that have produced iconic mineral localities across the state within the last 40 million years, Colorado's colorful geologic history has driven the formation of the state's unique and spectacular mineralogy. In this presentation, we will discuss minerals of Colorado from the perspective of the geologic processes, forces, and events that have produced our iconic collecting localities. We will particularly focus on the Laramide (approximately 80 to 40 million years ago) and post-Laramide (approximately 38 million years ago to present) tectonomagmatic episodes that have produced many of the famous mineral localities in Colorado. We will explore and re-evaluate the scientific ideas behind the origin of the "Colorado Mineral Belt." Although the mineral belt concept is useful from a socioeconomic and historical perspective, the underlying scientific hypothesis, in which an inferred through-going deep crustal zone of weakness localized emplacement of magmatic-hydrothermal systems, is not consistent with geoscientific datasets and modern understandings of geologic processes. For example, the Idaho-Ralston shear zone, a type locality for the "Colorado Mineral Belt" idea, is discontinuous, with little geological and geophysical evidence for significant displacement or for extension through the entire crust. We will also highlight the important differences between the Laramide and post-Laramide mineral-forming environments, the latter of which produced Colorado's iconic rhodochrosite and aquamarine.

Biographies:
Dr. Benjamin Scott Murphy is a Senior Geophysicist with Moombarriga Geoscience. He completed his Ph.D. in electromagnetic geophysics at Oregon State University in 2019, and he researched mineral systems and Colorado tectonomagmatism as a Mendenhall Postdoctoral Fellow at the U.S. Geological Survey from 2019 until 2023. He now works in electromagnetic imaging of ore deposits for mineral exploration applications. As a mineral collector, he focuses on field collecting corundum and Precambrian metamorphic minerals, and he is most interested in the genesis of mineral localities.

Dr. Jonathan Saul Caine is a Research Geologist with the U.S. Geological Survey. His work is focused on characterization of fault zones, fracture networks, and fluid flow in the Earth's upper crust. He combines structural geology, hydrogeology, detailed field studies, and geologic mapping to study fault zone architecture and permeability structure; fault rock textures and deformation mechanisms; and fluid flow in faults and fracture networks in the context of mineral deposits, hydrocarbon migration, earthquakes, groundwater supply, and environmental geochemistry. He received his Ph.D. in Geology from the University of Utah (1999) with concentration in Structural Geology and Hydrogeology.
