WCGMC Sand Times

In this Issue:

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We are doing something a little different with this issue of the WCGMC Sand Times. After a note about two GemFest exhibits that featured sand, there is just one single longer article. BUT, you can read it in sections if you wish; just consider each of the eleven garnet-rich sands as a separate chapter!

All of the sand photomicrographs in this issue were taken by Leo Kenney using a Canon 90D camera, a 65mm Canon macro lens, and Helicon photo stacking software. They may have lost some of their resolution when ported into this document, but they are still far better than either of us can produce.

The article is being published in the International Sand Collectors Society (ISCS) Symposium Volume associated with the upcoming SandFest event in Coos Bay, Oregon in September. One of us (Fred) is attending and in addition to writing this chapter he will be giving a short presentation. And, of course, he is taking extra samples of many of those sands with him to trade with other arenophiles.

That article begins on page 3.

Sand Exhibits at GemFest

If you ventured to the far end of GemFest, past where the blue line would have been if there was still ice in the building and behind the soapstone carving and rock painting areas, then you would have seen that two of the nine club member exhibits featured sand collecting. Neither of them won best exhibit (or even placed in the top three), but each of them did receive multiple votes in the club's best exhibit contest. In addition, a number of folks (OK, more than 3) did comment about the unique hobby illustrated in the exhibits that Jim Rienhardt and Fred Haynes put together beside the more conventional mineral, fossil and lapidary displays. Did we do enough to convince others to collect sand? Only time will tell.

By Jim Rienhardt

I got into sand collecting by mistake, I think. I don't really remember, but I do remember the first sands I collected. We vacationed on the coast of Maine every summer and while most of the coastline is rocky there are a few sandy spots. I collected sand at one spot and some coarser "sand" at another. Somehow soon after, I found out that a lot of people collect sand and off I went.

Jim Rienhardt's sand exhibit at GemFest 2022.

I like to share this interest with others. After all, what fun is it if you are the only one enjoying the hobby? I have since gotten at least five other people hooked on the hobby. Most of those people have more sand than I do now. I don't travel much, so I must depend on trades and friends and family bringing me some sand samples.

I wanted my exhibit to look attractive and people are attracted to color. I picked some of the most colorful samples I have, and some interesting ones to show varied composition. I put this together hoping that maybe I could draw more people into the hobby. Most people, I think, on first hearing about sand

continued on page 2 (see Sand Exhibits)

Sand Exhibits (continued from page 1)

collecting think it is quite odd, and perhaps it is, but people collect all sorts of odd things. Like Fred, and many other collectors, I am interested in the science/geology of my samples. Microscopic pictures can also show so much. Learning more about sand, how it forms, where it comes from, what types there are, what it is used for, can certainly add to your enjoyment and knowledge in the hobby.

And arenophilia? I hope that was the hook that drew people in. Sand collectors all share in this "disease" and we enjoy having it!

By Fred Haynes

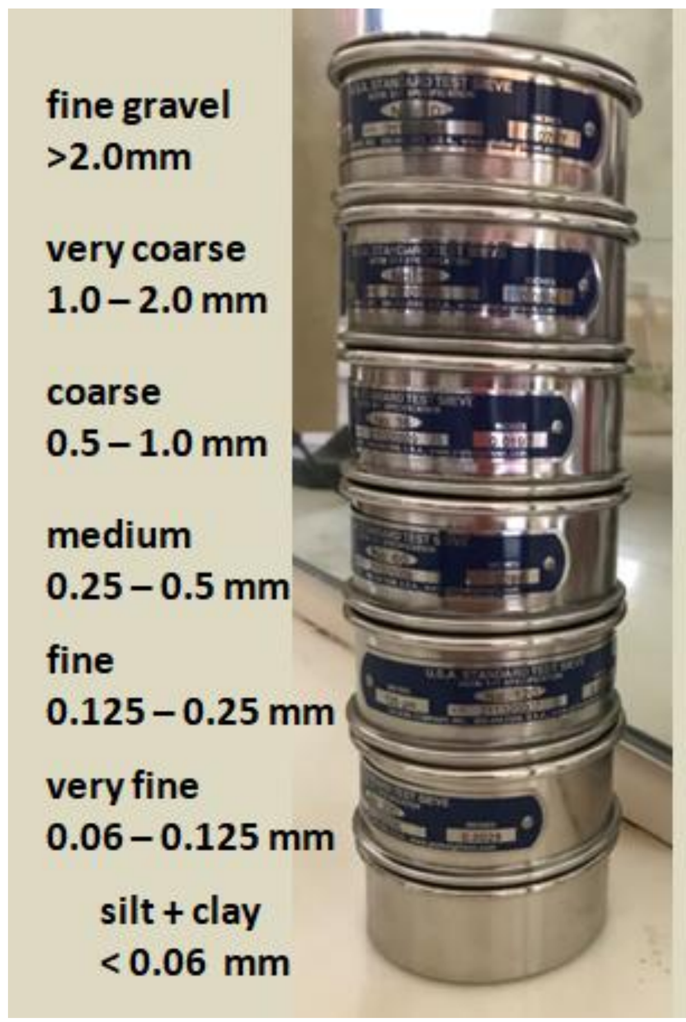
I have only been an arenophile for three years, but in that time I have self-collected sand from over 400 locations in 17 eastern states and Ontario. I have also traded extra sand from these locations to collectors around the world to acquire over 1000 additional sand samples. It is surely an addictive hobby and I decided it was time to come out of the closet and share my affliction with the world; well, the subset of the world that came to GemFest or might read this newsletter. It was time to exhibit my sands at GemFest 2022.

Fred Haynes' sand exhibit at GemFest 2022.

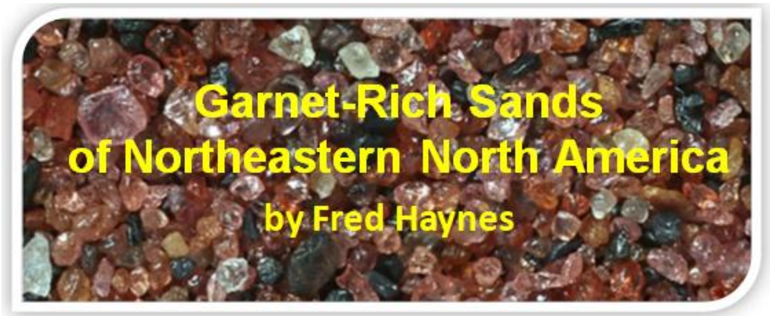
Sharing a collection of 1400 or so sands isn't feasible so I decided to focus on the sands I have acquired in the state of New York. My collection in New York numbers 76 self-collected sands and another 31 from trades with, or gifts from, other club members. That is still too many for an exhibit, but I found a 6-level acrylic stand that is designed to hold nail polish bottles that works well as a sand display unit. The unit holds 66 of the 20ml cork-topped vials that I use to store sands.

In addition to using an inexpensive digital microscope to take a picture of each sand, I have entered all my sands into a Google Map file that is online. The blue markers on the map on the back of the display case show where my self-collected New York sands are from. Sands acquired from others are marked in red. My favorite New York sand is a garnet/magnetite sand from Hamlin State Beach just west of Rochester and I featured that sand with the red garnet and black magnetite magnetically separated.

Being a bit of a science nerd, I purchased a 6-piece sieve set specifically designed to separate the 5 size fractions of sand (very fine, fine, medium, coarse, and very coarse) and set up a tray demonstrating the process of separating and measuring sand-size fractions. Other nerds who stopped by my exhibit might have taken a moment to read how this is done or study the semi-logarithmic plot used to portray sand-size distributions. OK, that probably did not happen, but it was there just in case.



Set of six 3" scientific stainless steel round test sieves for determining sand-size distributions. I acquired my set from Gilson Co. Inc. https://www.supplymylab.com/Supplies/Sieves



Introduction: Garnets are as hard, or harder, than quartz (Mohs hardness of 6.5-7.5). Like quartz, garnets lack cleavage (planes of weaknesses in their mineral structure where fracture can occur). For these reasons, garnet grains are able to survive the physical beating other mineral grains endure during weathering and water transport to their resting places in stream, lake or ocean sands. Of equal importance is their resistance to chemical weathering. While feldspars and many other silicate minerals break down into clay minerals, garnets do not.

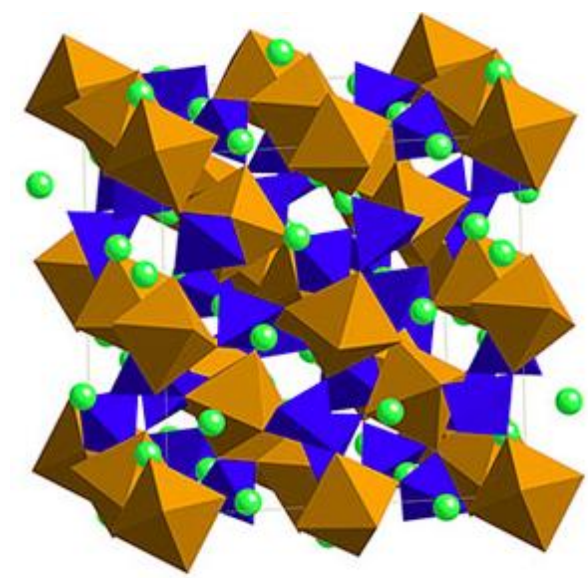
Garnets, when pure and clear, are gemstones. Garnet is also the January birthstone. With its color and crystal form, it should not be surprising that natural sands containing garnet are favorites among arenophiles. Here, we will review garnet mineralogy, discuss its sources in the northeast United States, and detail several specific locations where garnet-rich sand can be found and collected on beaches, in streams, and near outcrops. A map of all sand locations discussed is provided in Appendix A.

The Garnet Group of Minerals: As members of the isometric (or cubic) crystal system, garnets are symmetric with three equal and perpendicular axes. Structurally, garnets are simpler than other silicate mineral groups like amphiboles or tourmalines. Garnets are nesosilicates which means that the silica tetrahedrons upon which all silicate minerals are built are isolated and only connected by elements occupying interstitial locations in the mineral lattice. In the case of garnet, there are actually two interstitial locations, a large octahedral site and a smaller dodecahedral site (Figure 1).

The International Mineralogical Association (IMA) recognizes 14 end-member minerals in the Garnet Group [2], but most garnets come from one of two solid solution series. A solid solution series is a pair of minerals which share the same basic formula but experience substitution of elements in one or more atomic sites.

- Pyralspite garnets have aluminum in the octahedral (B) site. With iron in the dodecahedral site, the mineral is ***almandine*** ($Fe_3Al_2Si_3O_{12}$); with magnesium in that site the mineral is ***pyrope*** ($Mg_3Al_2Si_3O_{12}$). These are by far the most common garnets in the metamorphic rocks of eastern Canada and the northeastern United States and by inference also in selective sand beaches along the Atlantic Ocean and Great Lakes and the streams that lead to them (Appendix A).

- The ugrandite series of garnets is characterized by calcium in the dodecahedral (A) site. With iron in the B site, the mineral is ***andradite***. ($Ca_3Fe_2Si_3O_{12}$) The mineral ***grossular*** ($Ca_3Al_2Si_3O_{12}$) has aluminum in that site. Solid solutions of the two are referred to as ***grandites***.



$$\mathbf{A_3B_2(SiO_4)_3}$$

A: dodecahedral site (green)
[occupied by Fe^{++}, Mg, Ca, Mn]

B: octahedral site (brown)
[occupied by Al, Fe^{+++}, Cr]

SiO_4: silica tetrahedrons (blue)

Figure 1. The lattice structure for the Garnet mineral group [1]

Some have suggested that the solid solution series names pyralspite and ugrandite be retired [3], but they are included here because they are still commonly used in the literature.

Another garnet that deserves mention is ***spessartine*** ($Mn_3Al_2Si_3O_{12}$) which has manganese in the interstitial dodecahedral lattice position and is typically orange.

Although less common than pyralspite or ugrandite garnets in the northeast US, there are rocks, and yes, sands, where the garnets are spessartine.

Although a member of the isometric crystal class, garnets typically display dodecahedral form, the simplest of which has 12 surfaces, each a pentagon with five equal sides. There are several variations, and rhombic dodecahedrons are the most common in the garnet family. And, to be complete, we should mention trapezohedron habit, where the surfaces are “kites.” In geometry, kites are quadrilaterals with two pairs of equal length sides that are adjacent to each other. You know, like a kite!

Provenance: Sand is the product of the weathering and erosion of rocks over very long periods of time. Sometimes the source rock is nearby, but often water or wind has carried sand hundreds or thousands of miles from the original source. One of the more interesting aspects of sand collecting is determining the provenance, or geologic source, of the grains within the sand. The garnet found in sands throughout eastern North America provides one such opportunity.

So where did all the garnet found in sands on the East Coast come from? For starters, garnet is the Official State Mineral of Connecticut. Much of the bedrock in the state, in fact in much of New England, consists of medium- and high-grade metamorphic rocks produced by three separate mountain-building events (orogenies) during the Paleozoic Era. Volcanic arcs (like modern day Japan) and the sedimentary rocks in adjacent basins were plastered against the existing North American continent and accreted to it.

During each orogeny, sedimentary rocks dominated by shale were buried deeply, intruded by magmas, and overlain by volcanic lava flows. Mountain ranges were formed and the buried rocks underwent metamorphism. Many were converted to mica-rich schist. With plenty of iron (Fe), magnesium (Mg) and aluminum (Al) to go with the ubiquitous presence of silica (Si), garnets were a common product of this regional metamorphism.

In addition to the garnets within the metamorphic belts of the Paleozoic mountain building events, the older Precambrian rocks of the eastern United States and Canada have their share of garnets and they have also been exposed. These garnets are also mostly almandine and pyrope or a solid-solution mixture of both.

After hundreds of millions of years of erosion these once-buried rocks are now exposed and garnets are being released into streams and rivers and carried to the sea. Garnets are hard, so they survive the relentless forces of weathering. They are also denser than the most common hard mineral in beach sand, quartz. It is this property that permits them to be concentrated on ocean beaches and trapped along the streams that transport sediment to the ocean.

Along ocean beaches, wave action is strong and relentless, carrying all sand grains onto the beach. The retreating water has less energy and carries only the lighter quartz grains back towards the ocean. Repeated tidal action, assisted by coastal morphology and longshore currents, allows for the denser mineral grains like garnet, and often magnetite, to accumulate in the swash zone left behind as each tide retreats.

Of course, deposits left behind during a normal tidal sequence are moved by the next tidal advance and heavy mineral layers are not typically preserved. But storms generate higher tides which allow heavier grains to accumulate in protected regions above normal tide level or in lagoons behind barrier islands.

Atlantic Ocean beaches: The first environment to consider for garnet-rich sand is an ocean beach and there are several along the northeast coast of the United States where red, pink, or even purple sand has accumulated. Five Atlantic Ocean beach sands from four different states are pictured in Figure 2. Most are medium-grained and well-sorted, but two contain coarse grains larger than 0.5 mm in diameter. Each has a story to tell.

Madison, Connecticut (N41.0214 W72.608698): Garnet-rich sand can be seen on the north shore of Long Island Sound on a Google Satellite image (Figure 3). It is just as red when observed from land, or it was in September, 2019 when I visited (Figures 4 and 5) [4]. It would be interesting to know how this beach survived hurricane Henri in August, 2021.

This medium-grained sand rests above normal high tide east of the outlet of Fence Creek one mile west of Hammonasset State Beach. There is a small embayment at the location that may protect the beach, allowing heavy mineral grains to accumulate. As with most of the ocean beaches where garnet is found, there are also well-rounded magnetite grains (Figure 2A). A few green grains are present that may be epidote; non-magnetic black grains are likely amphibole or pyroxene.

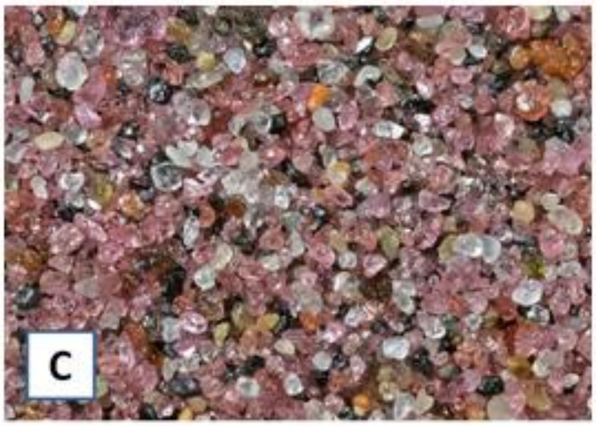


Figure 2. Garnet sands from northeast US beaches

A. Long Island Sound, Madison, CT
B. Nauset Beach, Cape Cod, MA
C. Plum Island, MA
D. Orient Point, Long Island, NY
E. Biddeford Pool, ME
F. Whitefish Point, Lake Superior, MI
G. Hamlin Beach, Lake Ontario, NY

All photos are about 8 mm across

Photos by Leo Kenney

Figure 3. Google Satellite image of the Connecticut shoreline: The yellow arrows point to the red section of beach "discovered" on Google imagery.

Figure 4. Madison beach from Seaview Ave. This picture was taken in the direction of the orange arrow on the satellite photo to the left.

Figure 5. The beach was still red when I walked out to observe it directly. I found myself kneeling in a sea of garnet sand when I reached the site near the red dot in the satellite image.

Nauset Beach, Cape Cod, Massachusetts (N41.858552 W69.951416): The glacial outwash deposits that make up Cape Cod are flanked by some of the most visited beaches in the northeast. Long and wide beaches and high aeolian sand dunes drape over the glacial deposits that stretch some 60 miles from mainland Massachusetts. The beach sand, particularly on the ocean side, is dominated by quartz grains sourced from recent river and stream outlet or from the glacial deposits of the Cape themselves. But locally conditions have permitted heavy mineral sands to accumulate. One of these occurs at Nauset Beach on the ocean side of the Cape (Figure 2B, Figure 6).

Figure 6. Nauset Beach, Cape Cod, Massachusetts: The medium-grained garnet- and magnetite-rich sand at the base of the eroding cliffs is an interesting combination of sand grains with multiple sources.

The sample I was able to acquire just above normal high tide line at the base of the Nauset Beach Cliffs is not a pure heavy-mineral sand as it contains appreciable quartz. But this actually adds to its geologic interest. The clear quartz grains in this upper medium-grained sand (Figure 2B, Figure 6) are from the active surf zone and represent modern erosional processes. The yellow and orange grains are sourced from the glacial outwash that is eroding from the exposed cliffs (Figure 6). Those grains are lightly stained by iron oxide deposited by ground water over the past 15,000 years since the last glacial retreat.

Plum Island, Massachusetts (N42.706667 W70.77222): The Parker River National Wildlife Refuge north of Boston is probably best known as a nesting site for the endangered piping plover. But for sand collectors it is also known for its purple sand. Plum Island is an 11-mile long barrier island held up by, of all things, an exposed glacial drumlin. At its southern end a unique garnet sand has accumulated against the dunes [5]. The garnet sand grains here are likely almandine and the sand is well-sorted. Under a microscope or in a photomicrograph (Figure 2C, Figure 7) the garnet grains are pink. But there is just enough black magnetite uniformly distributed in the sand to cause it to appear purple when viewed with the naked eye (Figure 7).

The pink garnet grains were likely transported by the Parker River at the south end of Plum Island and the larger Merrimack River system that drains much of northeastern Massachusetts and southern New Hampshire at the northern end of the island. The bedrock for much of this region is metamorphic rock associated with mid-Paleozoic orogenic events that accreted volcanic arc terrain onto eastern New England [6].

Figure 7. Plum Island, Parker River National Wildlife Refuge, Newbury, Massachusetts: Purple garnet-rich sand is draped on the dune face on the barrier island (September, 2020).

Orient Point, Long Island, New York (N41.16044 W72.233157): The garnet-rich sands entering Long Island Sound are not only found along the Connecticut coastline, but they also accumulate across the sound on New York State (Figure 8). Orient Point is located at the extreme northeast end of Long Island.

The garnets in this sand, like those across the sound in Madison, Connecticut, are multi-colored (Figure 2D). I can find no documentation on their composition; however, the pinker grains are likely almandine (iron-rich) while the darker red grains may contain more magnesium, even to the point where

Figure 8. Garnet-rich sand, Orient Point Beach, Orient, New York Photo by Leo Kenney

magnesium exceeds iron in the dodecahedral site and the mineral would be pyrope. This could reflect multiple provenances for the garnet grains in this sand. The heavy mineral sand at Orient Point is also known to contain fluorescent zircon [7].

Biddeford Pool, Maine (N43.447889 W70.334856): The garnet grains in this sand are slightly larger than in the other ocean sands (Figure 2E), reflecting either a shorter and less arduous journey to their resting site in southern Maine or a setting with a higher energy during deposition. The Saco River draining into the Atlantic Ocean in Biddeford drains a region of high-grade metamorphic rocks of Ordovician to Devonian rocks that were later intruded by Cretaceous-age granitic magma. Both are known to contain garnet. The later intrusives include the famous Maine pegmatites known for beryl, tourmaline and other rare minerals. They too could be in these heavy sands if one looked carefully.

The Great Lakes: The five Great Lakes and other large inland lakes can also provide resting places for garnet sand grains. While there is no tidal action on the Great Lakes, storms can produce significant wave action and heavy grains can be concentrated above the normal wave line in lakes.

Lake Superior, Whitefish Point, Michigan (N46.77133 W84.95606): The largest of the Great Lakes is home to a number of interesting sands including agate beaches, copper-bearing sands on the Keweenaw Peninsula, and even some interesting beaches near Marquette with polished grains of slag from nearby iron mills. It is certainly no surprise that "the lake they call Gitche Gumee" also hosts garnet-rich sands (Figure 2F). Their presence on the beach at Whitefish Point on the eastern end of Michigan's Upper Peninsula is ephemeral, present as a wide red strip along the beach one season and gone the next. Fortunately, the line of red sand was there to observe and sample during my visit in August, 2010 (Figure 9).

Like most of the garnet grains found in the New England sands, these are also likely almandine in composition, but their provenance is much older. The source rocks for the garnets found in the beaches of the Great Lakes region are the Precambrian metamorphic schists and gneisses of Ontario and north-central United States. Those rocks include both Proterozoic (2.5 to 0.55 billion years ago) and even older Archean terrain

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Figure 9. Lake Superior shore at Whitefish Point and garnet-rich sand stranded above wave base (August, 2019). Notice that I am also surrounded by a fine set of diverse naturally tumbled rocks. These can include Lake Superior agates if one is lucky.

The implement in my left hand is called a treasure scoop [8], a perfect tool for scooping sand or rocks out of water or without bending over. It is light weight and doubles as a walking stick.

Lake Ontario, Hamlin Beach, New York (N43.356968 W77.923208): By far the best (and largest) accumulation of garnet sand that I have found is on Lake Ontario 20 miles west of Rochester, New York just east of Hamlin Beach State Park [9,10]. The extremely high lake level in the spring of 2019 led to the exposure and erosion of multiple layers of heavy mineral sand left during previous periods of high lake level (Figure 10). The garnet and magnetite were redistributed across the lake's swash zone and then left fully exposed when the lake level retreated at the end of spring (Figure 11). As of summer 2021, this sand was still exposed, but it is slowly being covered by quartz sand. It is a very colorful sand under the microscope (Figure 2G).

Figure 10. An exposed bed of garnet and magnetite sand, Lake Ontario in Hamlin, New York (June, 2019)

Figure 11. The red garnet and black magnetite has been redistributed in the swash zone as lake level receded.

Rivers and Streams: Of course, sand grains must travel along streams and rivers to reach ocean or lake beaches and there are locations along the way where heavy grains can be trapped, or at least stalled, on their way to the ocean.

Salmon River, East Hampton, Connecticut (N41.55333 W72.44861): The Salmon River in central Connecticut drains a region dominated by Devonian metamorphic rocks. Most of the rock in the provenance region of the Salmon River is mica schist, and it is riddled with small 1-2 mm-size almandine garnets [11]. The sand along the river's edge is dominated by rock fragments and by quartz, mica, and feldspar, the lighter components of the local bedrock. Denser garnet grains get trapped and concentrated behind and underneath the larger cobbles and boulders in the river bed (Figure 12). It is a simple matter of using a spoon to carefully dig out sand or fine gravel from the sheltered, upstream side of the rocks to collect a sample laden with heavier mineral grains including almandine garnet (Figure 13).

Figure 12. Collecting on the Salmon River: can you see all the small garnets on the soup spoon in my right hand? They were dug out from behind the rock that my left hand is resting on.

Figure 13. The coarse sand fraction (1-2 mm in size) from a sample collected behind rocks in the river. The red rounded grains are garnet. The dark grain in the middle right appears to be an amphibole.

Weathered outcrop. It is even possible to go right to the source, the weathering outcrop, to find sand that is laden with garnet. Because the garnets are much harder than the micas and other minerals found in metamorphic schist, or chemically more stable than limestone, they accumulate at the base of outcrops or roadcuts or even in the floor of mines or quarries. Sometimes this leads to some rather unique mineralogy that would be otherwise dispersed if the eroding sediment were allowed to be transported farther from the source.

Littleton schist roadcut, Tolland, Connecticut (N41.85772 W72.420786): This is another site along the Connecticut Garnet Trail [11]. The towering roadcuts along Gerber Drive in Tolland, CT are from the 350 million-year old Devonian Littleton Schist. This unit extends from central Connecticut through parts of Massachusetts and into southern New Hampshire and Maine. In Connecticut, the silvery-grey micaceous unit is garnet-bearing almost everywhere it is encountered [11], and the roadcuts just off Interstate 84 in Tolland, CT are no exception. They basically bleed red garnets which accumulate at the base of the cliffs along both sides of the road.

The garnets at this site are a very uniform 1-1.5 mm in size (in other words, coarse sand grains). Because they have not been transported far, they are basically undamaged and display all of the wonderful textures typically observed in metamorphic garnet porphyroblasts that grew encased in a mica-dominated rock. Figure 14 is a washed, but otherwise unsorted sample of the sand collected at the base of the roadcut. Here the euhedral garnets are surrounded by the fragments of the mica schist from which they were liberated.

Where the mica plates were parallel to a garnet face within the host schist, a nice smooth crystal surface can be observed. However, where a garnet grew against, or into, the edges of mica grains, the garnet faced is naturally flawed. This is often referred to as a keyed surface. The keyed surface is evident on many of the grains in Figure 15, but you can also see the dodecahedral morphology of the mineral.

Figure 14. Garnet grains (about 1 mm in size) and micaceous schist eroding from a roadcut in Tolland, Connecticut.

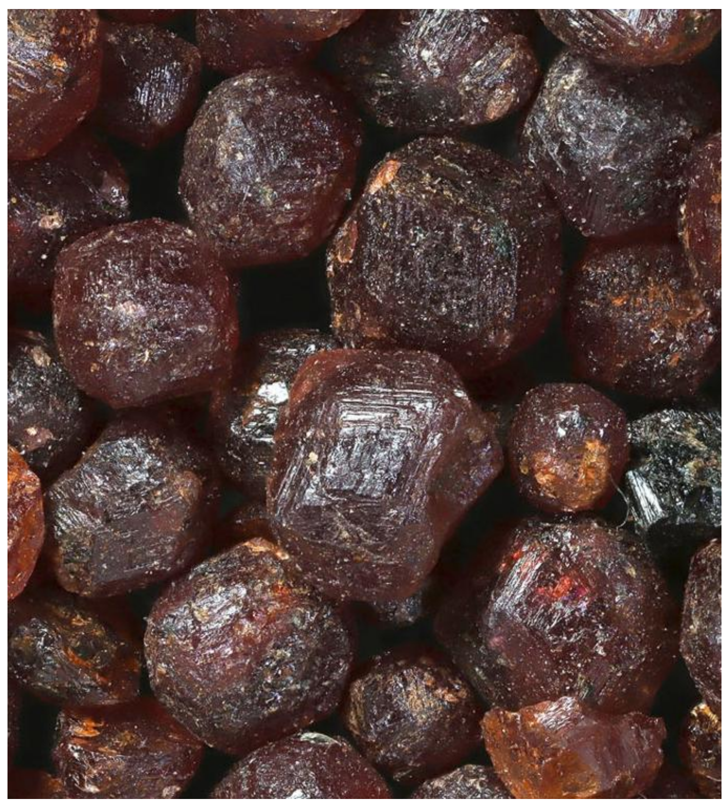

Figure 15. Garnets (average size 1.2 mm) from Tolland, Connecticut roadcut. All non-garnet grains have been removed.

Grossular in skarn, Redding, Connecticut. **(*N41.322778 W73.43833):*** Not all garnets in the New England metamorphic terrain are red. Where intrusive rocks have penetrated Paleozoic carbonate rocks, chemical reactions alter the rock and skarns are formed. Skarns are metamorphic deposits created by the interaction of hydrothermal fluids and carbonate rocks (limestone and dolomite). The hydrothermal fluids are silica-rich and this leads to the development of any number of calc-silicate minerals. Garnet is one of the minerals formed, but rather than being iron-rich, it is calcium-rich, reflective of the chemistry of the original limestone.

The most common calc-silicate garnet is grossular ($Ca_3Al_2Si_3O_{12}$). In West Redding, CT, a region of the Cambrian-age Stockbridge Marble has been intruded by later Paleozoic granitic magma and converted into grossular. There is a minor amount of associated pyroxene (likely diopside) and a bit of clinozoisite, but most of the skarn body is massive grossular.

Mineral collectors have frequented one location along the Shimpaug Turnpike in Redding [12] for decades seeking small vugs in the skarn which can contain very nice micromount mineral specimens of gemmy grossular garnet (Figure 16). The work by collectors has, over time, created a significant talus slope of sand to small gravel-sized grains that is dominated by the calcium-aluminum garnet. The pile is poorly sorted, and I used sieves to separate out the coarse-grained sand component from a sample collected in September, 2020 (Figure 17). Notice that the grains are highly angular and the conchoidal fracture surfaces in the garnet grains appear very fresh. Most of this material has been transported less than 50 feet and is very fresh, at least in geologic terms.

Figure 16. 1-3 mm grossular crystals on matrix from Redding, Connecticut. The matrix is also solid grossular. Photo from John Betts [13]

Figure 17. Angular grains of grossular garnet from roadcut in Redding, Connecticut. The greener grains are diopside. The field of view is about 12 mm across.

Spessartine, Betts Manganese Mine, Plainfield, Massachusetts. **(*N42.495312 W72.946036*):** In a geologic setting with sufficient manganese (Mn), the dodecahedral site in garnet can be occupied by manganese. When manganese is the dominant element in that lattice position, the mineral is named spessartine ($Mn_3Al_2Si_3O_{12}$). Manganese is not a common element in the earth's crust, making up less than 0.1% of all crustal material [14]. When compared to iron (5.6%), calcium (4.1%), and magnesium (2.3%), it is not surprising that spessartine is a much less common garnet than almandine or grossular.

But there is a site in western Massachusetts where small sand-sized spessartine garnets can be found and collected [15]. Betts Manganese Mine in Plainfield, MA is better known for the presence of another manganese silicate mineral, rhodonite, so much so that the pink lapidary favorite is the official State Gemstone. But if you visit the old mine site, you should not overlook the small garnets growing along fracture surfaces and bedding planes in the metamorphosed volcanic and stratabound rocks. If you are a sand collector small accumulations of 0.5-1.5 mm garnets can be found hidden among the rocks of the various mine dumps on the property (Figure 18). *The Betts Mn Mine is privately owned and visitation/collecting trips are only possible during authorized club field trips.*

Figure 18. Betts Manganese Mine: More than 50% of the grains in this picture Mn-rich spessartine garnets.

There is a very gemmy 1 mm spessartine just right of the center of the photograph. The full field of view of this coarse-grained sand is ~18 mm.

Concluding Remark: Garnet-rich rocks are not unique to northeastern North America. It may only take a little bit of research to learn where they can be found in bedrock near you and to track them to possible sedimentary deposits "downstream". I stumbled on the Madison, Connecticut location scanning the shoreline of southern Connecticut looking for accessible beaches as I planned for a 2019 trip. Other interesting Atlantic Ocean sands were found by searching the dune areas above normal tide line. Garnet sands are not as common as black magnetite-rich sands, but they are not rare if the provenance for the sand is right. And the search is fun regardless of whether one is successful.

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Wayne County Gem & Mineral Contacts

ELECTED OFFICERS

President – James Keeler
jamesrocks(at)jkeeler.com
Vice-President – Holly Woodworth
autum14513(at)yahoo.com
Secretary – Beth Webster
Treasurer - Bill Lesniak

Board of Directors
Bob Linderbery
Heidi Morgenstern
Karen Wilkins
Ed Smith

Past President – Linda Schmidtgall

Visit us on Facebook:
https://www.facebook.com/groups/1675855046010058/

APPOINTED POSITIONS

Field Trip Leader – Teresa Ferris, ***help wanted***
Fossil Field Trip Leader - Stephen Mayer

Fred Haynes – Newsletter Editor
fredmhaynes55(at)gmail.com

Bill Lesniak – Website Coordinator
Glenn Weiler – Workshop Coordinator

Linda Schmidtgall – Collection Curator

Fred Haynes – Facebook Administrator
Jim Rienhardt – Sand Chapter

Club meets 2nd Friday of each month starting in Sept.
Social meeting at 6:30 PM Regular meeting at 7:00 PM
Park Presbyterian Church, Maple Court, Newark, NY
Website – http://www.wcgmc.org/

Dues are only $15 individual or $20 family for a full season of fun. Renewal is in October. Send to:
WCGMC, P.O. Box 4, Newark, NY 14513