GEMS AND GEM MINERALS OF NORTH CAROLINA*

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North Carolina is one of the more notable states in this country for its variety of gems and gem minerals that have been found and mined within its borders.

With perhaps very few exceptions, the gem minerals have been found incidentally in a search for other minerals, or in the commercial mining of these, such as gold, corundum, mica, and monazite. There have been, however, certain localities that, after the discovery of the gems, have been developed and worked for the gem material.

The variety of gem minerals found in North Carolina is probably greater than in any other state, and includes the following:

- Diamond
- Spodumene
  - Hiddenite
  - Kunzite
- Corundum
  - Ruby
  - Sapphire
  - Oriental Emerald
  - Oriental Amethyst
  - Oriental Topaz
  - Pink Sapphire
  - Asteriated Sapphire
- Beryl
  - Aquamarine
  - Emerald
  - Emerald Matrix
  - Golden and Yellow
  - Blue
- Garnet
  - Almandite
  - Essonite
  - Pyrope
  - Rhodolite
  - Spessartite
  - Uvarovite
  - Jasper
- Opal
  - Hyalite
- Feldspar
  - Oligoclase
  - Orthoclase
  - Microcline
  - Labradorite
- Zircon
  - Hyacinth
- Cyanite
  - Blue
  - Green
- Spinel
  - Ruby
  - Grahnite
- Zoisite
  - Thulite
- Olivine
  - Peridot
- Epidote
- Iolite
- Serpentine
- Malachite
- Titanite

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Quartz
- Rock Crystal
- Amethyst
- Citrine
- Smoky
- Rose Quartz
- Prase and Chrysoprase
- Rutilated
- Agate
- Chalcedony
- Carnelian
- Moss Agate
- Sphene

Rutile
Octahedrite
Cassiterite
Hematite (in quartz)
Pyrite
Bronzite
Hypersthene
Pyroxene
- Diopside

Tourmaline (black)

Diamond

Twelve diamonds have been found in North Carolina, and there are also extensive deposits of itacolumite, the supposed matrix of the diamonds from Brazil, and peridotite, the matrix of the South African diamonds. It was hoped and expected that diamonds would be found in the peridotite but very careful examination of these rocks, and panning of the gravel of the streams below them, have not disclosed any diamonds.

The diamonds that have been found in the state occur distributed over a wide area in Burke, Cleveland, Lincoln, McDowell, Mecklenberg, and Rutherford Counties in the western Piedmont section of the state, and in Franklin County on the eastern edge of the Piedmont. They have been recorded from the following localities.

Three diamonds have been found in Burke County, two of which were from near the "Ford of Brindletown Creek." One of these found in 1843 was a well developed octahedral crystal and was valued at $100.00. The third diamond cut a gem 5/16 carat in weight, but its exact locality is unknown. This diamond is now in the State Museum.

The Cleveland County diamond was found in 1893 near Kings Mountain, the crystal weighing approximately $\frac{3}{4}$ of a carat. The Lincoln County diamond was found near Cottage Home by Dr. C. L. Hunter in 1852, in gold washings. This diamond was an octahedron with a greenish tinge and weighed one-half of a carat.

Four or five diamond crystals have been found in McDowell County, two or three of these were very small and were found in 1886 in the gravels at the headwaters of Muddy Creek. The largest diamond found in the state was a twinned octahedron weighing $4\frac{1}{3}$ carats, perfectly transparent, but of a greenish tinge, which was obtained at Dysartville. This diamond is in the American Museum

of Natural History, New York City. Another diamond, weighing $2\frac{3}{8}$ carats, was also found near Dysartville in 1877.

A white octahedral diamond weighing one carat was found in 1852 on Todd's Branch, Mecklenberg County; another was found at the J. D. Twitty Gold Placer Mine, Rutherford County in 1845. This was an octahedron with a yellowish tinge, weighing $1\frac{1}{3}$ carats. Two diamonds have been found in Eastern North Carolina in the gravels from the Portis Gold Mine in Franklin County.

In several instances supposed diamonds have turned out to be transparent colorless zircons.

It may be of interest to note here that examinations were made of the peridotite rocks and the gravels in the stream beds below these rock formations, not only for diamonds, but for platinum as well, but none has thus far been found. The only platinum mineral thus far discovered in the state has been a few crystals of sperrylite, which were obtained from the concentrates of the ruby bearing gravels of Cowee Creek, Macon County.

Corundum

There is no state or country that excells North Carolina in its variety of corundum gems. They are colored ruby red, sapphire blue, dark blue, various shades of green, violet, purplish, rose, pink, brown, yellow, grey, and colorless. The corundum gems are classified by their color, and there are at present nine varieties that are commonly recognized by lapidaries.

Most of the corundum found in North Carolina is associated with basic magnesian rocks such as peridotite, pyroxenite and amphibolite. While there are many localities in which corundum occurs, there are but few localities where it is found as gem material. The locality that has furnished the greatest variety of these corundum gems is the Corundum Hill Mine at Cullasaja, Macon County. The opening of this mine by Mr. Chas. W. Jenks in 1871 was the first systematic attempt to mine gems within the state. While the operations were of great interest from a scientific point of view, the number of gems found were so few that permanent operations were not warranted for gems alone, and in a few years the mining of this mineral was for abrasive purposes only. This mine is in an area of peridotite (dunite) of some ten acres in extent. The openings were for the most part along the contact of the dunite with the gneiss or schist through which it penetrated.

At the Corundum Hill Mine practically every shade and variety of corundum gem has been found and cut into precious stones. Perhaps the finest oriental emerald (green sapphire) ever found in the world came from this mine, and is a crystal 4 x 2 x $1\frac{1}{2}$ inches, part of which is transparent and from which several very fine stones could be cut. This crystal is now in the Morgan-Bement Collection in the American Museum of Natural History, New York City. Two of the best rubies that were ever found in this mine are also in this same collection.

A blue sapphire of over one carat in weight and a series of fine red and blue crystals are in the U. S. National Museum at Washington. Also in the National Museum are several beautiful gems from this same mine that were formerly in the Leidy Collection in Philadelphia, and include a wine yellow sapphire of $3\frac{1}{4}$ carats, a violet blue sapphire of a little over one carat, and three dark blue stones weighing respectively $1\frac{1}{2}$, $1\frac{1}{4}$, and $\frac{3}{4}$ carats each.

The most noted ruby locality is on Cowee Creek, north of Franklin, Macon County. The ruby corundum at this locality occurs in an entirely different rock from that in which the corundum gems occurred at the Corundum Hill Mine. The Cowee rubies occur in what is probably a basic hornblende-gneiss, and amphibolite. Some very fine rubies equal in color and quality to the Burma rubies have been found at this locality. They are of the well-known "pigeon blood red" color. The finest piece of ruby was a rough hexagonal crystal that measured about one inch by one and one-half inch. It was estimated that from the transparent portion of this crystal a gem worth from $1500.00 to $2500,00 could be cut. Although every endeavor was made to keep down expenses in mining these rubies, it was never a profitable mining proposition. The percentage of the ruby corundum that was capable of being cut into gems was too small.

Another locality from which several very good rubies have been obtained is the Grimshawe Mine near Montvale, Jackson County. To the north of the Corundum Hill Mine, and across the ridge is the Ellijay Mine on the headwaters of Ellijay Creek. At this mine a few very fine pieces of ruby corundum have been found, from which several exquisite gems have been cut.

Other mines besides the Corundum Hill Mine that have furnished good sapphires, are the Sapphire and White Water Mines near Sapphire, Jackson County, and the Grimshawe Mine at Montvale.

Many of the other corundum localities in North Carolina contain corundum of a deep blue color, but are not sufficiently transparent to be of value for gem purposes.

Another interesting variety of sapphire corundum occurring at the Corundum Hill Mine is a banded blue and white corundum. One gem was cut from this banded material which made rather an attractive sapphire of a rich deep blue color, but with a band of white or colorless material in the center.

At the Ellijay mine referred to above, the principal corundum found is a peculiar brown or bronze variety, which is known locally as "pearl corundum." This corundum shows distinct asterism both by natural and artificial light when cut cabochon. The fresh fracture of this corundum shows a decided bronze lustre and is somewhat similar to cat's eye. When cut the eye is sometimes very distinct. Cut gems as much as two-thirds of an inch in diameter have been obtained from this corundum.

Another attractive corundum is the pink and ruby corundum in masses of emerald to grass green amphibolite (smaragdite) which is found at the Cullakeenee Mine, Buck Creek, Clay County. While the corundum is not of gem quality, the combination of the green and pink colors make very beautiful specimens which take a high polish, and might make an ornamental stone of some value. It has been used to a limited extent for such purposes under the name of "Ruby Matrix." Near Elf post office on Shooting Creek, Clay County, there is a similar occurrence of pink corundum and sometimes a blue in amphibolite.

Beryl

The mineral beryl is found usually in pegmatite veins or dikes, which mineralogically constitute some of the most interesting and attractive occurrences in the state. Forty-seven different minerals have been noted from these pegmatites, and as many as twenty minerals have been found in a single vein.

Of the minerals found in pegmatites the following have been noted with sufficient purity to be a source of gems: beryl (aquamarine, blue, yellow, and emerald), oligoclase (moonstone), orthoclase (sunstone), microcline (amazonstone), quartz, garnet (essonite, rhodolite and almandite), gahnite (a green spinel), rutile, cyanite, and zoisite (thulite).

Emerald. There are many beryls which have a light green or a rather deep yellowish green color, but few have the rich deep

emerald green, so highly prized in the gem variety, and which is due to a minute amount of the oxide of chromium.

There are three localities in North Carolina where the real emerald beryls have been found, one in Alexander County in the vicinity of Hiddenite and Stony Point; the second in Mitchell County, near Spruce Pine; and the third in Cleveland County, a few miles south of Shelby.

The Alexander County emeralds are found in "gem-bearing pockets" which vary from several inches wide and a foot or more in length, to some that are a foot in width and several feet in length. Lining the sides of these cavities are several other minerals besides the emeralds and hiddenites, such as: quartz, aquamarine, rutile, dolomite, calcite, apatite, pyrite, monazite, and very beautiful muscovite crystals. All these minerals are extremely well crystalized. Occasionally the hiddenite crystals are found loose in the cavities.

The largest emerald crystal found during these mining operations was $8\frac{1}{2}$ inches in length, and weighed nearly nine ounces. It is now in the Morgan-Bement Collection in the American Museum of Natural History. Eight other emerald crystals were found in the same pocket, all of excellent color but only partially transparent. One was 5 inches in length and several others over three inches. Many gems have been cut from the product of this mine. Two others, one 4-23/32 carats and another 5 carats in weight, were somewhat too light in color to rank as very fine gems. These and a series of smaller emeralds are also in the Morgan-Bement Collection.

Many other crystals of emerald one to three inches in length have been obtained; and emeralds are still being found occasionally by the farmers in the area extending in length from one mile southwest of Stony Point to Hiddenite, and for several miles in width.

The Cleveland County emerald locality is on the land of W. B. Turner, $4\frac{3}{4}$ miles southwest of Shelby, and near the east bank of First Broad River. The largest emerald found was part of a crystal that measured one inch by $\frac{3}{4}$ inch. It was estimated that about 2700 carats of rough emeralds were produced in the mining operations of this property; and that from this 700 carats of cut gems were obtained, which were valued at $5.00 to $200.00 per carat.

The Mitchell County locality that has furnished gem quality was discovered in July 1894, and is 14 miles from Bakersville and

about the same distance from Mt. Mitchell on Big Crab Tree Mountain. The emerald occurs in a pegmatitic vein about 5 ft. wide. The associated minerals include translucent reddish garnet, black tourmaline, and aquamarine. The emeralds are small but well crystallized, varying in size from one to ten millimeters in width and five to twenty-five millimeters in length. They are of a very fine emerald green color, but only occasionally are they transparent enough to cut into faceted stones.

This property was operated by the American Gem and Pearl Company of New York, who developed a new gem material by cutting the emerald bearing rock (emerald, quartz, and feldspar with occasionally some tourmaline) en cabochon, and calling the cut stone "Emerald Matrix." The green and white mixture with an occasional bit of black color was very pleasing and this gem stone had considerable sale.

AQUAMARINE. The aquamarine variety of beryl is found quite commonly in many of the mica mines and pegmatitic dikes of Avery, Cleveland, Mitchell, Yancey, and Alexander Counties, and to a less extent in the mines and pegmatite dikes of Rutherford, Haywood, Jackson, Macon, and Transylvania Counties.

The principal localities are: The Wiseman Mine, near Spruce Pine, and the Grassy Creek locality in Mitchell County; the Ray Mica Mine near Burnsville, Yancey County; the Littlefield Mine on Tessentee Creek, near Highlands, Macon County; the R. E. Brown prospect, and the Grimshawe Mine, Jackson County; the Hiddenite and Stony Point deposits and the prospects near Healing Springs, Alexander County; the Hollybush prospects near Shelby, Cleveland County; and the Joel Walker prospect on South Mountains, Burke County. From all these localities gems of exceptional beauty have been obtained.

HIDDENITE

Hiddenite, a variety of spodumene, is a mineral peculiar to North Carolina. Specimens of the crystals and of cut stones of this gem mineral are in all the important collections, and the cut stones today are considered in value equal to that of the diamond. A $2\frac{1}{2}$ carat stone was sold for $500.00, and a number of other stones have brought from $40.00 to $100.00 per carat. One of the finest hiddenite crystals is in the Morgan-Bement Collection. It measures 2 2/5 by $\frac{1}{2}$ by $\frac{1}{3}$ inch, and it is estimated that from it there could be cut a gem weighing $5\frac{1}{2}$ carats.

Mr. Burnham Colburn operated the mine in 1927 and obtained what is now probably the finest collection of hiddenite in the world. This material is in his museum in Biltmore Forest, N. C.

Garnet

The different varieties of garnet that have been recognized in North Carolina are: grossularite (essonite), pyrope, rhodolite, almandite, spessartite, and andradite (demantoid).

Of the above the essonite, pyrope, rhodolite, and almandite are used for gem purposes.

The essonite garnet, which is also known as cinnamon garnet, or cinnamon-stone and is the "hyacinth" of the jeweler, has been found in beautiful transparent flat crystals between plates of mica in the mica mines near Bakersville, N. C., some of which were cut into gems of a carat or more in weight.

The almandite is the commonest of the gem garnets, and varies in color from a pinkish or scarlet, through brownish red to occasionally a deep red. This garnet has been found very extensively in Burke, Caldwell, Catawba, Jackson, and Mitchell Counties. Some almandite garnets have been found that weighed as much as 20 lbs. but they were not of sufficient purity to be cut into gems. At a great many mica mines in Avery, Mitchell, and Yancey Counties this garnet has been found crystallized in blocks and sheets of mica, and is usually perfectly transparent.

The pyrope garnet, which is also known as Bohemian garnet, has a more blood-red tint than the almandite. Pyrope of good color has been found in sands of the gold washings of Burke, McDowell, and Alexander Counties.

The rhodolite is the most unique variety of garnet found in North Carolina, and thus far has not been found in any other state. After it was recognized and named, it became commercially the most valuable gem material produced in the state. It has a variety of shades of color which are, for the most part, similar to the delicate rose-like tint of one of the rhododendrons. Most varieties of garnets are only beautiful and brilliant by transmitted light, and otherwise exhibit dark shades of color, but the rhodolite gives very striking effects of beautiful and varied colorings by reflected light. When first discovered the rhodolite was mistaken by many, and even by some jewelers, for a variety of ruby, and not until it was tested and analyzed would they believe otherwise.

The rhodolite has only been found in a very limited area, which includes the gravels of the streams that rise on Mason Mountain in Macon County, and in the gneissic rocks in several places on this mountain. Beautiful gems have been cut varying in size from a fraction of a carat to as high as $13\frac{3}{8}$ carats in weight. The largest piece of rhodolite that is recorded weighed $43\frac{1}{2}$ carats.

Quartz

Of the quartz gems the amethyst is the most beautiful and perhaps the most desired. There are many localities in Haywood, Macon, Catawba, Iredell, Lincoln, Davidson, Franklin, Wake, and Warren Counties where amethystine quartz occurs in considerable quantity, and in several of these localities it is of the beautiful purple shade, clear and transparent.

The best amethysts have been found in Macon, Lincoln and Catawba Counties. The Macon County deposits are on the headwaters of Tessentie Creek, and when the property was operated by the American Gem and Pearl Company in 1906, some of the most beautiful amethysts ever found in this state were obtained. Although many of the localities do not furnish amethysts suitable for cutting, they do produce very beautiful and interesting mineralogical specimens.

At Taylorsville, and Stony Point, Alexander County, extremely beautiful smoky quartz crystals have been obtained, and some of these have afforded fine gems. They are generally from one to 5 inches in diameter, and sometimes of a citron or light yellow color. From a mineralogical standpoint, the smoky quartz crystals from near Hiddenite and Stony Point, have attracted attention of mineralogists on account of the fact that the crystals are highly and peculiarly developed.

Perfectly transparent rock crystal is used to a considerable extent for cutting crystal balls, cubes and other objects of art. Some of the best rock crystal has been obtained from Long Shoals Creek on a spur of Phoenix Mountain in Chestnut Hill Township, Ashe County. Perfectly transparent spheres $4\frac{1}{2}$ inches in diameter, and slabs 6 inches square and from $\frac{1}{2}$ to 1 inch thick have been cut from this quartz. Rock crystal from Alexander County has furnished spheres 2 to $2\frac{1}{2}$ inches in diameter, and that from Burke County 2 3/16 inches in diameter. Similar material has been found near Elkin, Surry County, and near Bakersville, Mitchell County.

Another variety that is interesting is rutilated quartz, also known as sagenite or venus hairstone, which has been found in many places in Randolph, Catawba, Burke, Iredell, Jackson and Alexander Counties. Citrine or Spanish topaz, has been found with good color near Taylorsville, Alexander County, and in Burke and Catawba Counties. Rose quartz has been found near Dan River, Stokes County, and in Iredell and Catawba Counties.

The cryptocrystalline varieties of quartz, with the exception of chalcedony, have not been found to any large extent in North Carolina. Chalcedony of a rich fawn and salmon color has been obtained near Linville, Avery County; and fine agates and chalcedony were reported from Caldwell, Mecklenberg County; near Harrisburg and Concord, Cabarras County; and in Granville and Orange Counties.

The chrysoprase or prase variety of chalcedony, has been found in Buncombe County, near Morgan Hill, about 16 miles from Asheville. At the surface the color was pale green but the tint became deeper and richer as the mineral was obtained from lower depths. Prase of a rather light green color has also been found on Tremont Mountain to the west of Franklin, Macon County.

The jasper variety of quartz is found in Granville and Person Counties in banded red and black streaks; a bright brick red and yellow variety is reported at Knapps on Reed Creek, Madison County; at Shut-in Creek in Moore County; and in Wake County.

Opal

The hyalite variety of opal has been found at the Corundum Hill Mine, Macon County; the Carter Mine, Madison County; near Concord, Cabarras County; and near Elf, Clay County; but in no instance can it be considered as gem material.

Feldspars

There are several interesting varieties of feldspar occurring in North Carolina, from which some very beautiful gems have been obtained.

The most interesting of these feldspars and the one that has furnished the most beautiful gems is oligoclase, variety moonstone. This occurs at many of the mica mines in Mitchell and Avery Counties, but it is the Hawk Mine four miles east of Bakersville, that has furnished the best material, which is remarkable

for its transparency. One clear piece was found which measured 1×2×3 inches.

The orthoclase feldspar, variety sunstone, has been found near Statesville, Iredell County, and at Gold Hill, Rowan County. From each of these localities material was obtained which furnished material for gem purposes.

The microcline feldspar of a very beautiful light green color, known as amazonstone, has been found in North Carolina, at the Ray Mica Mine in Yancey County. Labradorite has been found near Charlotte, Mecklenburg County, and near Bakersville, Mitchell County. While the mineral from these localities shows a slight blue chatoyancy, it is not nearly as beautiful as the labradorite from Labrador.

Other Gem Minerals

Zircon or hyacinth as it is sometimes known, occurs quite abundantly in very small crystals in the gold and monazite sands of Polk, Burke, McDowell, Rutherford, Caldwell, Lincoln, and Cleveland Counties. Very few of these crystals have thus far been found of sufficient size to cut into gems.

Beautiful crystals of zircon, but not of gem quality, have been found at Sterling Hill, Iredell County, near Tuxedo, Henderson County, and near Mars Hill, Madison County.

Rutile is one of the most interesting minerals found in North Carolina, and reference has already been made to its occurrence as hair-like crystals in quartz. The color of rutile varies from deep red or reddish brown to black, and that from Alexander County has furnished some very fine cut black rutile, which closely approaches the black diamond in appearance. Rutile has been found quite widely distributed throughout the state in Alexander, Iredell, Burke, Macon, Madison, Swain, Orange, and other counties.

Cyanite has been found of gem quality in several localities in the state. The gem material occurs in two colors, one a deep blue and the other a moss green. Fine blue crystals of cyanite occur near Crowder's Mountain, Gaston County; near Swannanoa Gap, in Buncombe County; on Yellow Mountain, Mitchell County; and near Micaville, Nancy County. The green variety is found on the Young farm on North Toe River, a few miles from Spruce Pine, Mitchell County. Crystals are often transparent and were found up to ½ inch in diameter and over one inch in length.

The mineral olivine, variety peridot, occurs very abundantly throughout North Carolina as a constituent of peridotites. The

most promising localities in North Carolina for olivine of gem quality are near Webster and Balsam Gap, Jackson County.

Serpentine occurs widely distributed throughout the western section of the state and is usually the result of the alteration of some of the basic magnesian rocks. There are only a few localities where the translucent, green variety known as precious serpentine occurs. These are in the outcrops of the basic magnesium rocks between Leicester and Weaverville, Buncombe County; in Madison and Yancey Counties; near North Wilkesboro, Wilkes County; and near Patterson, Caldwell County.

The pink or rose colored zoisite, known as thulite, is found in radiating crystals in several of the mica mines in Avery and Mitchell Counties, associated with feldspar. In 1908, thulite was found at the Flat Rock mica mine, Mitchell County, which furnished some attractive gems when cut en cabochon with the inclosing feldspar.

Black tourmaline is found very commonly in many of the mica mines of Avery, Mitchell, and Yancey Counties; and sometimes it is in well developed terminated crystals. Occasionally it has been found crystalized in blocks of mica. Transparent green crystals of tourmaline have been reported from near Waynesville, Haywood County.

Octahedrite, in thin tabular brilliant crystals of a pale green color and up to one-third inch in diameter, has been found in the sands of Brindletown Creek and elsewhere in Burke County. Such crystals might furnish material from which gem stones could be cut.

Malachite occurs in small quantity at many of the copper mines of the state; but only rarely has it any gem value. A few fine pieces of gem malachite were obtained at the Copper Knob Mine in Ashe County and were placed in the Torrey Collection at the U. S. Assay office in New York City.

Of the remaining minerals referred to in the list of gem minerals occurring in North Carolina, attention might be called to the following:

Green gahnite and iolite from the Cowee ruby mine, Macon County; titanite, from the zircon mine near Tuxedo, Henderson County; hematite in quartz, from Iredell County; bronzite from near Webster, Jackson County; and epidote from Hampton's, Yancey County, near Old Fort, McDowell County, and from the gold gravels of Rutherford County.