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MINERAL RESOURCES

OF THE

UNITED STATES

CALENDAR YEARS

1883 and 1884

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PRECIOUS STONES.

BY GEORGE F. KUNZ.

Introduction.—This paper slightly repeats some of the material of the former one in the 1882 report, but this is scarcely to be avoided. The time allowed for the first paper was scarcely sufficient for consulting the literature to any great extent, and it was prepared from material at hand or from personal observation. The interval of over a year has afforded the time necessary to inquire into and verify the authenticity of this matter. Where the material has been duplicated, it is only in part, and fuller or more authentic facts are added in this report. A number of localities are mentioned where, although no gems have as yet been found, the material at times is very nearly good enough for gems; or else from the small amount of development, the possibility of gems being found in the future may fairly be inferred. A few localities are mentioned where specimens unexampled as such have been found, and have a claim on the gem collector, since they are gem minerals; and also where they have been of financial value to the finders, although little or no gem value may be attached to them, as in the case of the Pike's peak amazonstone and smoky quartz, and the Monroe spinels. Many of these are as beautiful, if not more so, in their native form, than they are after having undergone the cutting process, as for example some of the Utah topazes, beryls from North Carolina, and many others, a fact of which almost any one would be convinced by a visit to some of our finer cabinets. The cutting of such material, therefore, for the higher money value, is really vandalism and should be discouraged by all scientists.

A most important find of gem materials and specimens during the past year was at the Auburn, Maine, locality (*a*), which from July, 1883, to July, 1884, afforded possibly about \$1,000 worth of tourmaline specimens, and the other minerals netted about \$500 more. These were taken out in one month's work, and since then fully \$500 more has been realized on those taken out by the various persons working the locality.

The tourmalines and beryls found in the last work done by the Mount Mica Mining Company during the summer of 1882 were still in the possession of the company, and were offered for sale in the summer of 1884 at Bar Harbor, Mount Desert, Maine. Some were there readily sold as

a See paragraph on tourmaline, page 743.

Maine gems. The cut gems owned by the company in the early part of the summer of 1884 were valued by them as follows :

Tourmalines, from \$10 to \$500 each	\$2, 000
Beryls and aquamarines, from \$5 to \$50 each	1, 000

There are about \$400 worth of uncut specimens. No work was done here in 1884.

The beryl locality at Stoneham (a), Maine, has yielded fully \$700 worth of gems and specimens to the different workers, one crystal selling at \$75 for gem material. Some very fine blue beryls were found here.

The topaz locality, though it produced no topaz, from other minerals yielded the workers over \$500 by the sale of herderite, columbite, and associated minerals.

Work was suspended by the mining company at Stony Point, North Carolina, at the end of August, 1883, and was resumed for about two weeks during July of 1884. Since July, 1883, perhaps \$500 has been realized from the work done. The work of 1883 brought to light some of the finest crystals that have yet been found, for color, but of secondary gem value. The largest of these was about 3 inches long and very perfect. The two weeks' work of 1884 discovered a few very fine quartz crystals containing rutile, and some containing asbestos or byssolite (†); also very fine rutile crystals, though no gems. When work will be resumed is not definitely known. The adjoining property is reported to have been purchased with a view to working at some future time. The indications on Mr. John Lackey's property look very well for the class of minerals found in this section.(b)

Since October, 1882, the Pike's peak topaz and phenakite locality has been searched to some extent, and the topaz and phenakite taken from it thus far would be valued at fully \$1,500, one crystal of topaz being held at \$100, and one phenakite also at fully this amount. Two topaz gems cut from the stones found here were worth fully the same each after the cutting.

The Crystal peak locality, near Florissant, Colorado, has yielded perhaps \$1,000 worth of topaz, some specimens associated with phenakite and on amazonstone, and a number of fine amazonstone crystals.

A number of stones enumerated here, although below 7 in hardness, and even below 6, may suggest to some that they are too soft for any gem or ornamental uses. Thus apatite and fluorite are too soft for cut gems, yet beautiful cups, vases, etc., can be made of the latter. Serpentine and catlinite could be successfully worked where apatite could not, because they are opaque and do not show scratches, and an even, good color will always appear. It is only by adapting any mineral to its proper use that it can be made a success.

One of the finest displays of gem minerals since 1876 was the North Carolina exhibit in the fall of 1883 at the Mechanics' Fair at Boston.

a "Mineral Resources of the United States, 1882," page 457.

b See paragraph on beryl, page 738.

In this were some of the finest North Carolina quartzes, from White Plains and other localities; remarkably brilliant rutiles from Mitchell and Alexander counties; beautiful amethysts, some of them-rutilated; some remarkable Alexander county emeralds, and blue, green, and yellow beryls, and many others that as a rule were quite new to the general public as gem minerals.

Delusive finds.—During the past year a number of articles have appeared in regard to the finding of valuable gems, which have proved otherwise on investigation; and as newspaper statements are at times copied into the literature, it may be well to give them notice from some reliable source.

The "Blue Ridge sapphire," or the "Georgia marvel," as it was called by the press, was found nearly two years ago in a brook in Georgia, in the Blue Ridge mountains. It was estimated to be worth about \$50,000 by the owner, who had been assured of its authenticity as a sapphire by two southern jewelers, and arrived at its valuation by taking into account its weight. Anything scratched by a file is sure to be pronounced glass, whether that or really topaz or some equally hard stone; while, on the other hand, the common fallacy may prevail that anything not touched by a file is to be regarded as a genuine stone, even though it may be only glass. In this instance the gem proved to be a piece of rolled blue bottle glass, and its owner could be convinced of this only when he saw a platinum wire coated with a melted fragment of the material.

Another was a stone plowed up by Mr. James M. Smith, of Gibsonville, Guilford county, North Carolina, pronounced a genuine emerald, weighing 9 ounces, by some local expert, who tested it, and with the microscope showed that it contained various small diamonds. Its value was estimated up in the thousands, and \$1,000 was reported to have been refused for it by its owner. As it was believed to be the largest known emerald, it was expected by its owner that it would realize him many thousands. Being therefore too valuable to be intrusted to the express company, he put himself to the expense of a trip to New York, where it proved on examination to be a greenish quartz crystal, filled with long, hairlike crystals of green byssolite or actinolite, on which were series and strings of small liquid cavities that, glistening in the sun, led to the included diamond theory of the local expert. As \$5 was the best offer received for the stone, it was returned to North Carolina.

The "Wetumpka ruby," from Elmore county, Alabama, the property of Mr. James W. Thomas; was supposed to be a ruby of 6 ounces' weight "after cutting away all the roughness." Owing to its value, it was deposited in the Wetumpka bank vault, and on no consideration would be sent to any one on approbation. A small fragment sent to Mr. L. P. Gratacap, of New York, and examined by him, led him to believe that it was only a common garnet, and from its stated quality of no value,

even if a ruby. Doubtless it is one of the large rough garnets so often found in the South.

Another is a quartz (?) crystal found by Mr. James Pepper, of Danbury, North Carolina, which was examined and pronounced to be a genuine diamond by the local jewelers, and valued at \$7,000.

The diamond discoveries so often reported are not to be wondered at. In one of the southern States one of the late geologists who had much to say as to the "immortality of human events that would eventually lead to the finding of diamonds, rubies, sapphires, and emeralds in his State," knew so little of the diamond that he actually sent a common paste imitation to New York to inquire as to its genuineness as a diamond. Yet his remarks have often been copied, especially a story that a bottle of diamonds that were worth many thousands of dollars was thrown away before they were recognized.

Utilization of precious stones.—During the last ten years taste in furniture and decoration in the United States has reached so high a degree that every conceivable new idea which has been or is applied anywhere on the face of the earth has been resorted to. Minerals, as a rule, have been only slightly utilized, owing principally to the want of familiarity with them and the methods of applying them so as to avoid coldness and inappropriateness. In one of the finest pairs of carved rosewood silver-paneled pedestals in this country the dull effect of the rosewood was very much relieved by the insertion of a number of small round cabochon pieces of a dark red Texas agate, these additions really giving all the necessary brilliancy where polished wood was an effect not desired. Our large list of cheap and beautiful ornamental stones, such as jasper, agate, silicified woods, turquoise, rose quartz, and a large number of others, might be introduced with advantage into the inlaid work on clocks, mantels, and fine furniture. The utilization of rock crystal for hand glasses is mentioned on page 750.

One of the new departures in the United States in the uses made of the common stones is the introduction by a leading New York firm of a line of American stone goods, similar to the Scotch jewelry, the designs of which will be so improved and American gem stones used to such an extent in them that they will undoubtedly find a ready sale, and before the year is closed may be universally sold throughout the United States, displacing many of the cheaper varieties of gold and silver pins. Some of the minerals used are agate, moss agate, jasper of all colors, rhodonite, pyrite, labradorite, Chester county moonstone, and other cheap American minerals. The designs are crowns, knots, thistles, shepherds' crooks, nails, horseshoes, crescents, daggers, keys, spears, umbrellas, and a large variety of others suggested by the variations of forms and colors shown in the kaleidoscope.

The following few items may perhaps be of sufficient interest to entitle them to mention in this report: During the last three years a novelty has appeared in the form of a so-called mineral clock, consisting

of a plain wooden case, usually in the form of a house, and completely covered with specimens about an inch square of pyrite, galenite, amazonstone, ores from celebrated mines, and other Colorado minerals. They are glued on, and, as a rule, numbers are pasted on each referring to a list of the minerals on the back of the case. The clock part consists of a Connecticut Yankee clock. They have sold remarkably well since they were introduced, \$15,000 worth in 1882, \$11,000 in 1883, and \$20,000 worth in 1884, to be retailed at an advance of 33 per cent. In addition there are a large number of paperweights, inkstands, and a variety of objects made that have netted several thousand dollars per year more.

Arrow points.—Mr. H. C. Stevens, of Oregon City, Oregon, writes that since 1878 he has personally handled 35,000 fine arrow points, peculiar to Oregon, and that fully 50,000 in all have been found by different persons. Before 1878 perhaps an equal number were found. Fully \$3,000 have been realized on these in cash since 1878. At present few are found, except after a heavy freshet and overflow of the river banks, where the greater number have been found. These points at times represent the highest examples of savage stone chipping, and are really so often gem materials that the demand for them as articles of jewelry is not surprising. The prices range from \$1 to \$2.50 each for the finer ones, which are usually made of rock crystal; flesh-colored, red, yellow-brown or mottled jasper, obsidian, or various colors of chalcedony. They are principally sold in the East, scarcely any being sold in Oregon for jewelry. They are not made by the present Indians of Oregon. Fine suites of Oregon arrow points were exhibited by Mr. M. F. Savage at the Bartholdi Loan Exhibition at the New York Academy of Design, December, 1883.

Trilobite ornaments.—The trilobites found in various parts of the United States are used, when of the proper form, as charms, scarf pins, and other ornaments. Perhaps 99 per cent. of those used for these purposes are found in the vicinity of Cincinnati, especially near Covington, Kentucky. The species is *Calymene senaria*, which, as a rule, are found curled up, evidently in dying, and therefore appear either round or slightly oval in form, making very neat charms, and the smaller ones very pretty scarf pins. They vary in size from one-fourth inch to 2 inches in diameter, and are sold at the locality at from 25 cents to \$5 each, according to beauty or perfection. The casts of the *Calymene senaria*, variety *blumenbachii*, if perfectly flattened out and perfect in form, are worn at times as scarf pins. As they are entirely limestone, the surface, as a rule, is covered by thousands of microscopic brilliant crystals of calcite, the glitter of which is very effective. A number of fine trilobites are sold annually at Trenton Falls, especially the *Ceraurus pleurexanthamus* and *Asaphus gigas* from the Trenton limestone. They are sold, however, more as tourists' mementoes than as objects of orna-

ment. Twenty-five dollars is often asked for large fine specimens of the *Asaphs gigas*.

Cat's-eye minerals.—The following minerals found in the United States, when fibrous or cut across the cleavages in cabochon effect, will show the cat's eye ray :

Corundum: At Ellijay creek, Macon county, North Carolina, Mr. E. A. Hutchins cut a dark brown, almost black, crystal of corundum that furnished a long *en cabochon* gem, two-thirds of an inch across, that shows the cat's-eye ray distinctly.

Chrysoberyl: The chrysoberyls of Stow, Peru, and Canton, Maine, would cut into poor cat's-eyes.

Beryl: The beryls of Stoneham, and some of the North Carolina beryls, especially those from Alexander county, would furnish cat's-eyes, although not fine.

Quartz: Quartz filled with actinolite, from Cumberland Hill, Rhode Island, makes a very fine quartz cat's-eye. This is the Thetis hairstone of Dr. Jackson.

Hornblende: A fibrous black hornblende from near Chester, Massachusetts, afforded an imperfect cat's-eye.

Pyroxene: A white compact fibrous pyroxene from Tyringham, Massachusetts, made a curious white cat's-eye.

Labradorite: Some of the Labrador spar, when filled with included minerals and impurities, will show a cat's-eye ray; this is especially applicable to the mineral found in Orange county, New York, and that also in the northern part of the State.

Hypersthene, bronzite, and enstatite, when fibrous and cut across the fiber, produce a cat's-eye effect, and are sold abroad for this purpose to a very limited extent.

Limonite: Limonite from Salisbury (Connecticut), Richmond (Massachusetts), and other American localities, would at times cut into a gem showing the cat's-eye ray.

Aragonite and gypsum satin spars: These both produce the cat's-eye effect.

LOCALITIES OF PRECIOUS STONES IN THE UNITED STATES.

Diamonds.—Referring to the paper on American gems, in "Mineral Resources of the United States, 1882," containing information furnished by Mr. John H. Tyler, sr., about the Manchester diamond, having since been enabled to obtain a more complete history of it, as it is possibly the largest diamond really found in the United States, I herewith present the facts. The first record I have been able to obtain is from the New York *Evening Post* of April 28, 1855, which says: "We were shown yesterday, on board the steamship Jamestown, what is said to be the largest diamond ever discovered in North America. It was found several months ago by a laboring man at Manchester, Virginia, in some earth which he was digging up. It was put in a furnace for melting

iron, at Richmond, where it remained at red heat for two hours and twenty minutes. It was then taken out and found to be uninjured and brighter than ever. It was valued in Richmond at \$4,000." This stone was next in the possession of Capt. Samuel W. Dewey, now of Philadelphia, and by him was named the Oninoor or "sun of light," though it has more generally been known as the Dewey or Morrissey diamond. It then passed through many hands. It was cut at an expense of \$1,500 by Mr. H. D. Morse, and at one time \$6,000 was loaned on it. This diamond was a slightly rounded trigonal trisoctahedron. Its original weight was $23\frac{3}{4}$ carats, and after cutting it weighed $11\frac{1}{8}$ carats. As it is off-color and imperfect it is to-day worth not more than from \$300 to \$400. Exact copies of it in glass, as it was found, and also as cut, were deposited in the United States mint at Philadelphia, by Capt. S. W. Dewey, and also at the Peabody museum in New Haven. Electrotypes of it may be seen in a number of cabinets.

The first diamond found in North Carolina was at the ford of Brindletown creek, by Dr. F. M. Stephenson. It is an octahedron in form, and is valued at \$100. Another, in the possession of Professor Featherstonhough, was found in the same neighborhood by him. A third, observed in Mr. D. J. Twitty's collection by General Clingman, and described by Prof. C. U. Shepard, was found at Twitty's mine, Rutherford county. In form this is a distorted hexoctahedron, yellowish in color. A fourth was found by Dr. C. L. Hunter, near Cottage Home, Lincoln county, in the spring of 1852. It is said to be greenish in color and in form an elongated hexoctahedron. Another, in the possession of Dr. Andrews, of Charlotte, was found at Todd's branch, Mecklenburg county. It was said to be a perfect crystal and of a good white color. Dr. Andrews reports also the finding of a black diamond the size of a chincapin by three persons, who crushed it, believing a diamond could not be broken. He found that the fragments scratch corundum very readily.

Dr. Genth reports two diamonds from the Portis mine, Franklin county, one of them a very beautiful octahedron. A small diamond was found on the headwaters of Muddy creek, in McDowell county, and diamonds have also been reported in weight frequently from one-half carat up to over 2 carats, from J. C. Mills's mines, in Burke county. Some of these, examined by Mr. James B. Mackintosh, proved to be quartz, and another supposed diamond, found in some gravel from this mine, in the State collection at Raleigh, I found not to be a diamond, but zircon. The diamonds in North Carolina are usually found associated with gold, monazite, xenotime, zircon, octahedrite, and other minerals. Dr. Genth(a) says this débris is the result of the old gneissoid rocks, such as mica-schist and gneiss, in which graphite is always found.

In a letter to the *New York Sun* Mr. C. Leventhorpe mentions the

^a "Mineral Resources of North Carolina," *Journal Franklin Institute*, November and December, 1871.

finding at his placer mine, in Rutherford county, of a diamond of bad color, which was pronounced a diamond and placed in the Amherst College collection by Prof. C. U. Shepard. The same article also mentions a fine white diamond, valued at \$400, found in a South Carolina placer by Mr. Twitty, and states that Mr. Twitty has a diamond weighing 3 grains in his possession which was taken in White county, Georgia, from a "long tom."

In the cabinet of Mr. Samuel R. Carter, of Paris, Maine, are two small crystals of diamond weighing less than one-eighth carat, which were found in March, 1866, at the Horshaw placer gold mine, Racoochee valley, White county, Georgia, one by Dr. A. C. Hamlin(*a*), of Bangor, and the other by Mr. H. Ashbury. They are opaque and have no definite form. Several stones of fine quality have been found here.

At the May, 1867, meeting of the California Academy of Sciences Prof. B. Silliman exhibited four diamonds found in California. One, from Forest Hill, El Dorado county, weighing 0.369 gram (= 5.673 grains = $1\frac{1}{2}$ carats), was of good color with a small cavity and a dislocation on one of the solid angles. This crystal, which was not entirely symmetrical, was found at a great depth from the surface, in a tunnel running into the auriferous gravel at Forest Hill. Another was found at French Corral, in Nevada county, weighing 0.3375 gram (= 5.114 grains = $1\frac{1}{4}$ carats). It was very symmetrical in form, remarkably free from flaws, and slightly yellowish, its color having been altered by having been subjected to a red heat. It had been found in the deep gold washings and was thrown out from the cement. The third was the property of Mr. M. W. Belshaw, weighing 0.2345 gram (= 3.619 grains, little less than 1 carat). This crystal is distorted, and has several re-entering angles and cavities. Four others besides this have been found in the search for gold at Fiddletown, Amador county, in the gray cemented gravel underlying a stratum of so-called lava or compact ashes. The other one shown was the property of Mr. George E. Smith, who states that it was found at Cherokee Flat, Butte county, and that he had seen fully fifteen diamonds from this locality; these were all found in the deep gravel washings, and were believed to have come from a stratum 3 feet thick, forming part of a superincumbent mass of material 25 feet thick. Mr. Rémond(*b*) is quoted as authority for the occurrence of diamonds at Volcano, which may be the same locality as Fiddletown. Professor Whitney at this meeting stated that diamonds had been found at from fifteen to twenty localities in California, the largest that had come to his notice weighing $7\frac{1}{4}$ carats, having been found at French Corral.

Prof. B. Silliman(*c*) mentions that platinum, almandine garnet, chromite, epidote, gold, idosmine, limonite, magnetite, pyrite, quartz, rutile,

a "Leisure Hours among the Gems," A. C. Hamlin, page 49, Boston, 1884.

b "Geology of California," Vol. I., page 276.

c *American Journal of Science*, Vol. 6, 1876.

topaz, and zircon are associated with the diamond at Cherokee, Butte county, California.

Mr. W. P. Carpenter (*a*), of Placerville, states that while he was assisting Mr. W. A. Goodyear, assistant State geologist, in 1871, they found several diamonds in the hands of persons who did not know what they were; one of these was purchased as a specimen by Mr. Goodyear, who had found some specimens of itacolumite 3 miles east of Placerville, but had kept them as curiosities. The gravel in the channel is capped by lava from 50 to 450 feet in depth, and of late years is worked by steam cement mills. He says he knows of instances where fragments of broken diamonds have been found in cleaning up the batteries. He gives the following list of the finders of diamonds near Placerville: Charles Reed and Mr. Jeffries, each one; Thomas Ward & Co., three, two white and one yellow (one of these is now in the possession of Mr. Ashcroft, of Oakland, who had it cut in England); Cruson & Olmstead, four, one (*b*) of which, $\frac{3}{8}$ inch in diameter, was sold to Mr. Tucker, of San Francisco, for \$300; Thomas Potts, one small flawed stone, which was sold to Mr. Goodyear for \$15; Jacob Lyon, one light-straw colored, about the size of a medium pea, and several fragments from the tailings of a cement mill at the Lyon mine; A. Brooks, one, small white; E. Bentfeld, one, small yellow, weighing two grains, which had passed through a cement mill; one was found by Mrs. Henderson in some tailings that were washed for gold, and is most probably the one mentioned in the 1882 report as having been found near San Francisco.

Mr. H. G. Hanks visited Cherokee Flat, with the intention of studying the celebrated diamond localities, and was informed by Mr. A. McDermott, of Oroville, of a diamond the size of a pea and quite round, which had been sent to him in 1862. They are found in cleaning up the sluices and undercurrents. The first notice of a diamond being found here was in 1853. The largest one, now in the possession of Mr. John More, weighs $2\frac{1}{4}$ carats, 9 grains. Fifty to sixty stones in all have been found here, of which some were rose-colored and yellow, and others white, and all were associated with zircon, platinum, iridium, magnetite, gold, etc.

Microscopic diamonds were reported from the platinum sands of the Trinity river by Prof. F. Woehler, of Gottingen, with similar associations as at Cherokee. In all the northern counties of California drained by the Trinity river, in the vicinity of Coos bay in Oregon, and on the banks of Smith river, Del Norte county, diamonds may be looked for in the flumes and sluices.

A fine diamond from the Spring Valley mine at Cherokee, Butte county, was presented to the California State museum by Mr. G. F. Williams, superintendent of the mine. Two diamonds from here, one cut and one uncut, are in the possession of Mr. and Mrs. Harris, of

a Second report of the State mineralogist of California.

b Mentioned in Whitney's "Auriferous Gravels of the Sierra Nevada."

Cherokee. Mrs. W. C. Hendricks, of Morris Ravine, near Oroville, has also a fine Cherokee diamond set in a ring. A diamond found in 1861, weighing 6 grains (= $1\frac{1}{2}$ carats) is now in the possession of Mr. John Bidwell, of Chico. It was from a locality $1\frac{1}{2}$ miles northwest of Yankee Hill, Butte county, and has been cut in Boston.

Mr. C. G. Yale furnishes the following notes on the California occurrences: "For a period of more than thirty years the placer miners of California have occasionally picked up small diamonds. The hydraulic washings at Cherokee, Butte county, have been the most prolific. The diamonds are usually found by the miners when cleaning up their sluices or while washing off the bed rock, though in some few instances they have been picked up on the surface. As a general thing the gravel in which they occur is mixed with lava, ashes, or other volcanic matter; zircon, platinum, iridium, magnetite, etc., being associated with the diamonds. While many of these stones have been of good color, brilliant and perfect, none weighing over $3\frac{1}{2}$ carats have been found in the State. In size they have ranged usually from about half a carat down to stones of microscopic dimensions, the latter being numerous in a few localities. So far as known \$500 is the highest price for which any California diamond in the rough has been sold, though large numbers have found purchasers at prices ranging from \$10 to \$50, and not a few at as much as \$100. The stones have been of all colors, white, yellow, straw, and rose, and many of good water. A few small diamonds have been found also in the placer diggings of Idaho, being of about the same quality and occurring under the same conditions as in California. In neither region have diamonds been made the object of special search, those found having been picked up by miners while washing gravel for gold. Fragments of diamonds have been noticed in the tailings from the quartz mills, being the remains of stones which have been broken under the stamps."

Since February, 1884, numerous notices have appeared in the press of the finding of diamonds under very peculiar circumstances. A jeweler of Milwaukee purchased from a lady customer for \$1 a stone which he represented as being a topaz. The stone was reported to have been found eight years before at Eagle, Waukesha county, Wisconsin, having been thrown out from a depth of 60 feet while excavating a well. Two small stones are also reported to have been found here, each weighing less than one-half carat, the larger one first found weighing about 15 carats. One of the smaller stones I examined. All three stones are said to resemble those found at the Cape. The 15-carat stone is slightly off-color, and would, therefore, be worth only about \$300 at the outside on its merits as a diamond. It has been offered at \$1,000, owing to its being the first diamond found in Wisconsin, and it was supposed by the owner that it would be purchased for the State cabinet. Having carefully examined a quantity of the gravel sent to different persons, I have failed to find anything but the regular débris from glacial drift, and,

as remarked by one gentleman, believe if the box were to be filled with the drift material from New York City the owner would not discover the difference.

In the latter part of 1883 a diamond was reported to have been found at Nelson hill, near Blackfoot, Deer Lodge county, Montana. This stone is described as being colorless, and in form dodecahedral, with triangular markings, but is more likely a trigonal trisoctahedron with curved faces. Its specific gravity is said to be about 3.5; its weight about 12 grains. It was pronounced by an old diamond dealer of New York as really a diamond. The person now owning it came into its possession through a Chinaman, who panned it out and handed it to him, and he thinks he has seen many similar stones in the mine.

Mr. J. D. Yerrington, of New York, informs me of a brown diamond weighing 1 carat, and yielding when cut a gem weighing one-half carat, which was found near Philadelphus, Arizona. Two pieces of blue bottle glass that had been rolled so as to lose all form, were naturally supposed by the finder to be sapphires, being in the same locality with the diamond.

To insure the finding of diamonds in a new district one of the best methods is to familiarize the searchers with the luster principally, which can be readily accomplished, as once partly carried out by Mr. Dwight Whiting, of Boston. He suggested selling to the miners small imperfect diamond crystals (bort), mounted in a very inexpensive manner, so as that the entire ring or charm could be sold at from \$5 to \$10. Several thousand searchers thus prepared would soon ascertain whether diamonds really existed, and the crystal would also serve for testing the hardness of the stone as well as the luster. One of the minerals most likely to be mistaken for the diamond is a form of small quartz crystal found principally at Santa Fé and Gallup, New Mexico; Fort Defiance, Arizona; Deadwood, Dakota; and Shell creek, Nevada. They range in size from 1 to 5 millimeters, and the prism is nearly or entirely obliterated. In addition to this, as a rule, the surface is slightly roughened, and by an inexperienced person is easily mistaken for an octahedron, which is almost universally considered to be the only diamond shape.

The well-known "Arizona diamond swindle" was an adroit one, and the locality could hardly have been better selected; but it should not have received so much credence, since gem minerals are so readily recognized by means of their local characteristics by gem-collecting mineralogists.

SAPPHIRE GEMS.

Corundum.(a)—In North Carolina many corundum localities have been opened, and the material found is often of a very fine color even if not of gem quality. It was first found in the State by Gen. T. C. Clingman, who came upon a large dark mass of the cleavable variety, 3 miles be-

^a See also page 714 *et seq.*

low Marshall, in Madison county. Later on it was found by Dr. C. L. Hunter in reddish and bluish masses at Crowder's mountain, and also at Chubb's and King's mountains, Gaston county.

The largest deposits of the finest material, however, are those in Macon county, near Franklin (see "Mineral Resources of the United States, 1882," page 485). A very interesting variety from here, in addition to the gems, is a white and blue banded form which would afford curious gem stones. The Culsagee or Corundum Hill vein is from 10 to 14 feet thick. Other Macon county localities are Jacobs & Haskett's mine, on Ellijay creek; Robinson's mine, Sugartown Fork; Houston's mine, and Moore & Higton's mine.

At the Jenks mine, at Franklin, was found probably one of the finest known specimens of emerald-green sapphire (oriental emerald). It is the transparent part of a crystal of corundum 4 by 2 by $1\frac{1}{2}$ inches, from which several gems could be cut that would together furnish from 80 to 100 carats of very fine, almost emerald-green gems (not too dark, as the Siamese), the largest possibly fully 20 carats in weight. As this gem is one of the rarest known, it makes this specimen a very valuable one. It is now in the fine cabinet of Mr. Clarence S. Bement, with a suite of the choicest crystals found at this mine, and its value is over \$1,000.

From near Franklin^(a) a curious brown variety was found which shows a distinct asteria in sunlight or artificial light when the stone is cut *en cabochon*. Similar crystals have recently been found near Franklin by Mr. E. A. Hutchins, and more recently Dr. T. M. Chatard, at a locality 12 miles from Franklin, found a fine dark brown variety with bronze-like reflections.

In the Hogback mine, Jackson county, on the feldspar hanging wall, sapphire is met with in crystals; at the Cullakenee mine at times a deep ruby-red corundum is found, and also at Penland's on Shooting creek, in Clay county. Two miles northeast of Pigeon river, near the crossing of the Ashville road, in Haywood county, and 2 miles north of this on the west fork of Pigeon river, at the Presley mine, are found some of the finest colored specimens of blue and grayish-blue corundum. Twenty miles northeast of this, at the Carter mine, fine white and pink corundum is found in crystals and in a laminated form.

Blue, bluish-white, and reddish corundum is found at Swaananoa Gap, Buncombe county.

Mr. J. A. D. Stephenson found fine hexagonal prisms of a pale brownish corundum at Belt's ridge, and more recently some very fair colors from several new localities near Statesville, North Carolina.

A very fine black corundum crystal is in the Vaux cabinet at the Philadelphia Academy of Natural Sciences, the locality given being Buncombe county, North Carolina. This cabinet has also a fine ruby-

^a Transactions New York Academy of Natural Science, March, 1884.

colored corundum from Buck's creek, Clay county, and another from Hogback, Jackson county.

The gravel deposits of Burke, McDowell, and Rutherford counties contain small grains and crystals of corundum usually altered into damourite.

Mr. E. A. Hutchins, who is doing much to develop the corundum properties of North Carolina, has some very fine opalescent and deep indigo-colored corundum from near Franklin and elsewhere in Macon county.

One of the principal Pennsylvania localities is near Black Horse, near Media, Middletown township, Delaware county; the cleavage plains of the crystals show a bronze luster, and the crystals have usually fixed asterias shown by Dr. Isaac C. Lea(*a*) to be produced by included crystals. They are here found in a feldspathic rock. Near here are also crystals, found loose in the soil, at times 4 to 6 inches in length. After sinking a 60-foot shaft fully 50 tons were mined here, but work has been abandoned.

Mineral Hill, near Media, has furnished large brown and altered crystals.

Near Village Green, Ashton township, Delaware county, large brown crystals have often been found with the brown luster. Dr. Genth mentions a small mass of grayish and blue corundum with good cleavage in the vicinity of the chrome mines, Lancaster county, Pennsylvania.

In Chester county, near Fremout, West Nottingham township, and 2 miles south of Oxford, corundum has been observed with albite. Near Unionville, Newlin township, are several localities of interest. also 1½ miles north of this locality loose crystals 3 to 4 inches in length were found in the soil. (*b*)

Mr. W. W. Jefferis described a new locality on the south side of the Serpentine ridge, in Newlin township, Chester county, and fully 500 pounds of massive blue corundum had been taken out.

Mr. Louis Zimmer, of New York, possesses a fine large crystal of corundum of a deep blue color, found by him 40 miles north of Richmond, Louisa county, Virginia.

Professor Wilson, of Chicago, is reported to have found a large deposit of corundum at Lone mountain, Pennsylvania. Good blue corundum has been found on Sequale creek, Georgia.

Prof. C. U. Shepard (*c*) mentions specimens of asteriated sapphire from Litchfield, Connecticut, lacking, however, the transparency requisite to a good gem.

Hoffmann(*d*) mentions impure columnar corundum in fragments nearly 1 inch in diameter from Silver Peak, Nevada.

a Proceedings Philadelphia Academy of Natural Sciences, May, 1869.

b Proceedings Mineralogical Section Philadelphia Academy of Natural Sciences, 1879.

c "Report on Minerals of Connecticut," 1837, page 64.

d "Mineralogy of Nevada."

In Dr. F. A. Genth's suite of corundums are some that would afford opalescent stones with fixed stars, and other interesting forms from North Carolina and Pennsylvania. Many fine examples of corundums that would afford mineralogical and interesting gems from Pennsylvania are in the cabinets of Mr. W. W. Jefferis, now of Philadelphia, Mr. Lewis Palmer, of Media, and Dr. Cardesa, of Claymont. Specimens from Pennsylvania and North Carolina are to be found in the cabinets of Mr. Clarence S. Bement, Col. Joseph Wilcox, and Dr. Isaac Lea, and in the W. S. Vaux cabinet at the Philadelphia Academy of Natural Sciences. At present, however, the finest of the sapphires for the gem trade really all come from near Helena, Montana, collected there by the miners in the sluice boxes of the placer mines. These are rolled crystals, rarely over one-quarter to one-half inch long, and the colors are pale but brilliant. In the gravels of the upper Missouri river, in Montana, corundum is also found in placer mining.

The largest known crystal of sapphire(*a*) is the one found at the Jenks mine near Franklin, Macon county, North Carolina, about 1872. It weighs 312 pounds and is both red and blue (ruby and sapphire) in color. It is now in the Shepard collection at Amherst College, and escaped the disastrous fire of 1882, which destroyed so many of the fine objects there.

Chrysoberyl has been found at Stow(*b*), Maine, in masses weighing 5 pounds each, and also in single distorted crystals 3 by 5 by 1 inches, of an opaque color; these may in part furnish very poor chrysoberyl cat's-eyes. Large masses have also been found at Canton, Maine, of a somewhat similar character; and recently, perfect, small, and very distinct crystals of no gem value have been found in fibrolite at a new locality in Stow, Maine. Peru, Maine, has also afforded some crystals, though this locality is now exhausted. Mr. N. H. Perry found one small, very perfect crystal at Tubbs' Ledge, Maine, and it has also been observed at Speckled mountain, and at Stoneham, Oxford county, Maine, near the Stow line, by Professor Verill; also at Norway.

Rev. Frederick Merrick stated that he had collected fifty years ago some crystals that he believed would furnish gems, but perhaps not of the finest quality, at Haddam, Connecticut, an old and well-known locality, now exhausted. The Greenfield locality, 1 mile north of Saratoga Springs, New York, afforded many beautiful crystals, but is now also exhausted. It was also found in New Hampshire in granite, at the deep cut of the Northern railroad at Orange Summit. None of these localities, however, have furnished a fine gem. The most promising localities are those near Stow, Peru, and Canton, Maine, and gems, if found at all, will be likely to be found here. The alexandrite variety of chrysoberyl has not been observed at any American locality.

a See paper on corundum, *Popular Science Monthly*, Vol. XXII., page 452, February, 1874.

b Transactions New York Academy of Sciences, January 22, 1833.

Spinel.—Mr. Silas C. Young, who has collected minerals in Orange county, New York, for over twenty years, writes that in the past he has collected small ruby spinels, also others of a smoky and purple tint sufficiently clear to cut, and that the locality at Hamburg, New Jersey, was discovered by his father over fifty years ago. The region of granular limestone and serpentine in which spinels abound is from Amity, New York, to Andover, New Jersey, a distance of 30 miles. Monroe, Norwich, and Cornwall (New York), and Vernon, Sparta, Franklin, and Hamburg (New Jersey), are well-known localities. The locality known as Monroe, New York, which furnished the monster spinel crystals so well known to collectors of twenty years ago, is really somewhere between Monroe and Southfield. Its exact location was known only to two persons, Mr. Silas Horton and Mr. John Jenkins, both mineralogists, who worked it for some years by moonlight for secrecy, and from it took crystals that realized over \$6,000. The locality furnished many fine crystals that were ruined in blasting and breaking out. Since the death of the former miners the position of this most wonderful locality has been unknown. All this region has afforded an occasional gem stone.

The garnite from the Deak mine, Mitchell county, North Carolina, is of a very dark green color, translucent on the edges, and appears to be compact enough for cutting. The localities of Franklin and Sterling, New Jersey, have afforded some of the finest known crystals of this mineral, which would cut into mineralogical gems. At the lead mine at Canton, Georgia, some fine ones were found on galenite. Dr. F. A. Genth mentions in his "Contributions to Mineralogy" large, rough crystals 9 centimeters long from the Cotopaxi mine, Chaffee county, Colorado. Mr. William Tatham, of Philadelphia, sent me a specimen of gahnite from some lead mine in New Mexico; the crystals were from one-eighth to three-eighths inch across, bright polished octahedrons embedded in galenite. This most interesting and curious association was accompanied with massive garnet. The crystals were translucent on the edges. This locality may rightfully be regarded one of the most interesting for this variety, and it is to be regretted that more exact information cannot be obtained regarding it. At none of these places has this material been found sufficiently fine to make a good gem.

Topaz.—The Platte mountain topaz locality, near Pike's peak, described by Rev. R. T. Cross^(a) and by Mr. Whitman Cross^(b), has been prospected very extensively during the last fourteen months, and many fine crystals of topaz have been found, some of them yielding cut stones from 10 to 193 carats each in weight, and in color ranging from colorless to a rich cinnamon brown, and entirely free from flaws. One of the larger ones, belonging to the cabinet of Mrs. M. J. Chase, weighs 125 carats, and is as fine a gem as America has produced of any

^a *American Journal of Science*, October, 1883.

^b *American Journal of Science*, October, 1882.

kind. These crystals are equal in quality to many of the finest of the same size from Siberia, and one fragment of good color but flawed has been found here which weighed 2 pounds. The crystals found in this locality, over one hundred in all, during fourteen months, have sold for nearly \$1,000, at a valuation of from 50 cents to \$100 each. At Crystal peak, near Pike's peak, on large amazonstone crystals, topaz is found of a slightly different type, with phenakite, and also different in form, from the Pike's peak variety. Some occur over 1 inch long and quite thick. Prof. J. E. Clayton, of Salt Lake City, visited the locality mentioned, and it was also visited by Lieutenant Simpson in 1847. Here the topaz occurs in some isolated mountains west of the Sevier lake, and 140 miles southwest of Salt Lake City by the road. The rock is an eruptive overflow of trachyte full of amygdaloidal cavities, in which the topaz crystals are found; they are also disseminated through the body of the rock. The crystals are usually small, from 1 to 100 millimeters long, and from 5 to 8 millimeters across. The wine color, yellow, and blue are very uncommon, the general color being limpid white; they are very brilliant and of remarkable transparency, closely resembling the Durango, Mexico, and the Chaffee county, Colorado, varieties, especially the latter, which in the same rock is associated with small fine crystals of garnet. In the scarcity of water the locality presents almost insuperable obstacles, but will no doubt be revisited in the near future. The Stoneham, Maine, locality has furnished scarcely a fair crystal during the year. Genth and Kerr(*a*) mention that the Crowder's mountain topaz is very doubtful, proving on examination to be kyanite. Pycnite occurs in fine columnar aggregations of a yellowish and brownish-yellow color, associated with garnet, near White's Mills, Gaston county, North Carolina.

Diaspore.—Possibly the finest known diaspores are those which were found at the corundum locality near Unionville, in Newlin township, Chester county, Pennsylvania. The crystals were from one-half to 1½ inches in length, and one-quarter of an inch in thickness. The color varies from a white to a fawn color inclining to a topaz, while others are at times of slightly brownish tint. They closely resemble topaz in appearance, and would afford gems as fine as any yet obtained. The finest of these are in the cabinets of Dr. Isaac Lea and Colonel Joseph Wilcox, of Philadelphia.

The emery mines of Chester, Massachusetts, have produced a few small crystals which might be cut into minute cabinet gems.

Mr. John C. Trautwine, of Philadelphia, obtained some minute acicular crystals in a cavity of massive corundum at the Culsagee mine, North Carolina. General T. C. Clingman also observed the mineral associated with blue corundum near Marshall, Madison county, North Carolina.

Beryl and emerald.—Prof. Parker Cleveland(*b*) mentions having seen

a "Minerals and Mineral Localities of North Carolina," page 53.

b "Mineralogy and Geology," by Parker Cleveland, Boston, 1822, page 341.

several emeralds from Topsham, Maine, of a lively beautiful green color, scarcely, if any, inferior to the finest Peruvian emeralds; also two (a) rose-colored beryls as having been found at Goshen, Massachusetts. The finding of an emerald at Haddam, Connecticut, of a deep green color, an inch in diameter and several inches in length, is mentioned in Bruce's *Mineralogical Journal*, Vol. V., 1, as belonging to Colonel Gibbs' cabinet.

As no true emeralds are in existence from Haddam or Topsham, these may really refer to very dark green beryls.

Of emerald specimens some of the finest in color, though of little gem value, were found during the summer of 1883 at the Stony Point mine, in North Carolina. The finding of fine beryls and emeralds of pale color collected by Mr. J. A. D. Stephenson on the property of J. O. Lackey, 1 mile southwest of the Stony Point deposit, and a short distance from the Lyons property, on which the same mineral was found by Mr. Smeaton, of New York, shows that the deposit is evidently not accidental, and that there is encouragement for future work in this region. Beryl is found in greenish-yellow and deep green crystals, resembling the Siberian, in the South mountains 9 miles southwest of Morganton, Burke county; in the Sugar mountains at Shoup's ford, Dietz's, Huffman's, and Hildebrand's, and in smaller crystals in Jackson county. One fine blue-green crystal in quartz was found at Mills's gold mine, Burke county, and one fine transparent green crystal from near here is now in the cabinet of Mr. M. T. Lynde, of Brooklyn. Fine blue-green aquamarine occurs at Ray's mine on Hurricane mountain, Yancey county, North Carolina. Clear green beryls have been found at Balsam Gap, Buncombe county; Carter's mine, Madison county; Thorn mountain, Macon county; E. Balch's, Catawba county; Fort Defiance, Caldwell county, and at Wells, Gaston county. Some crystals 2 feet long and 7 inches in diameter, that would cut into gems with small clear spots, occur 4 miles south of Bakersville creek, and still others, larger, at Grassy creek, North Carolina.

The Stoneham, Maine, beryls have flocculent centers, with fibrous appearance, and some of these may cut into beryl cat's-eyes.

Beautiful transparent beryls have been found at Streaked mountain, Norway, Lovell, Bethel, and Franklin plantation, Maine, and very good ones also at Mount Mica and Grafton, Maine. The best locality, however, is the one at Stoneham, mentioned in the last report.^(b) Here some perfect gems over 1 inch long were cut from the material, and the work during the last year has yielded aquamarines of a good blue color, the aggregate values of which amount to over \$700.

At Albany, Maine, Mr. N. H. Perry has recently found beautiful transparent golden yellow beryls that would cut into perfect gems of over

^a "Mineralogy and Geology," by Parker Cleveland, Boston, 1822, page 344.

^b "Proceedings American Association for the Advancement of Science," 1883.

2 carats each. One fine-cut light sea-green aquamarine beryl from Sumner, Maine, in Mrs. Merchant's cabinet, weighs about 7 carats.

One remarkably fine deep-blue gem from Royalston, Massachusetts, weighing over 10 carats, is in the United States National Museum, and in the same collection is one weighing 14 carats from Portland, Connecticut, equal to almost any from Brazil for depth of blue color. Both of these localities have at times afforded fine clear material. Some very clear white stones are obtained at Pearl hill, in Fitchburg, Massachusetts, and are sold by the local jewelers. Dr. A. C. Hamlin owns a very fine golden yellow beryl of 4 carats from this locality.

Fine crystals of beryl of almost emerald green color, also beautiful yellowish green and bluish beryls, are found in Deshong's quarry, near Leiperville, Pennsylvania; the crystals are at times 12 inches long, of a yellowish green color. At Shaw & Ezra's quarry, near Chester, at Upper Providence, and in Middletown, Concord, and Marple townships, fine specimens have been found. Fine beryls also have been observed at White Horse, 3 or 4 miles below Darby, Pennsylvania. Bluish green and blue beryls occur in the vicinity of Unionville, Newlin township, and on Brandywine battlefield, in Birmingham township. One crystal, of a dark tourmaline green tint, over one-half inch long, in the cabinet of Mr. Michael Brodley, of Chester, Pennsylvania, is from Middletown, Delaware county, and would afford a fine gem. Some of the gems from here, especially those from the John Smith farm, have much the appearance of bluish emeralds. The finest American golden yellow beryls are found at the Avondale quarries, Delaware county, Pennsylvania. A 20-carat gem is in the cabinet of Mrs. M. J. Chase, and material for another is in the cabinet of Mr. Clarence S. Bement. Mr. B. B. Chamberlain has lately found six fine yellow beryls, 1 to 2 carats each, in Manhattanville, New York City.

The variety of beryl found at Goshen, Massachusetts, and called goshenite, occurs in pieces transparent enough to afford gems.

Phenakite.—About fifty crystals of phenakite have been found during the last year, of which fully one-quarter would afford gems, some over 6 carats in weight and absolutely pellucid; the largest crystal found was 3 inches across; the finer ones are equal in quality to the Siberian. They have been observed at the locality near Pike's peak(*a*), and also near Crystal peak small ones on amazonstone. At the topaz locality at Florissant, El Paso county, Colorado, phenakite(*b*) occurs in small but very interesting crystals implanted on microcline amazonstone. They are rarely over 5 millimeters in size, and are very transparent and colorless, and would afford minute gems.

Euclase.—Only one mention is made of euclase in the United States(*c*)

a W. Cross, in *American Journal of Science*, October, 1882.

b Identified by Mr. W. Cross in December, 1884.

c "Minerals and Mineral Localities of North Carolina," 1881.

In this case several crystals were reported as found at the residence of Mr. Morrill, Mills's Spring, Polk county, North Carolina, by Gen. T. L. Clingman, in washing the gold sand at this locality, and Dr. F. A. Genth says this mineral was *not* euclase.

Zircon.—At a locality near the Pike's Peak toll road, due west from the Cheyenne mountains (*a*), zircons are found in a soft yellow mineral in a quartz rock. The crystals found here are the most beautiful ever found of this mineral, nearly always brilliant and often transparent; in color generally a rich reddish brown, although at times pink and honey-yellow, some few emerald-green crystals also having been found. They are rarely over one-eighth inch in diameter, as a rule not over one tenth, and yet some of them would furnish very interesting small gems. Opaque zircon is found at several localities in the Pike's Peak district, in one case associated with amazonstone and in another with astrophyllite, also with a flesh-colored microcline in the same region, and in a quartz rock. No gems have been found in these localities. Zircon is abundant in the gold sands (*b*) of Polk, Burke, McDowell, Rutherford, Caldwell, Mecklenburg, Nash, Warren, and other counties in North Carolina, in nearly all the colors peculiar to Ceylon; yellowish brown, brownish white, amethystine, pink, and blue. They have many planes, but are too minute to furnish gems of any value. Gen. T. L. Clingman, in 1869, obtained within a few weeks 1,000 pounds of the well-known brownish crystals from Buncombe county, North Carolina. They occur in equal abundance at Anderson, South Carolina. The latter are readily distinguished from the North Carolina crystals, being much larger, often 1 inch across, and the prism is nearly always very small, the crystal being made up often of the two pyramids only.

Fine crystals of this mineral have also been found in Lower Saucon township, Northampton county, Pennsylvania, and three-fourths of a mile north of Bethlehem. The gravels of the Delaware and Schuylkill rivers contain considerable quantities of very minute nearly colorless crystals of zircon. Some fine ones over 1 inch in length have been found at Litchfield, Maine, and all through the cancrinite and sodalite rocks near them. In the Canfield cabinet are some of the finest known black zircons, perfect crystals over 1 inch long, which were found near Franklin, New Jersey.

Andalusite.—The andalusites of Upper Providence, Delaware county, Pennsylvania, described by Prof. E. S. Dana (*c*), are worthy of mention from the fact of their remarkable size, one of the crystals weighing 7 pounds, although not fit for gem purposes.

Andalusites of a fair pink color not entirely perfect, but still of a quality to produce mineralogical gems, were found to some extent at

a *American Journal of Science*, October, 1882.

b "Minerals and Mineral Localities of North Carolina," 1881, page 44.

c *American Journal of Science*, III., Vol. IV., December, 1872.

Westford, Massachusetts(a), some of the crystals being 2 inches long and one-fourth inch across.

No new crystals have been found at the Gorham, Maine, locality(b), of which a brief mention was made in the last report.

Andalusite has been found on the slope of Mount Wiley, Standish, Maine, by Mr. Lucien Holmes, of Standish; the crystals are fully one-quarter to three-eighths of an inch in diameter and of a good flesh-pink color; they would cut into very fair mineralogical gems. While collecting on the Dresser farm, back of the Lucien Holmes farm, I found some crystals similar to the above, equally as transparent, associated with crystals of pyrrhotite in a quartz ledge. The locality associations being identical at the three places, although 6 miles apart, would lead to the inference that this mineral must occur in some abundance in this vicinity, and that these are only outcrops of the same rock, which may yield some fine gems if the proper amount of work be expended there.

Prof. W. P. Blake (c) first observed that in Mariposa county, California, in the drift of the Chowchilla river, near the old road to Fort Miller, chiasolites are found in great abundance in fine crystals, showing the dark crosses on a white ground in a remarkably perfect and interesting manner. They are also found in the stratum of conglomerate which caps the hills above the streams, and these were doubtless all originally in place in the slates a little higher up the river. Smaller and less perfect "macles" are found in the slates at Hornitos on the road to Bear valley. The Mariposa, California, crystals, are rather the finer.

The interesting and well-known illustrations in Dana's "System of Mineralogy," page 372, well indicate the endless variety of markings that may exist in this mineral and the beautiful ornamental effects that could be produced, serving also purposes of personal adornment.

Lancaster and Westford, Massachusetts, have produced many of the finest "macles" ever found.

Schorlomite.—The schorlomite of Magnet Cove, Arkansas, as a rule is penetrated by white crystals of apatite, but at times is very free from all foreign matters, and very compact, breaking with a very bright conchoidal fracture. Its superior hardness impressed me enough to try and see the effect in gem form. It proved on cutting to yield a dead black stone of not quite as metallic a luster as rutile, but rather a modification between it and black onyx. As it occurs in sufficient quantity we have here material that will form a new and fine mourning gem; stones can be cut of any size to perhaps over 20 carats, as the mineral occurs to fully this size. The first stone cut was over 6 carats in weight. It is the only gem of metallic luster over 7 in hardness.

Staurolite.—The staurolite of Fannin county, Georgia, 12 miles south-

a School of Mines cabinet, New York.

b "Proceedings American Association for the Advancement of Science," 1883.

c W. P. Blake: "Mineral Localities of California," 1866.

east of Ducktown, Tennessee, first described by Prof. E. S. Dana(*a*), has furnished some of the finest known twinnings of this material. From their beauty these have found a sale abroad as ornaments and charms, and are more highly regarded than those found at Bretagne, France, which the superstitious believe were dropped from Heaven, according to the legend. They occur twinned in single and double crosses, and large quantities were found in decomposed rock, of which perhaps one-tenth were perfect crystals. They usually require a certain amount of scraping and cleaning when found.

Some fine brilliant crystals are found at Windham, Maine, some of the twins forming fine crosses. Occasionally crystals are found here that would afford small mineralogical gems, if cut. Their use for natural ornaments is exceedingly limited abroad, and here they are used scarcely at all.

Staurolite is found also at Franconia and Lisbon, New Hampshire, in mica slate; on the shores of Mill pond, loose in the soil; at Grantham; at Cabot, in Vermont; at Chesterfield, Massachusetts; at Bolton, Litchfield, Stafford, Tolland, and Vernon, Connecticut; on the Wissahickon, 8 miles from Philadelphia, in abundant reddish brown crystals; and at Canton, Georgia, at the lead mine.

It is also found at the Parker mine, Cherokee county, North Carolina, in fine twins; also on Persimmon, Hanging Dog, and Bear creeks, Madison county, and Tusquitee creek, Clay county. At the latter localities it is found in argillaceous and talcose slates.

Some staurolite macles similar to a chiastolite are described by Dr. C. T. Jackson from Charlestown, New Hampshire, which by insensible shades pass into andalusite macles.

Iolite.—The late Dr. Torrey possessed a fine seal made of a cube of iolite from the albite granite of Haddam, Connecticut, that displayed its dichroitic properties to the greatest perfection, the blue being remarkably fine. Though this locality promised well, the supply of gem material was scant. It has been found near the Norwich and Worcester railroad, between the Shetucket and Quinnebaug, where the gneiss has been quarried for the road. At Brimfield, Massachusetts, on the road leading to Warren, it occurs with andalusite in gneiss, and also near Norwich, Connecticut. It is found also at Richmond, New Hampshire, with anthophyllite in a talcose rock. No gems are being found at present.

Tourmaline.—One of the remarkable tourmaline localities(*b*) of the world is Mount Apatite, on the Hatch farm, Auburn, Androscoggin county, Maine, the locality first discovered by Mr. S. R. Carter. It was worked by Mr. N. H. Perry, who first found the true vein in 1882, and obtained probably one thousand five hundred crystals. They are

a *American Journal of Science*, Vol. XI., May, 1876, page 385.

b *American Journal of Science*, Vol. XXVII., April, 1884. "Proceedings American Association for the Advancement of Science," 1883.

usually colorless, light pink, light blue, bluish pink, light golden, and sections show the characteristic variety of color, such as blue and pink, green and pink, when viewed through the end of the crystal. Some of the faintly colored crystals afforded gems that were considerably darker after the cutting.

During the last summer the north side of this locality has been worked by Mr. G. C. Hatch and Mr. T. F. Lamb, and much darker material has been found, especially the green colors, some of which equal anything found at Mount Mica. Rude black crystals were observed here 8 inches in diameter and 12 feet long, and at times inclosing quartzite. Several specimens were almost emerald color, and would afford gems. This promises well to afford fine gems for some time to come, as well as the Mount Mica locality.

Mr. Lucien Holmes, of Standish, Maine, found crystals of green, red, and blue tourmaline on the Hussey farm, but they were not of gem quality, although very good as crystals. As little work has been done, this locality might improve by development. The specimens at Bates College, Lewiston, labelled "Baldwin," are supposed to have been found at this locality.

During the last year Mr. E. G. Bailey and Dr. A. C. Hamlin have opened the Mount Black locality at Rumford and Andover, Maine. The indications here are quite good for gems, and a quantity of rubellite, a great quantity of lepidolite, spodumene 3 feet long, cookite, amblygonite, and other minerals similar to those of the Mount Mica, were taken out, none however of gem quality.

The tourmaline mentioned in Hamlin's "Tourmaline," page 72, was found about 1860, by Augustus Lane, at Welcome's Corner, on the Boutelle farm. This specimen was first recognized by Dr. Hoar. The locality is about half a mile from the Hatch farm, and the indications were found by Dr. Hamlin on working, in 1860 and 1862, to be the same as at the Hatch farm.

The localities in Maine that have furnished fine tourmalines are Mount Mica at Paris, two localities at Auburn, Hebron, Norway, Mount Black in Andover and Rumford, as well as the Standish locality; the two latter have furnished no gems.

Some of the finest of the cut rubellites and green tourmalines are in the possession of Prof. C. U. Shepard and members of his family. One of the most magnificent known green tourmalines is one, the color of which is described by Professor Shepard as of a chrysolite-green, and having a blue tinge, while less yellow and more green than chrysolite. It is 1 inch long, $\frac{3}{4}$ inch broad, and 1 inch thick, and finer than any of the Hope gems. One fine rubellite of two-thirds this size, and equally fine, one pink topaz one-half this size, and one remarkable rubellite the size of the large green tourmaline, are also in possession of this family.

The Hamlin cabinet (a), the first crystal of which was found in 1820,

a See "The Tourmaline," by A. C. Hamlin.

contains many hundred fine rubellites, indicolites, achroites, and fine pink, green, yellow, and other colored tourmalines, mostly from Paris, Maine. It is the finest tourmaline collection in the world, and really would furnish full suites for a dozen cabinets. One wonderful dark gem of 28 carats, 1 inch long, one achroite of 23 carats, and many fine stones of nearly every known shade of color of this gem, are found in this cabinet.

The DeKalb, New York, locality of white tourmalines afforded a few fine crystals. The choicest of these, in the cabinet of Mr. Clarence S. Bement, is over 1 inch long, and would cut into a gem weighing over 10 carats, that for light yellow color would be equal to that from any American locality.

Dr. Genth(*a*) mentions beautiful light yellow, brownish yellow, and at times white crystals, at Bailey's limestone quarry, East Marlborough, Pennsylvania; yellow crystals at Logan's limestone quarry, West Marlborough; brown, light yellow, at times transparent, at John Nivin's limestone quarry, New Garden township; and green tourmaline in talc has been found near Rock Spring, Lancaster county. Very beautiful crystals of black tourmaline are found in Delaware county; near Leipserville, it is found in crystals of 5 inches in length and $1\frac{1}{2}$ inches thick, and well terminated; also in Marple township, terminated with two low rhombohedra. These are about as fine as black crystals are ever found. Bluish and brownish green tourmaline is found in fine crystals, penetrating damourite and diaspore, at Unionville, Newlin township.

The brown tourmaline found near Amity, and called xanthite, Mr. S. C. Young informs me he has observed transparent enough to cut into gems.

A small, well terminated, transparent green tourmaline (*b*) was found by Colonel Mills, on Silver creek, Burke county, North Carolina; also a black crystal 4 inches long, inclosed in a green beryl crystal.

Garnet group.—Although the garnets found in the diamond mines at the Cape of Good Hope, the so-called Cape rubies, are larger in size, and perhaps equal to those of Arizona, New Mexico, etc., by daylight, yet there is undoubtedly no finer garnet found that looks better in the evening than those from the garnet regions of the United States. The dark color in Cape garnets remains by artificial light, whereas with the American garnets nothing but the clear blood color is visible. They are of fine quality and plentiful on the Great Colorado plateau. Hoffmann mentions good though small crystals of garnet from Black Cañon, Colorado river, Nevada. Fine small almandine garnets are also found in the trachyte of White Pine county, Nevada. Some very fine crystals of garnet have been found during the summer at Round mountain, Albany, Maine, by Mr. Edgar D. Andrews. The large dodecahedral and trapezohedral garnets, coated externally with a brown crust of

a "Preliminary report on the Mineralogy of Pennsylvania," page 96.

b "Minerals and Mineral Localities of North Carolina," page 52.

limonite, but usually on breaking showing a bright and very compact material, are often as fine in color as the Bohemian gem material, and should find a ready use for watch jewels and other like purposes. Some of these crystals weigh 20 pounds, and would afford large dishes or cups measuring from 3 to 6 inches across. Some have been cut into very fine gems. They are found in Burke, Caldwell, and Catawba counties, North Carolina. A very large quantity has been found about 8 miles southeast of Morganton, in Burke county, and also near Warlick, in the same county. Another good locality is 4 miles from Marshall. Many of them are very transparent, varying in color from the purple almandine to a pyrope red. Many tons have been crushed to make "emery" and the sandpaper called garnet paper. The peculiar play of color is often due to the inclusions. In these, as well as those from Stony Point and elsewhere, at times nearly one-quarter of the entire crystal is taken up by cavities of fluid, acicular crystals, etc.

Pyrope of good color has been observed in the sands of the gold washings of Burke, McDowell, and Warren counties, North Carolina.

The Avondale, Pennsylvania, quarry has furnished some of the finest known crystals of common garnet as specimens, one of them measuring $2\frac{1}{2}$ inches across (in a piece of quartzite), in color a rich purplish red, with beautiful natural polish and remarkably sharp angles. It is, perhaps, as fine as it is possible for this mineral to occur in crystal form, and is in the cabinet of Mr. C. S. Bement.

Iron-alumina garnet is found in Concord township, at Deshong's quarry, Shaw & Ezra's quarry, and at Upland, near Chester; also in Darby, Acton, Lower Providence, Haverford, and Radnor townships, Pennsylvania. A dark red variety, similar to pyrope in color, is found in the bed of Darby creek, near the Lazaretto, in Delaware county. Some peculiar garnets of a deep blood-red color have been mistaken for pyrope, but an analysis made by Mr. C. A. Kurlbaum proved them to be true garnets. Many garnets have been cut by collectors from both Chester and Delaware counties, and some of these were of very fair quality. At Acworth, Grafton, and Hanover, New Hampshire, garnets of gem value have often been found. At Russell, Massachusetts, a vein of garnet, very dark in color, and called there black garnet (not melanite), was opened during the last two years, and many fine crystals have been taken out, partly by Mr. Daniel Clark, of Tyringham, Massachusetts. These have been sold as specimens only, or exchanged for minerals, and were valued at fully \$1,000 in all.

Beautiful transparent essonites one-fourth inch in diameter have been found at the Avondale quarry, Pennsylvania. They are entirely transparent and quite flat, being usually found between plates of mica. A few have been found equal to the Ceylon essonites. Essonite has been found of good quality at Milton plantation, and at the Carter, Perry, and Wild properties, Oxford county, Maine. Very fine essonites, red and fine yellow, were formerly found at Phippsburg, Maine. Mr. George

W. Fiss, of Philadelphia, found some of the most beautiful natural gems of microscopic yellow garnets in the cleaning out of a small cavity at the microlite locality near Amelia Court-House, Virginia. In the cabinet of Dr. Isaac Lea are some crystals of a rich, dark, oily green grossularite, transparent, from 1 to 5 millimeters long, that were found at the Good Hope mine, California. Some very fair crystals of a rich green grossularite, from 1 to 5 millimeters in diameter, are found at Hebron and West Minot, Maine.

The colophonite from Willsborough, New York, although of a beautifully rich, iridescent color, has never been utilized, owing to the small size of the grains and the friability of the large masses. At Franklin, Sussex county, New Jersey, immense crystals of the different varieties, melanite, polyadelphite, colophonite, etc., have been found, but rarely in crystals that would afford a gem.

The beautiful and rare garnet, ouvarovite, was first described as occurring in this country by Prof. C. U. Shepard (*a*), as having been found in minute nearly transparent emerald-green crystals one-tenth inch in diameter at Wood's chrome mine, Lancaster county, Pennsylvania. The ouvarovite from Oxford, Canada, adjoining Newport, Vermont, on Lake Memphremagog, is found in large quantities, at times in masses over 1 foot across. The crystals, however, are very small, being rarely over one-sixteenth inch across, though usually of a good color. The white garnet from here, described by Dr. T. Sterry Hunt (*b*), although not in crystals, is identical with the fine crystals found at Wakefield (*c*), Canada, and has been cut into white gems. The Wakefield ouvarovite is much finer than the Oxford crystals, some one-fourth inch across having been found, one of which is now in the cabinet of the late Mr. John G. Miller, of Ottawa, Canada.

Garnets are found at many localities in California and Arizona. According to Prof. W. P. Blake they have been found at the following places in California: Rodgers mine, in the eastern part of El Dorado county, a green grossular stone in copper ore; near Petaluma, Sonoma county, associated with specular iron, calcspar, and iron and copper pyrites; in the Coso district, Inyo county, in large semi-crystalline masses of a light color, some specimens of which were taken to San Francisco under the impression that they contained tin; 3 miles from Pilot Hill, El Dorado county, in blocks several feet thick; also in Plumas, Mono, Fresno, Los Angeles, and San Diego counties. Garnets occur in great quantities in mica-schist at the mouth of the Stikéén river, near Fort Wrangel, Alaska. Blood-red stones are plentiful on the Nacimiento desert, near Fort Defiance, northeastern Arizona. They are found here in the loose sand, having probably been brought by the action of water from a point 50 miles to the north, where they occur in

a *American Journal of Science*, 2, XLI., page 216.

b "Geology of Canada," 1863, page 496.

c "Proceedings American Association for the Advancement of Science," 1883.

the so-called syenite. This is thought to be the place where the perpetrators of the famous "diamond swindle" procured the garnets with which they salted the bogus diamond field. In the western part of Arizona, on the same parallel with Fort Defiance, garnets have been observed on both sides of the Colorado river.

Kyanite.—The finest American kyanites were possibly those formerly found at Chesterfield, Massachusetts, a fine example of which is in the British Museum cabinet at South Kensington. The crystals in this are all distinct, of a fine dark blue color, and would cut into some small mineralogical gems.

At the locality at Derby creek, Moon's ferry, Delaware county, Pennsylvania, fine deep azure-blue blades 5 and 6 inches long have been found, which would afford gems if they were thicker. Blue, green, and gray specimens are found at East Bradford.

Fine crystals are found, together with lazulite, at Chubb's and Crowder's mountains, Gaston county, North Carolina, on the road to Cooper's gap.

In Maine kyanite is found in fine crystals at Windham.

The old localities are Worthington, Blanford, Westfield, and Lancaster, Massachusetts; Litchfield and Washington, Connecticut; Stratford, Salisbury, and Bellows Falls, Vermont; near Wilmington, Delaware, and at Willis mountain, Buckingham county, also 2 miles north of Chancellorsville, Spottsylvania county, in Virginia.

No really fine gems have as yet been produced from American kyanite.

Danburite is found in considerable quantity at Russell, New York.

Lithia emerald (hiddenite).—Lithia emerald, or hiddenite, has been found in very small quantities at Stony Point, Alexander county, North Carolina, since the spring of 1883; nearly all the gems sold by the company now are, therefore, of old material. usually small stones, or else rather light colored.

SILICA GROUP.

Transparent quartz.—In Herkimer county, New York, quartz crystals have been collected by many for their remarkable brilliancy and perfection, rivaling even those found in the Carrara marble; many collections of them have been made, notably one by Rev. Bogert Walker, of Herkimer. There are a number of others at Middleville, Little Falls, Canajoharie, and other places. Many are sold along the railroads, a two-ounce vial of them usually bringing \$2. Crystals with a drop of water bring from \$1 to \$30; single fine limpid ones, from 10 cents to \$25. At times they are brilliant, transparent, and perfect as any known substance, whiter even than any diamond. Curious groupings or inclusions, such as bitumen, pearl spar, etc., also bring fancy prices.

Many fine crystals were obtained where the railroad was opened, at Middleville and Newport, also at Little Falls, on the line of the West

Shore railroad. The old diggings at Little Falls have been worked so extensively that the highway has been encroached upon, thus partly preventing further digging. There crystals are in demand all over the United States, several men being required to dig nearly all the time to supply the demand from all quarters. At Diamond point and Diamond island, Lake George, the same crystals occur as in Herkimer county, and are extensively sold there.

Some of the most magnificent known groups of quartz were formerly obtained at the Ellenville lead mines, Ulster county, New York, some of the finest of which are now at the American Museum of Natural History, New York City. Few, if any, of these were used for gem purposes, although many were sold as souvenirs at the locality over twenty years ago. The Sterling mine at Antwerp, New York, furnishes small, fine, doubly-terminated dodecahedral crystals, and the same forms, slightly different, are also found in the specular iron at Fowler, Herman, and Edwards, Saint Lawrence county; Diamond hill, Lansingburg, is an old but poor locality, and Diamond island, Portland harbor, Maine, is well known for the small but bright crystals found there.

Dr. Genth, in "Preliminary Mineralogy of Pennsylvania," mentions crystals from $1\frac{1}{2}$ to 3 inches across, short and thick, but with clear pyramid, from Nazareth, Northampton county, Pennsylvania; also fine crystals, $1\frac{1}{2}$ inches long and wide, from Crystal springs, on Blue mountain, in Bushkill township.

The highly modified crystals from Diamond Hill and Cumberland Hill, Rhode Island, also the fine ones from White Plains and Stony Point, Alexander county, and from Catawba and Burke counties, North Carolina, are worthy of mention, and lately formed the subject of a crystallographic memoir by Prof. Gerhard vom Rath.

The San Francisco *Bulletin* of July 16, 1884, mentions the finding of a large deposit of crystal or pebble stones on the Santa Margarita rancho, San Diego county, California, special reference being made to one specimen of pure crystal 8 inches in diameter.

Mention is made by Dr. Daniel G. Britton(a) in a paper on the folk lore of Yucatan, in quoting the language of Garcia that the natives were converted from Pagan idolaters to Christian idolaters, and speaking of the belief in witchcraft and sorcery among them, that the wise men divine with a rock crystal and that it has great influence over their crops. Their occurrence in the mounds of Arkansas, North Carolina, and elsewhere, and the abrasion of the crystalline edges, would lead to the inference that they were not collected only to bury with the dead, but that they were carried by the natives for a long time to produce certain influences, and having been used for such purposes were probably buried with them as their property. Personal observation in Garland and Montgomery counties, Arkansas, carried on at times 40 miles from the Crystal mountain locality, showed these crystals

associated with a quantity of some of the finest chipped arrow points of chalcedony anywhere found, and yet no trace of a chipped crystal could be found among them. In a number of the mounds leveled by the farmers in cultivating, and not worked systematically, many single crystals of quartz were revealed, which may, however, have been kept for their beauty and symmetry by the Indians. These masses of transparent quartz, especially from North Carolina, would afford perfectly clear crystal balls, at least 2 to 4 inches in diameter, and a few have been cut over 2 inches.

A large mass weighing 5 kilos was recently brought from Alaska, and was only a part of an original mass which must have weighed 20 kilos. It afforded clear crystal slabs for hand glasses 3 by 5 inches. The superiority of this material over glass lies in the fact that it does not, like glass, by its color detract from the rosiness of the countenance. A fine glass of this kind is in the Dresden "green vaults."

Amethyst.—One of the finest American amethysts was lately shown me by Mr. L. M. Ives, of New York City. The color was nearly equal to the finest Siberian, and the crystal would afford a gem three-eighths inch across. It was found by Mr. Ives, 1½ miles from Roaring brook, near Cheshire, Connecticut.

Amethyst of a light purple and at times pink color is found in crystals 3 inches long and over in large abundance at Clayton, Rabun county, Georgia. At times these have large liquid cavities containing movable bubbles of gas. They are of little gem value, although fine as specimens. Some fine amethysts in the Hamlin cabinet are from Oxford county, Maine. Very fair crystals were formerly found at Mount Crawford, Surray, Waterville, and Westmoreland, New Hampshire. Some very fair crystals have been observed at Bristol, Rhode Island. Dr. F. A. Genth(*a*) mentions magnificent specimens from Delaware and Chester counties, Pennsylvania. Among the principal localities may be mentioned the farms of S. Entrikin, William Gibbon, Mrs. Faulkes, and Dr. Elwayne, in East Bradford township; in Pocopsou township, John Entrikin's and Joseph B. Darlington's; Birmingham township, on Davis B. Williams's farm; in Charlestown township about 1 quart of loose crystals were obtained; on Charles Passmore's farm, Newlin township, about 100 pounds have been found. Mr. W. W. Jefferis(*b*) announced that amethysts of a rich purple color had been found in the northern part of Newlin township. Splendid crystals, one weighing 7 pounds, though not gem material, were found at Morgan Hunter's farm in Upper Providence. Other localities are Astor, Concord, Marple, and Middletown townships. Near Twaddle's paper mill, in Birmingham, they are found in clusters, and in isolated crystals near Dutton's mill;

a "Preliminary report on the Mineralogy of Pennsylvania," page 57, B.

b "Proceedings Philadelphia Academy of Natural Science, Mineralogical Section," page 44.

also at Chester and Thornbury, Delaware county, Pennsylvania, where many fine gems have been found, well known among the cabinets.

Hoffmann mentions amethyst on the mesa near the mouth of the Rio Virgen, Nevada. In Llano and Burnett counties, Texas, some very fair amethysts have been found; and at Grand Rapids, Wood county, Wisconsin, also in the amygdaloid on the Lake Superior shore, and in Michigan in trap rock at Keweenaw Point and Point Aux Peaux, Monroe county.

In the Yellowstone National Park and at Holbrook, Arizona, amethysts line the hollow trunks of agatized trees, varying in color from light pink to a dark purple, and forming a beautiful contrast with the chalcedony and banded agate sides of these specimens. They occur also in small crystals at Nevada and neighboring localities on Bear creek, Clear Creek county, on the summit of the range east of the Animas, Colorado. The Lake Superior variety found at Prince Arthur's landing, often of large size, is spotted with the coating of red mosslike markings so well known, giving them a moss-amethyst effect, if cut, though as a rule the coating is so even as to cover the entire surface, and nothing but a brick-red color is visible unless the crystals are broken. Notwithstanding the abundance of this mineral, but few gems could be cut from this locality. The West Shore railroad tunnel at Weehawken, New Jersey, brought to light a few very fair amethyst specimens in the volcanic rock.

The most remarkable amethyst as yet found in the United States has lately been deposited in the National Museum by Dr. H. S. Lucas. It is a turtle-shaped prehistoric chipping, measuring $2\frac{3}{4}$ inches in length, 2 inches in width, and $1\frac{1}{2}$ inches in thickness. The entire piece is transparent, flawless, and would afford a remarkable gem if cut.

Citrine is mentioned by Hoffmann(*a*) as occurring at Tuscarora, Gold Mountain, and in Palmetto cañon, Nevada. At Taylorsville and Stony Point, North Carolina, a number of clear pieces of this material were found that cut fair stones weighing over 1 ounce each. Occasionally at the Herkimer and Lake George localities quartz crystals have a fine citrine tint.

Smoky quartz.—The quartz of Herkimer county, New York, and Diamond island and Diamond point, Lake George, is at times of a variety of beautiful smoky tints and exceptionally pellucid. Some fine smoky quartz has been found at Goshen, Massachusetts, and by Mr. Gideon Bearce at Minot, Maine. A mass of fine clear smoky quartz weighing over 6 pounds, with clear spaces several inches across, was found in the summer of 1884 on Blueberry hill, Stoneham, Maine; and a fine crystal over 4 inches long and 2 across, very clear in parts, was found near Mount Pleasant, Oxford county. Dr. Genth(*b*) mentioned smoky quartz near Philadelphia; on the Schuylkill, near Reading, Berks

a "Mineralogy of Nevada."

b "Preliminary report on the Mineralogy of Pennsylvania," page 58.

county; near Hammerstown, Dauphin county; in Upper Derby, near Garret's road tollgate, and near the Kellyville schoolhouse, all in Delaware county; also at the tunnel near Phoenixville, and in East Nottingham and Birmingham townships, Chester county. In certain parts of Delaware and Chester counties the amethyst and smoky quartz gradually shade into each other, a characteristic peculiar also to many from the North Carolina localities. Alexander, Burke, and Catawba counties and other localities afford fine smoky quartz crystals. Some very fine ones have been found at Iron Mountain, Missouri.

From a region 20 miles west of Hot Springs, for about 60 miles westward, the quartz crystals as a rule are all doubly terminated and detached, and are found loose in the sand between the breaks or veins in the sandstone, which somewhat resembles the calciferous sandstones of Herkimer, New York. At that part of this region called "the gem country," nearest Hot Springs, the crystals are quite white, but gradually shade into a dark smoky color at the other end of the district. As a rule all the quartz is filled with fluid cavities. Some four hundred crystals with liquid inclusions were obtained from two veins of sand within three days.

Most of the cut articles of smoky quartz sold at the tourist localities are of foreign material cut abroad at a very low figure. Smoky quartz pebbles are rarely found in the sands along our coasts. At the watering places, such as Long Branch and Cape May, they are, however, occasionally found and cut as souvenirs.

The Pike's peak region at Bear creek is by far the richest locality for smoky quartz, and many thousands of crystals have been procured from 1 inch to those from 1 foot to over 4 feet long.^(a) Considerable of this material has been sent abroad for cutting. Crystals are also found on Elk creek and the Upper Platte. Smoky quartz is found near Placerville, El Dorado county, California, in the placers. A fine large crystal 6 inches in diameter was in the cabinet of Dr. White, of Placerville.

A specimen of the rose quartz from Stow, Maine, cut into a long double cabochon from a massive transparent piece of quartz, distinctly shows the asteria effect similar to the star sapphire, if viewed by sunlight or artificial light.

Aventurine^(b) quartz has not been observed from any American locality in fine specimens, although mentioned by Dr. F. M. Endlich as occurring on Elk creek, Colorado. Prof. John Collett has lately found a few small specimens of white aventurine quartz pebbles in the drift near Indianapolis.

Rose quartz.—At Stow, Albany, Paris, and a number of other localities in Maine, the veins of quartz shade from white, transparent, and opalescent resembling hyaline quartz, often without any imperfections, through faintly tinted pink and slightly salmon colored, into a rich rose

^aDr. A. E. Foot's cabinet.

^bTenth Annual Report, F. V. Hayden, Geological Survey, 1876, page 160.

color, thus forming a beautiful series of tints of color that have merit for a common gem or for ornamental stone work. Possibly as fine transparent opalescent rose quartzes as have ever been found were recently obtained, in pieces free from all flaws, of a fine rose-red with a beautiful milky opalescence 4 by 5 inches in size, at Round mountain, Albany, Maine. A beautiful opalescent quartz has been found at Daw river, Stokes county, North Carolina. Rose quartz is found at many localities in the granites of Colorado, also in fine specimens at the head of Roaring fork, from near Clear creek, and on Bear creek. It is mentioned by Hoffmann, from Tuscarora, Moray, and Carlin, and Silver Peak, Nevada(*a*); also by Sweet(*b*) in crystals from Grand Rapids, Wood county, Wisconsin.

Prase.—Prase is found always crystallized at the various limonite deposits on Staten Island, New York. As specimens the mineral is very good indeed; groups of crystals are often 8 or 10 inches across, although the crystals are rarely over one-half inch long and one-eighth inch in diameter. The color as a rule is a dark leek green of no gem value.

Prof. W. P. Blake(*c*) mentions a greenish-tinged quartz resembling datolite in color, from the French lode, Eureka district, California.

Hoffmann, in the "Mineralogy of Nevada," mentions prase in crystals at Reese river, San Antonio, and occasionally on the mountain near Silver Peak.

A translucent leek-green variety(*d*) of chalcedony and quartz occurs in the syenitic range of the Lehigh, especially at the allanite locality, 5 miles east of Bethlehem, Pennsylvania. Prase is found at Blue hill, Delaware county, in doubly-terminated crystals, in curious crossings and rosettes several inches across; also in inferior specimens near Dismal run, Delaware county. Very fine quartz(*e*) occurs in its massive variety at George Van Arsdale's quarry, Bucks county; in Delaware county at Radnor; and in East Bradford township, Chester county.

Quartz inclusions.—The quartz inclusions as they occur in some varieties are sometimes of great beauty, and constitute an important part of the American gem minerals. As some of these are quite rare and little known among collectors, mention of a few of the leading American localities may not come amiss(*f*).

Two of the finest known specimens of rutilated quartz are of American origin; they are massive smoky quartz, evidently parts of one crystal. One of them was originally in the possession of the late Dr. Chilton(*g*) as early as 1847, and is now in the Vaux cabinet at the Philadelphia Academy of Sciences. It is about 7 by 3½ inches, and is

a "Mineralogy of Nevada."

b Sweet's "Minerals of Wisconsin."

c "Catalogue of Minerals of California," 1866, page 20.

d Preliminary report on the Mineralogy of Pennsylvania, page 59.

e Preliminary report on the Mineralogy of Pennsylvania, page 58.

f See also paragraphs on rutile, amethyst, and garnet.

g "Proceedings American Association for the Advancement of Science," 1849.

completely filled with transparent essonite-red crystals of rutile, some of which are over 6 inches long and from the thickness of a knitting needle to that of a thin lead pencil; the larger crystals are slightly flattened. The other belongs to Prof. Oliver P. Hubbard(*a*), of Dartmouth College, and is 7 inches long by 3 inches across, and of a rich smoky color. The included crystals are a fine essonite-red, but not thicker than a knitting needle. Both were brought from some Vermont locality now unknown; believed, however, not to be Bethel or Rochester, notwithstanding these localities have furnished many fine crystals of similar size filled with beautiful rutile. Beautiful pieces of quartz 3 by 4 inches, and fine crystals of quartz penetrated by beautiful clove-brown and black rutile, were formerly found at Middlesex, Vermont.

Rutilated quartz of unexcelled beauty, the rutile usually brown, red, golden, and black, has been found at many localities in Randolph, Catawba, Burke, Iredell, and Alexander counties, North Carolina; and during the last year, at the emerald mine at Stony Point, crystals of quartz have been found 3 inches in length, and filled with rutile as thick as a knitting needle. Fine pieces of quartz 4 inches square, containing acicular rutile of a rich red color, were found near Amelia Court-House, Virginia. Some fine acicular crystals of rutile in limpid quartz, in the possession of Mr. Joseph Wharton, were found near Knitzer's, Lancaster county, Pennsylvania.

Mr. Samuel R. Carter has in his cabinet cut specimens of pieces of bluish quartz filled with small acicular crystals of indicolite, somewhat resembling rutile in quartz, with the exception of the blue color. These were found in pieces over 1 inch square at the famous tourmaline locality at Mount Mica, Paris, Maine.

The mining operations at Stony Point, North Carolina, brought to light a number of crystals of quartz, some 4 inches long and 3 inches across. Large pieces of quartz 3 inches square, filled with what appears to be asbestos or byssolite, form interesting and pretty specimens. The inclosures of what appears to be göthite in red fan-shape crystals from North Carolina also form very pretty and interesting gem stones.

A fine limpid crystal(*b*) of quartz, 1 inch long and two-thirds of an inch in diameter, penetrated by fine green crystals of actinolite one-half millimeter in diameter, is said to have been found at some Virginia locality. The so-called Gibsonville emerald(*c*), exactly similar to the above, the crystal being 3 by 2 inches, was plowed up in a field at Gibsonville, North Carolina.

Some crystals of limpid quartz have been found in California containing particles of native gold; one of these was said to be 1 inch long, and inclosed a scale of gold about the size of the end of a finger

a "Proceedings American Association for the Advancement of Science," 1849.

b Cabinet of Tiffany & Co.

c See page 725.

nail. Two of these inclusions, not so large, are in the possession of Rev. W. C. Hovey, of Minneapolis, Minnesota.

In Nevada county, California, in the Grass Valley mines, quartz is often found supporting gold between the crystals. Pellucid crystals of quartz, some 1 inch long and three-fourths of an inch across, filled with a very brilliant stibnite projecting in all directions and some of them curiously bent, were found at the Little Dora mine, Animas forks, San Juan, Colorado, Mr. John W. Palmer, of Chicago, owning a very fine one. This material is capable of being made into one of the finest of this class of gems that have been found at any locality.

The beautiful specimens of limpid milky quartz, and also quartz crystals, the latter at times from three-fourths of an inch to 2 inches long, are found penetrated by crystals of black hornblende varying in size from acicular to those one-sixteenth inch in diameter and at times 6 inches long. They interlace and penetrate the quartz in every direction, making a very beautiful gem and ornamental stone. Fine pieces 6 inches square have been found. It occurs at the quarry at Calumet hill, Cumberland, Rhode Island, where the workmen, as a rule, knowing its value, secure the best specimens for disposal to the greatest advantage. Some hundreds of pounds of this material were sent abroad a few years ago to be cut up for jewelry at Idar and Oberstein. As, however, work has been suspended at the locality, the mineral is likely to become somewhat uncommon. Cut specimens sell at from 50 cents to \$5, and specimens polished on one side at from 25 cents to \$5. This locality is one of the best known for this association.

Among other inclusions that might be utilized for gems may be mentioned the following: Crystals of quartz filled with specular iron found at the Sterling mine, Antwerp, New York; quartz including scales of hematite from King's Mills, Iredell county, North Carolina; dolomite in pellucid quartz of Herkimer county, New York; crystals of quartz containing crystals of the green spodumene (hiddenite) from Stony Point, North Carolina, and fine inclosures of chlorite and mica, green when viewed through the side of the prism, from several North Carolina localities.

The corals and sponges of Tampa bay, Florida, which are so often found there altered to chalcedony by the siliceous waters, are at times filled with fluid that was imprisoned while the regular deposition of silica closed the apertures that admitted the siliceous water. These, as well as the ones found in Uruguay, the so-called hydrolites, or water-stones, are always lined with drusy quartz. If not as beautiful as those from Uruguay, they are even more interesting, and have been sold at from \$2 to \$20 each.

The crystals of quartz from the Herkimer (New York), North Carolina, and Arkansas localities, containing fluid cavities with moving bubbles, are at times cut into ornaments which are not only interesting but pretty. One of these pure limpid crystals with a crescent-shaped

cavity, from Little Falls, was mounted in a pair of gold ice-tongs to represent a cake of ice. These crystals are valued at from \$1 to \$25 each. In Rabun county, Georgia, the fine amethysts often contain these cavities nearly 1 inch long, and would afford good gems, as would also those from Stow, Maine.

The quartz pseudomorphs, after calcite cleavages, from the locality 2 or 3 miles northwest from Rutherfordtown, Rutherford county, North Carolina, at times contain liquid in irregular-shaped cavities, and from their breaking out in good shape can be utilized for curious ornaments. This variety of quartz was also found by Mr. J. A. D. Stephenson in Iredell county. Possibly the finest specimen is one belonging to Mr. W. B. Dinsmore, of New York City. It is about 1 inch long and the surface is coated with a beautiful bluish white chalcedony with a curious rough surface, and it is perfect on all sides, with a free movement of the bubble. It is so thin and so filled with liquid that the liquid would weigh fully twice as much as the quartz walls. It is of the proper size and sufficiently beautiful for personal ornament. As nearly as can be ascertained it is from some locality in Georgia.

In the cabinet of Dr. Isaac Lea, of Philadelphia, there are perhaps thousands of remarkably fine and unique inclusions in quartz, as well as in all known gems, probably, in fact, every known form of mineral inclusion, forming undoubtedly the finest cabinet of "included minerals" in the world, the result of scores of years of keen observation and careful microscopic work. In the cabinet there are, of course, many stones which could be cut into fine gem stones, but which possess a higher interest as mineralogical specimens.

Agate and chalcedony.—The "trap" along the Connecticut river, especially at Amherst and Conway, Massachusetts, and Farmington, East Haven, Woodbury, and Guilford, Connecticut, affords agates of considerable beauty, though rarely over 3 inches across. The so-called chalcedonic balls of Torrington are very handsome when polished, and the rich carnelian shades with milky translucency afford a pleasing contrast. Many of these were cut into the form of sealstones as early as 1837(a), which were fully equal to any from abroad in the delicate arrangement of the layers and the richness of the colors. At Natural Bridge, Jefferson county, New York, fine agates have been found. The Belmont lead mine, Saint Lawrence county, has afforded some very good chalcedony. White, yellow, and blue chalcedony of good size was found 4 miles east of Warwick, at Bellvale, Orange county, New York, by Dr. W. Horton.(b)

Chalcedony is found in Delaware county, Pennsylvania, principally at Middletown and Marple. Brown botryoidal masses occur at the Hope-well mine; also, at Williston, West Nottingham, West Goshen, and London Grove townships, in Chester county; a pale blue variety at

a C. U. Shepard: "Mineralogical Report of Connecticut," 1837.

b "Geological Survey of New York," 1840; Report on Orange county minerals.

Cornwall, Lebanon county; near Rock spring and Wood's mine, in Lancaster county; between Clay and Hamburg; also, at Flint hill, Berks county; in Cherry valley, Munroe county; at Conshohocken, Montgomery county, and at other localities in Pennsylvania. From many of these localities, especially in Delaware and Chester counties, ringstones, sealstones, and other ornaments are worn by the residents who have had them cut from local material.

Agates are found abundantly on the entire Lake Superior shore, and along the Mississippi river, especially in Minnesota, and fine chalcedony occurs 5 miles north of Grand Rapids, Wisconsin. Agate and chalcedony are both found at the Fox river, Illinois. Agate, chalcedony, and carnelian are found near Van Horn's well, Texas, and near Hot Springs, Arkansas.

The agates of the Yellowstone National Park and Holbrook, Arizona, equal any yet found.

A rich fawn and salmon colored chalcedony has been found in Burke county, North Carolina, by E. A. Hutchins. At Caldwell's, Mecklenburg county; near Harrisburg and Concord, Cabarrus county, and Grauville, Orange county, and in other localities in North Carolina, fine agates and chalcedony have been found.

In Colorado chalcedony is found 8 miles south of Cheyenne mountain at the Los Pinos agency at Chalk Hills; on the bluffs near Wagon-Wheel Gap and along the upper Rio Grande valley; in Middle and South parks, Buffalo park, Fair Play, Frying Pan, Trout creek, Gunnison river, and frequently in drift accumulations.

Agate is found in fine specimens lined with amethyst on the summit of the range of the Animas, clouded white and gray in the lower trachytic formations of the Uncompahgre group. It occurs in a variety of forms, clouded, banded, laminated, and in a variegated form, at the Los Pinos agency; also in the South park in the drift, in the lower Arkansas valley, on the Frying Pan, and throughout the Middle park in the form of onyx and sardonyx, on the lower Gunnison and adjacent regions.

Prof. W. P. Blake^(a) mentions large masses of white chalcedony, delicately veined and in mammillary sheets, near the Panoches, in Monterey county, California; on Walker river, Nevada; also of a fine pink color near Aurora, Esmeralda county, Nevada; and in pear-shaped nodules in the eruptive rocks between Williamson's Park and Johnson's river, Los Angeles county, California.

Beautiful pebbles of agate and chalcedony are abundant along the beach of Crescent City, California, and are often cut as souvenirs; they are usually of a light color. In the pebbly drift of the Colorado river they are more highly colored, more abundant, and of larger size; many of the surf-worn pebbles of the Pescadero beach, California, are agate and quartz, of very fine bright colors; occasionally these are

^a "Minerals of California," page 9, 1866.

utilized as gem stones. Fine agates and jaspers are found about the Willamette, Columbia, and other rivers in Oregon. Beautiful red and yellow carnelian and sardonyx result from the silicification of the corals and sponges at Tampa bay, Florida, and although the pieces are not large, the colors being natural are very good.

The silicified bones of the *atlantasaurus* found at Morrison, Colorado, have at times a coarse cellular structure, infiltrated with carnelian, giving a very pleasant effect of a brilliant red striped and mottled appearance.

Chalcedony coats and incloses the crystallized cinnabar of the Redington and other mines of California; and these crusts, if cut with the cinnabar, form very pretty and interesting gem stones.

Silicified coral.—The true silicified corals found at Schoharie, New York, along the Catskills, and at a large number of other American localities, form very pretty gem stones. Some similar to the so-called fossil palm wood from India have been observed at a few localities in New York State. One very interesting black siliceous coral form with large white markings was found at Catskill, New York; when cut across the large white columnar lines the effect was very pleasing and ornamental.

Silicified wood.—In the valley of the east fork of the Yellowstone river, and in the volcanic Tertiary rock, which here attains a thickness of 5,000 feet and is made up of fragmentary volcanic products which have apparently been redistributed by water and now form breccias, conglomerates, and sandstones, Mr. W. H. Holmes^(a) mentions the occurrence of silicified wood in great abundance, and in some cases the trunks are *in situ* in these strata.

In the valley of the main Yellowstone, in the Gallatin range, and about the sources of Cañon and Boulder creeks, also near the divide at the head of Boulder creek, and at a number of points above this line, may be observed trunks many feet in height and of gigantic proportions, standing in the identical strata in which they grew. In general, these strata are horizontal. Three miles south of Gardiner's river, at an elevation of 6,000 feet above the sea, silicified trunks are found in sandstone belonging to the same strata. On the south side of Third cañon, opposite the mouth of Hell-roaring creek, is a massive promontory, in which many fine trunks are exposed in a conglomerate. At Amethyst or Specimen mountain some of these trunks have been found 10 feet in diameter. Many thousands of silicified trees are found; in some cases the structure is well preserved, and in other cases completely agatized or opalized, and lined with crystals of calcite, quartz, and beautiful amethysts. In this locality many of the finest specimens of American silicified wood are found.

The workmen on the Denver and New Orleans railroad in 1882^(b),

^a "Geology of the Yellowstone National Park," page 48.

^b A. E. Foote, *Naturalist's Leisure Hour*, July, 1882, page 32.

while within 20 to 30 miles of Denver, Colorado, between Cherry and Bunning creeks, were met by an obstacle in the form of a buried forest. The trees are of various sizes, all silicified and agatized, and buried at depths of from 10 to 20 feet; they are very perfect and are met with in a half dozen localities.

Numerous newspaper articles have appeared on the utilizing of the petrified forests near Holbrook, Arizona, by a company which is making large ornaments of the material, and which have gradually driven the so-called California and Mexican onyx out of the market. A company has been formed, however, and a large exhibition of this material was made at New Orleans, and a quantity of the mineral was sold, usually as small paper weights or for small jewelry ornaments. The company has been reorganized, and with its new sawing machinery hopes to be able to cut table-tops, tiles, and for other like purposes. The material is one of the finest known for color and hardness that could be used in this way. A stump, 18 inches across and 3 feet high, was sold to a Russian at New Orleans. Immense quantities of the material exist in Arizona and in magnificent specimens. One in the Peabody museum is fully 24 inches across and very compact; some of the trunks are at times magnificently lined with quartz and amethyst. One tree, fully 100 feet long, spanning a chasm and making a natural bridge, is one of the attractions. Some use may arise for the material if cheap polishing and slitting can be introduced, and no doubt in the near future some developments will be made in this line, since a second company has obtained property adjoining that of the company doing the work. The cutting of some sections of a 12-inch trunk into bottoms for solid silver trays is one of the novelties introduced by a leading jewelry firm.

Moss agate.—Moss agate was formerly found near Hillsborough, Orange county, North Carolina. The agatized trees from Holbrook and Specimen mount show these mosslike markings more like the fine tree-stones from Brazil than our common American agate. One curious stalactite of chalcedony, about 3 inches long and having the appearance of a piece of common sperm candle, had a black core through its entire length about the size of a candle wick, making it at first sight scarcely distinguishable from a half-used candle. It was unfortunately cut into a number of matched stones for cuff-buttons, which were very unique with the beautiful black central dot.

In the southeastern part of Humboldt county, Nevada, are large quantities of moss agate of the dendritic and "fortification" forms, which, however, have been utilized to a very limited extent.

Moss agate has been very sparingly used during the past year, the sales amounting to not over \$1,000. Since the recent introduction into cheap jewelry of the Chinese natural green and artificially-colored red and yellow moss agate, the sale of the American has almost entirely fallen off. A so-called moss agate is found at Rock Springs, Lancaster county,

Pennsylvania, and also near Reading, Berks county. A beautiful moss jasper is found in Trego county, Kansas.

Chrysoprase.—Possibly the best American chrysoprase was found within the last year by Mr. F. E. Monteverde, at Nickel mountain, near the town of Riddle, Douglas county, Oregon. The chrysoprase was observed in small veins about one-eighth inch thick, and furnished a number of flat stones of a rich green color, that were over 1 inch square; it occurs in a vein of serpentine associated with the nickel ores.

Traill(*a*) mentions chrysoprase from New Fane, Vermont, which mineral Prof. J. D. Dana refers to green quartz and not chrysoprase, although it was also so-called at the locality where found.

A fine green-colored specimen intermixed with a black hornblende that would afford gems 1 inch across was shown to me by Mr. E. A. Hutchins, of New York, and was found at some locality in Macon county, North Carolina.

Mr. Thomas A. Tabor, in 1839, mentions in a letter to Dr. C. A. Lee the occurrence of chrysoprase in Chester county, Pennsylvania, without any description of its quality, though one would infer that it was of gem quality, since Mr. Tabor was a jeweler. Dr. F. M. Endlich(*b*) mentions chrysoprase as of rare occurrence in Middle park, Colorado.

Opal.—Beautiful fire opal without any opalescence is found in Washington county, Georgia, and was first described by Prof. G. J. Brush, who has the finest piece in his cabinet. It is a vein about one-fourth inch thick and 2 inches square.

Common opal occurs rarely in small masses of a greenish and yellowish white with vitreous luster, at Cornwall, Lebanon county, Pennsylvania. It is found at Aguas Calientes, Gilson gulch, at Idaho Springs, Colorado, in narrow seams in the granite, and most of it is brownish. Mr. J. W. Beath states that he had seen fine opal specimens showing play of colors, said to have come from the Idaho Springs locality. At Colorado Springs it occurs milk white in color.

The following is communicated by Mr. C. G. Yale: "While the precious opal has never been found in the Pacific division, the common kind occurs in numerous localities. Large and very beautiful opalized wood is frequently found in the hydraulic mines of California. Small stones in great number are also taken out of some of the drift mines. A few of these being infiltrated with the oxide of manganese, giving them the appearance of being filled with moss or possessing other peculiarities, are enough sought after to give them some little value."

Hoffmann(*c*) mentions opal in magnificent colors (evidently opalized wood) with silicified wood, and states that on breaking some of the large trunks at San Antonio, Nevada, fine specimens were obtained.

a "Quartz and Opal," page 35.

b "Catalogue of Minerals found in Colorado," 1876; tenth annual report of the Hayden Survey, page 150.

c "Mineralogy of Nevada,"

Hyalite occurs with cachalong at several localities in Yavapai county, Arizona; at the Philips ore bed, Putnam county, New York; and cachalong at Bellevale, 4 miles east of Warwick; in Burke and Scriven counties, North Carolina; in yellow fluorescent coatings upon gneiss at Frankford, Pennsylvania, and at Avondale, Delaware county, in bluish-green; also at Megarge's paper mill on the Wissabickon. Hyalite occurs at Concord, Cabarrus county, and the Culsagee mine, Macon county, North Carolina. Associated with semi-opal it is mentioned in the Mount Diablo range about 30 miles south of Mount Diablo.

Prof. W. B. Blake^(a) mentions that a rich white variety of opal is found at Mokelumne Hill, Calaveras county, California, or on the hill near that place known as Stockton hill, on the west side of Chile gulch. A shaft had been sunk 345 feet, and the opals were found in a thin stratum of red gravel. They varied in size from that of a kernel of corn to a walnut, many of them containing dendritic infiltrations of oxide of manganese resembling moss. In 1866 about a bushel of these stones were raised in a day, and were reported to have a market value. A milky variety similar to the above, and without fire, is found with the magnesite on Mount Diablo, 30 miles south of the mountain; also in the foot hills of the Sierra at the Four creeks.

Beautiful pieces of a moss-marked opal, similar to moss agate, are found in Trego county, Kansas. They are often 3 and 4 inches across.

Semi-opal is found together with the chalcedonies at the Los Pinos agency, and north of Saguache creek, Colorado, in trachyte.

Geyserite.—Some of the geyserite from the geysers in Yellowstone park, especially at Firehole river, occurring in such a variety of concretionary and imitative forms, might be used for small ornaments.

Jasper.—Dr. Genth mentions that cat's-eye has been observed in several localities; a fair hexagonal crystal with the pyramid of greenish color, resulting from very fine fibers of actinolite disseminated through it, came from York county, Pennsylvania; it is found also 5 miles east of Bethlehem at the allanite locality, but not of gem quality.

A curious dark-gray piece of quartz was observed from the West Shore railroad tunnel at Weehawken, New Jersey^(b), that was filled with what seemed to be byssolite, but really may be an altered pectolite, and would cut a tolerably fair mineralogical cat's-eye.

The so-called Thetis hairstone described by Dr. Jackson^(c), found at Cumberland, Rhode Island, is really a quartz cat's-eye, and some very fair cat's-eyes have recently been cut from it by Mr. Edwin Passmore, one of them nearly two-thirds of an inch long, and quite equal to many from Hoff, Bavaria.

Little or no novaculite has been used during the last year for ornamental purposes, although it has some use as streakstones for miner-

^a "Catalogue of California Minerals," 1866, page 18.

^b Cabinet of G. F. Kunz.

^c "Geology of Rhode Island," 1839.

alogical work, being better adapted for this purpose than anything else, owing to its hardness and pure white background.

Red jasper is found on Sugar Loaf mountain, Maine, and a fine yellow with chalcedony has been found at Chester, Massachusetts; fine red and yellow also by Dr. Horton 4 miles east of Warwick, at Bellvale, Orange county, New York; pebbles of fine red occur along the Hudson river from Troy to New York, especially at Hoboken, Fort Lee, and Troy, where the jaspery rock outcrops. The so-called green jasper of Norman's Kill from the Hudson river slates was used by the Indians for arrow points.

Jasper agate is found in considerable quantity at Diamond Hill, Cumberland, Rhode Island, in all shades of white, yellow, red, and green; these colors are also all intermixed in one specimen, usually mottled, and at times beautifully banded in irregular seams of white, creamy brown, greenish, and brecciated. It is found in large quantities, and although fully 1,000 pounds is taken away every year by visitors and collectors, not over \$100 worth is sold or polished per annum.

Large pieces of fine yellow jasper have been found at Tyringham, Massachusetts, by Mr. Daniel Clark, of that place.

In Pennsylvania^(a) jaspers more or less impure are abundant in the drift of the Delaware and Schuylkill rivers; also in Berks county, near Reading. Brownish-yellow is found at West Goshen, Chester county, and a reddish brown variety near Texas, Lancaster county, and a brown banded variety at the hydropathic establishment near Bethlehem. The arrow heads found in this vicinity and near Easton are mostly made of jasper. The jaspery sandstone so plenty near Mauch Chunk might be utilized for large ornamental work with advantage.

In North Carolina fine jasper, banded red and black, is found in Granville, Person county; bright brick-red and yellow at Knapp's, Reed's Creek, Madison county; at Warm Springs; at Shut-in Creek in Moore county; also in Wake county, and elsewhere in the State.

In Texas fine jasper has been found near Fort Davis, Bexar county, and at Barilla Springs, where are found the jaspery agates called Texas agate.

The moss jasper of Trego county, Kansas, is equal to any yet found.

Fine yellow, brown, and red jasper is found at the Los Pinos agency; throughout the Middle and South parks; along the Gunnison, in the Dakota group; on the Arkansas, Grand, White, Animas, and other rivers of Colorado, in the drift, and in some of the trachytes, mostly red, green, and brown. A very fine specimen was found at the junction of Lost Trail creek and the Rio Grande. Small but smoothly worn pebbles of jasper and agate are quite plenty on the shores of Lake Tahoe, California. Red and green jasper are very abundant in the

^a "Preliminary report on the Mineralogy of Pennsylvania," page 60.

neighborhood of San Francisco, though not of fine quality; some of this stone has been used in building and for sidewalks.

Fine red jasper is found on the Little Colorado river, New Mexico, and also on the Willamette, Oregon. The latter region evidently furnished the material for the fine arrow points of Oregon.

The banded jasper found near Colyer, Graham county, Kansas, red, yellow, and other colors, with even white bands, affords blocks over 1 foot long and 6 to 8 inches wide, and really merits the attention of workers in ornamental stone, as it is unrivaled in the world for banded jasper.

Bloodstones in beautiful specimens with the red markings very fine are found at Chatham county, Georgia. Some fine heliotropes from here are in the cabinet of W. W. Jefferis. Heliotrope was formerly found in veins in slate at Blooming Grove, Orange county, New York. Some very fine pieces have been found near the Willamette river, Oregon, and of fine quality near the South park, Colorado, and below the Uncompahgre, near Grand river.

Basanite was found by Dr. Horton(a) at Canterbury and Cornwall, New York. It is also sparingly found in nearly all the drift north of New York City, and in that of the Delaware river from Easton, Pennsylvania, down to the State line.

Gold quartz.—The gold found in California quartz is worth about \$16.50 per ounce, but jewelers will give willingly from \$20 to \$30 for each ounce of gold contained in such material as they can use. The price of specimens varies according to their beauty from \$3 to \$40 per ounce of quartz. The specific gravity of the mineral is taken, after which the gold value is ascertained by a table called Price's table. The amount of this material in the rough sold for jewelers' purposes is variously estimated at from \$40,000 to \$50,000 per annum, \$1,000 to \$2,000 worth being often purchased at one time. One lapidary at Oakland, who employs several assistants, purchased nearly \$10,000 worth within one year, and a large jewelry firm in San Francisco, during the same time, purchased nearly \$15,000 worth of this material.

Great care must be taken in the selection of the quartz. The stone used must be large enough to bear the rough treatment of the diamond saw and the lap wheel of the polisher; all of the ore is friable, and some of it crumbles to pieces while undergoing these processes. For the same reason all the pieces set in cabinet work are small; the saw hanging in the gold in the slitting prevents the cutting of large pieces, as the wafer-like slabs are apt to be broken by this resistance while being separated from the block. Pieces 4 by 2 inches are quite rare, although fine pieces 4 inches square are at times seen.

Rarely more than one-half of the ore purchased finds its way into the mounting owing to this breakage and the trimming into shape. Nearly all the cutting of this material is done at Oakland, California.

a "Geological Survey of New York," 1840.

The white gold quartz of California is mainly supplied from the following counties: Butte, Calaveras, El Dorado, Mariposa, Nevada, Placer, Sierra, Tuolumne, and Yuba.

The black gold quartz, a quite recent novelty, is found at the Sheep Ranch mine, Calaveras county, and at Sutter creek, Amador county, California.

The so-called rose gold quartz is made by backing a translucent quartz with the desired shade of carmine paste, and forms an effective contrast to the opaque white and black gold quartz with which it is usually mounted in some design.

Single stones for scarf pins, rings, and sets of pin and earrings, sell from \$2 to \$10 each, and occasionally exceptionally fine or curious pieces bring higher prices.

It is not many years since gold quartz has been utilized to any great extent in jewelry. At first the designs were usually simple and the mountings very modest, but the demand has created a supply of the most elaborate designs, and at present it is used in every conceivable form of jewelry, and in articles of personal or house adornment of almost unlimited variety, such as canes, paper weights, writing cases, perfume bottles, fan sticks, bracelets, watch chains, and lace pins, the latter in such designs as shovels, picks, and other mining emblems.

In certain kinds of furniture it is used as paneling; and here, as in the jewelry, the effect is better brought out by added colors, such as are afforded by agate, moss agate, silver rock, smoky quartz, pyrite, chalcopyrite, cinnabar, malachite, turquoise in the matrix, and other bright minerals.

Much of the jewelry made of this material is sold to tourists from the eastern States and from other countries. Eleven hundred dollars' worth was recently purchased by an Asiatic embassy, and scarcely any one visiting California fails to purchase a memento. The sale is increasing.

The best taste as a rule is not exercised in the designs. Many are too large and ungainly for personal adornment, and many others are not as well mounted as most of the other jewelry sold with them. Perhaps not one article in ten sold will have much if any wear. There is much room for improvement in the line of this work.

One of the large designs made of gold quartz, representing the cathedral of Notre Dame, at Paris, is valued at \$20,000. It stands about 12 inches high, and is perhaps the finest piece of gold quartz work produced.

A mass of gold quartz^(a) weighing 160 pounds was hydraulicked out of the bank of the Nevada Hydraulic Company at Gibsonville. The boulder was smoothly washed and had the appearance of having been ground in a pothole. Its estimated value was \$2,500, but its real worth was more, since it was valuable for lapidaries' purposes.

^a *Jewelers' Circular*, Vol. XIV., page 258, September, 1883.

It is stated that some years since a Mr. Thiery devised a method of fusing quartz and throwing in lumps of heavily alloyed gold, and allowing the material to cool in molds of required shapes. It is said the mingling of the metal and the quartz was complete, but the quartz had a milky, unnatural glasslike appearance entirely unlike the gold quartz it was intended to represent. Messrs. LeDuc, Connor & Laine, on applying for a patent for an imitation gold quartz produced by means of electricity, found that a similar patent had been issued nearly fifty years ago to a New York man. However, notwithstanding they were not able to obtain the monopoly, they started as manufacturers of jewelers' quartz, but abandoned it, as it proved so unsatisfactory.

Actinolite.—The emerald-green glassy actinolite of Concord township, Pennsylvania, is very fine and might be utilized in some form, possibly the compact, as a form of cat's-eye. An inlaid ornament of this mineral taken from an old piece of furniture in London during the early cat's-eye excitement netted the persons who cut it up hundreds of dollars.

Rutile.—The rutile of Middletown, Connecticut, was cut into gems that were almost ruby in color, as early as 1836, by Prof. C. U. Shepard. The finest small brilliant geniculated crystals are found at Millholland's Mills, White Plains, at John Lackey's farm, near Liberty Church, and at Wilson's near Poplar Springs, in Alexander county, North Carolina. These have furnished some of the finest cut black rutile, which more closely approaches the black diamond in appearance than any other known gem. Some of the lighter colored ones furnished gems closely resembling common garnet.

Beautiful long crystals, at times transparent red, have been found, ranging in thickness from that of a hair to one-quarter and in some few cases nearly two-thirds of an inch across, and from 1 to 6 inches in length, at Taylorsville and vicinity, and at Stony Point, North Carolina. These are very brilliant and at times doubly terminated.

Beautiful crystals are also found in quartz and loose in the soil at Sadsbury township, Pennsylvania, for 7 miles along the valley, especially near Parksburg, where double geniculations and geniculations forming complete circles are found, weighing over 1 pound. This is the "money stone," so called by the inhabitants of the district, as it is often looked for because they can obtain money for it from the collectors; some of the finer small ones are worn as ornaments.

Some of the beautiful geniculated nigrine from Magnet cove would also well serve the purpose of ornament. These and the Alexander county rutiles are possibly the finest in the world.

Azinite has been observed with the essonite and idocrase at Phippsburg and Wales, Maine, and also at Cold Spring, New York. The best American locality is the one near Bethlehem, Pennsylvania, first found by Prof. F. Prime, jr., and Dr. Reopper, and described by Prof. B. W. Frazier.^(a) These crystals, colorless, pale yellowish, and brown, are

at times one-fourth inch long, and future finds in this vicinity may bring some gems to light; up to this time no stones suitable for fine cutting have been found, though a few might furnish mineralogical gems.

Jade.—Among the implements collected by the Point Barrow (Alaska) Expedition were a number made of dark green jade. This mineral is supposed to be found in a place somewhere to the east of Point Barrow.

Rhodonite.—Rhodonite has been found in an extensive bed at Blue Hill bay, Maine, on Osgood's farm; also in bowlders at Cummington, Massachusetts, and in the neighboring towns; at Warwick, Massachusetts; in Irasburgh and Coventry, Vermont; near Winchester and Hinsdale, New Hampshire; and at Cumberland, Rhode Island.

The Alice mine, at Butte City, Montana, has produced a large quantity of rhodonite associated with rhodocrosite, and it has here been used to some extent as a gem stone.

It has recently been described by Mr. William North Rice(*a*) as occurring at the White Rocks, Middletown, Connecticut—only in a limited quantity, however.

The variety fowlerite, found at Franklin, Hamburg, and Sterling, New Jersey, is also very fine in color.

Rhodonite has recently been used very effectively in combination with unpolished or stone-finished silver, as handles for very fine ornaments, the rose color streaked with black presenting a very pleasing contrast.

Epidote.—Fine crystals of epidote have been found at Haddam, Connecticut, which might yield small gems. The large crystals in quartz at Warren, New Hampshire, were all too opaque, though fine as cabinet specimens.

At Roseville, in Byram township, Sussex county, New Jersey, epidote was formerly found in good crystals that would afford mineralogical gems.

Dr. F. A. Genth(*b*) mentions a crystal of epidote in the cabinet of the University of Pennsylvania, from the gold washings of Rutherford county, North Carolina. This crystal is strongly pleochroic, like the so-called puschkinite from the auriferous sands of Katherinenburg, in the Ural mountains, and would cut the best American gem yet found.

Some fine highly complex forms have been observed at Hampton's, Yancey county, North Carolina, by Mr. William Earl Hidden(*c*) The Yancey county crystals would also possibly afford cabinet gems, none of them as fine, however, as the Tyrolese epidote.

In Chester county, Pennsylvania, crystals 3 inches in length have been found. The principal localities are the Smith and McMullin farms, West Bradford township; East Bradford, where dark green specimens

a *Science*, Vol. I., No. 21, page 601.

b "Minerals and Mineral Localities of North Carolina," 1881, page 44.

c *Ibid.*, page 86.

occur, and Taylor's mill, West Goshen. In East Marlboro' township it occurs in yellowish-green crystals, and at McCloud's farm and Pearce's old mill, Kennett township. In the limestone quarries of London Grove and Sadsbury townships it occurs in bottle-green crystals.

Idocrase.—Idocrase or vesuvianite that would yield small gems has been found at Phippsburg, Maine.^(a) A beautiful wine-colored variety^(b) is mentioned as occurring near New Hope, Bucks county, Pennsylvania.

At the locality $1\frac{1}{2}$ miles from Sanford, Maine, idocrase occurs in unlimited quantities, one ledge being fully 30 feet wide, made up almost entirely of this mineral associated with quartz and occasionally with calcite. Some of the crystals are 7 inches long, and the smaller ones would afford fair gems at times.

Idocrase is mentioned by Endlich as occurring in large crystals on Mount Italia, Colorado, and north of the Arkansas river, in granite.

Cassiterite.—The finer crystals of cassiterite found at Hebron, Norway, and Paris, Maine, would afford mineralogical gems.

The claims in the Temescal range, in San Bernardino county, as well as the locality near San Diego, California, will possibly produce specimens of this mineral equal to that from Durango, Mexico.

The important occurrence at the Broad Arrow mines, 2 miles from Ashland, Clay county, Alabama, may produce both the crystals and the stream tin. The Black Hills of Dakota locality is a fine one for the gem. On Jordan creek, Owyhee county, Idaho, Prof. W. P. Blake mentions very fine specimens of wood tin one-eighth to one-half inch across, of very pure and clean material. Cassiterite has also been found in large quantities in North Carolina, though scarcely any of these localities have produced a single fine gem.

Chondrodite.—The finest known crystals of chondrodite, and the finest known gems of this mineral, have been found at the Tilly Foster mine, Brewster's, New York. The gems are few in number, and one of the finest is a cut stone (*c*) measuring one-half by one-quarter inch, of a transparent garnet color. Another (*d*), an essonite-colored crystal, is one-quarter by one-eighth inch, and another (*e*), of a red essonite color, is one-quarter by one-quarter inch. The two latter, though uncut, would furnish fine gems. The finest of these crystals are in the Allen cabinet, now at the Johns Hopkins University, and in the mineralogical cabinet of the Peabody museum. The gems are so few as only to serve for mineralogical rarities.

Turquoise.—Mr. Bernard Moses recently brought to New York a series of finely colored specimens of the American varieties of turquoise, obtained at Mineral Park, Mohave county, Arizona. They were from

^a Cabinet of Gideon Bearce, West Minot, Maine.

^b George Rogers: "Geological Report of Pennsylvania," Vol. II., page 685.

^c Cabinet of F. A. Canfield.

^d Cabinet of C. Bullman.

^e Cabinet of F. A. Canfield.

three veins, varying in width from 1 to 4 inches, about 100 yards apart, running almost parallel and traceable for nearly half a mile. They show evidences of having been worked by the Indians and Spaniards, and a large number of stone hammers were found.

One of the largest masses of the American turquoise is in the possession of Prof. W. P. Blake; it is $2\frac{1}{2}$ inches long, $1\frac{1}{4}$ inches wide, and weighs 75.5 grams.

No work is carried on at present at the Los Cerillos mines, the recent investment to work that locality having proved unsuccessful. Some of the specimens sent east showed a fine blue color, which, however, was artificial, as proved by dipping for a moment in ammonia. Along the line of the railroad turquoise is sold to some extent by the Indians of the San Domingo pueblo, New Mexico, the men, women, and children coming some distance from the road to sell them. They are ground into round or heart-shaped ornaments, which are drilled with a crude form of bow-drill called by them "malakates." The drilling point is made of either quartz or agate, and the wheel to give it velocity was in one instance made of the bottom of a cup. The selling price of the ornaments is now very low. Rev. R. T. Cross states that one string made up of many hundreds of stones was valued at the price of a pony. Turquoise was used by the ancient Mexicans to inlay obsidian ornaments, and also together with pyrite for making mosaic inlays and incrustations, thus forming many rich and curious effects.

Hoffmann (*a*) mentions turquoise from the mountains 5 miles north of Columbus, Nevada. The specimens are of a pale blue color, although some fine ones have been obtained.

Very little of the American turquoise seems to find sale except as tourists' souvenirs or mineralogical gems; yet for ornamental or inlaying work it might have quite a sale, were it properly introduced, as the green color would contrast favorably with many stones or wood.

Hematite.—See 1882 report.

Ilvaite.—Mr. R. D. Rand (*b*) observed some small black crystals of ilvaite in a narrow calcite vein in gneiss at Flat Rock tunnel on the Philadelphia and Reading railroad, opposite Manayunk.

This mineral forms a curious deep black gem and is one of the few that can be used to represent the initial "I" in jewelry work made up of the initial letters of gems. It would also represent the letter "Y," although the name yenite has been rejected.

It is reported as occurring with hornblende and magnetite, traversing quartz, in slender brown-black or black crystals at Cumberland, Rhode Island, and formerly also at Milk Row quarry, Somerville, Massachusetts. No material for really fair gems has as yet been found in the United States.

Pyrite.—The small groups of brilliant pyrite occurring with the slate

a "Mineralogy of Nevada."

b "Preliminary report on the Mineralogy of Pennsylvania," page 22.

found through the coal regions, are trimmed and cut into ovals, squares, and other shapes, and sold for mounting as scarf pins, lace pins, ear rings, and ring stones, as well as other ornaments. Fine single crystals are also sold for ornaments, principally at Mauch Chunk and the summit of the Switchback road, and by the local jewelers at Ashland, Shenandoah, and Mahoney City. The finest specimens used here are from the Raven Run mine, 6 miles from Mahoney City.

Many fine single crystals with a very high polish have been found at Black Hawk and other localities in Colorado; which are often sold for ornaments, just as they are found, at Denver, Colorado Springs, and other places in the West. These are compact enough to cut into the faceted gem, known in Europe as "marcasite," which has been almost entirely superseded by bright steel jewelry.

Diopside.—Associated with the garnets from Fort Defiance (Arizona), Gallup (New Mexico), and other localities in that vicinity, small pieces of almost emerald-green diopside are found—evidently a chromium diopside similar to that found with the South African diamonds. As a rule they are too small to afford gems of any value, but a few pieces have been found that are of sufficient size for very small gems. This would be a very desirable addition to the list of American gem localities, if the specimens were found in any size or quantity.

At the De Kalb (New York) locality, some very large crystals were found in 1884, several over 3 inches long and 1 inch thick, with clear spots of gem material, promising to afford cut stones weighing 20 to 30 carats.

FELDSPAR GROUP.

The greenish variety of orthoclase, called lennilite by Dr. Isaac Lea^(a), found at Lenni Mills, Delaware county, Pennsylvania; the pearly variety called delawarite by Dr. Lea, and the bluish-green sub-transparent of an aventurine character, the bright particles being hexagonal hematite (?), called cassinite by Dr. Lea, found at Blue hill, 2 miles north of Media, are all at times of fine enough color to make a common gem or ornamental stone.

Large boulders of labradorite are often met with in the towns of Lewis, Moriah, McIntyre, Newcomb, and Westport, also in Green, Lewis, Orange, Schoharie, Saint Lawrence, and Warren counties, New York. Within a few miles of Amity, in Orange county, Mr. Silas C. Young broke up a mass of fine material for specimens, weighing over two tons, that showed the chatoyant play of colors very well.

In Pennsylvania it occurs at Mineral hill, Chester county, and opposite New Hope, Bucks county; and also in the Wichita mountains, Arkansas.

Mention is made by Genth and Kerr^(b) of a curious white variety as occurring at the Cullakenee mine, Clay county; also, large crystals in

^a "Proceedings Philadelphia Academy of Sciences," May, 1866.

^b "Minerals and Mineral Localities of North Carolina," page 48.

the trap at Shiloh Church. On the road to Charlotte, Mecklenburg county, and near Bakerville, on Toe river, specimens showing a slight blue chatoyancy are also found.

Rockport, Massachusetts, formerly afforded many finely colored pieces of amazonstone. Some fine green crystals have also been found at Paris, Maine, and at Mount Desert material that will cut into fair gems is occasionally met with.

One large, fine light green crystal, over 6 inches long, was found near Amelia Court House, at the microlite locality.

On the John Smith farm, Middletown, Delaware county, Pennsylvania, many shades of green feldspar, passing into the cassinite and delawarite, are found in the soil in loose bowlders up to 20 inches in diameter.

Elæolite.—The elæolite of Gardiner and Litchfield, Maine, would admit of a very good polish, and at times the color is greenish and would look quite well. Some of the Salem, Massachusetts, variety would also do for this purpose.

Leopardite.—A compact variety of orthoclase, which is spotted with hydrated sesquioxide of manganese, called leopardite(*a*), is abundantly found near Charlotte, Mecklenburg county, and also in Gaston county, North Carolina. It is a variety of porphyry with crystals of disseminated quartz. This material is found in large masses and would furnish a good ornamental stone if polished. It would also furnish material for a cheap gem stone.

Moonstone.—At Van Arsdale's quarry(*b*) near Feisterville, Bucks county, Pennsylvania, orthoclase is found in crystals from one-half to 2 inches in length, usually, however, in cleavage masses of gray or grayish-black colors, which show the blue chatoyancy, as well as many varieties of labrador spar, and make a very fine variety of moonstone.

The albite occurring in such beautiful specimens at Mineral hill, near Media, in Middletown, Delaware county, Pennsylvania, shows the blue chatoyancy remarkably well, and is there called "moonstone." It might well be, and is doubtlessly rightfully classed under this head, since the appearance differs so slightly from an orthoclase moonstone, and it is the effect that really gives it its name.

The greenish-gray granular albite or oligoclase found in the serpentine at the magnesia quarries, West Nottingham township, Chester county, Pennsylvania, shows a faint blue moonstone luster.

The beautiful feldspar found by Mr. W. W. Jefferis, with the sunstone at Pearce's paper mill, shows the blue chatoyancy equal to any labrador spar. It may be the latter or oligoclase(*f*). The finest examples of this mineral from an American locality, very closely resembling the Ceylon in quality, transparency, and color, have been lately found

a "Minerals and Mineral Localities of North Carolina," Genth and Kerr, page 51.

b "Preliminary report on the Mineralogy of Pennsylvania," page 89.

at Amelia Court House, Virginia, by Mr. George W. Fiss, of Philadelphia, who had two very fine gems over one-fourth of an inch across.

Peristerite has been found in some abundance in the town of McComb, Saint Lawrence county, New York, associated with common orthoclase; it occurs by the ton, and many of the specimens show the beautiful light blue chatoyant effect. Mr. C. D. Nimms has also observed this mineral as far north as Bythurst, Canada, 9 miles north of Perth; also in the towns of Pierrepont, Russell, and in at least a dozen other places in this section of New York State. Some specimens make a very fine gem stone, differing somewhat from labradorite and moonstone. Mr. Charles A. Dana, of New York, has had a number of these flesh-colored pebbles of orthoclase found on Long Island sound, near his home, at Glen Cove, New York, cut *en cabochon*, making thus a very effective salmon-colored stone.

Perthite, found so plenty in Canada, at Perth, Ontario, is likely to be found in the United States as bowlders, and possibly in place. This forms a very curious and rich-colored gem stone, with its bright aventurine reflections.

A very fine oligoclase occurs at Dixon's quarry, Newcastle county, and a fine striated variety at West Chester, Delaware county, Pennsylvania.

Sunstone.—Very good sunstone (oligoclase ?), with very fine reflections, has been found near Fairville, Pennsbury township, Pennsylvania. Sunstone (oligoclase ?) occurs at Mendenhall's lime quarries, Pennsbury, Chester county; also in Ashton township, some of which is a grayish-white color with coppery reflections; and also a curious variety of sunstone in moonstone (albite) is found, showing double reflections.

A very fine green and red sunstone is found near Media. On John Scofield's farm, in Middletown township, Delaware county, moonstone and sunstone in small nodular lumps are scattered through the soil. About 1 ton has been taken out since the locality was discovered. On John Hibberd's farm, in the same township, moonstone in bowlders is found. A very fine sunstone, the orthoclase of which is a very rich salmon color and quite transparent and streaked with white, showing the aventurine effect beautifully, is found at Glen Riddle, Delaware county.

Another beautiful variety is found in the hornblende at Kennett township, Chester county; this, Dr. Genth thinks, is most probably an oligoclase. The greenish orthoclase, sometimes in bright green pieces, also pale green, and at times much spotted with brownish tints, all showing a very good sunstone effect, is found at Mineral hill, Middletown, and in Upper Providence, Delaware county. The orthoclase of Frankford, Pennsylvania, with the göthite disseminated through it, approaches the sunstone in appearance very closely.

On the Horace Greeley farm, at Chappaqua(a), New York, small pieces

a "Proceedings New York Academy of Sciences," Vol. I.

of an orthoclase sunstone were found, almost as fine as any of the Norwegian.

Obsidian.—Smoky, transparent obsidian that would cut well, and form a curious variety somewhat resembling the "Moravian bottle glass" (moldavite), but not so green, has been found in rounded pebbles, over 1 inch across, near Santa Fé, New Mexico.

A porphyritic and spherulitic obsidian is found under the trachyte on Gunnison river, and a heavy vein of porphyritic obsidian near the Rio Grande pyramid, continuing from there southward through the trachytic bed. Nodules occur in the lower members of the trachytic veins.

A dike of obsidian, light gray and clear with concentric structure, sets from the Colorado Central lode near Georgetown, north of Saguache creek. Hoffmann mentions obsidian in fine pieces and very abundant as occurring 10 miles southeast of Silver Peak, Nevada. Across the State line, 5 miles in Owen valley, California, it is found in red fragments, and also banded with alternate layers of black and brown. Obsidian occurs in large, fine black pieces, and mottled black and brown, and in small layers, in a moss rock at Obsidian cliffs, Yellowstone park.

Octahedrite.—Octahedrite is reported as occurring in small crystals at Dexter's lime rock at Smithfield, Rhode Island, and in flat tabular glassy crystals of a pale green color and very brilliant in the gold sands of the Brindletown mine(a), Burke county, North Carolina. These would possibly afford small gems, nothing, however, to compare with the beautiful blue crystals from Brazil, so splendid at times as to be mistaken for diamonds.

Brookite, arkansite, microlite.—At the Ellenville, Ulster county, New York, lead mines some remarkable flat, ruby-red crystals of brookite have been found, and at Magnet cove, Arkansas, remarkably brilliant crystals of the variety of this mineral known as arkansite occur in great profusion, at times a transparent honey yellow. The mineral does not, however, readily admit of polish. One fine crystal of microlite in the cabinet of Mr. C. S. Bement, is about three-eighths of an inch long, and in part a rich honey-yellow color, having all the color of topazolite, with a higher luster. This might possibly be added to the list of American gem minerals. This crystal was found at Amelia Court House, Virginia. Some few of the microlites found at the Amelia Court House locality are of sufficient transparency to afford gems, the color ranging from an essonite red to that of a rich spinel yellow and remarkably brilliant.

Microlite has the highest specific gravity of any known gem, being about 6.

Ilmenite.—At Magnet cove, Arkansas, the ilmenite is found in such fine bright crystals as to form natural ornaments, and will, besides, admit of a fine brilliant polish.

a "Minerals and Mineral Localities of North Carolina," 1881 page 84.

Allanite.—The allanite found in large masses and crystals in Amherst county, Virginia, is very compact and bright black in color, and would form a black metallic gem stone.

Sodalite, cancrinite.—At Litchfield and South Litchfield, Maine, sodalite, elæolite, and cancrinite are found in boulders in size from that of the fist to those weighing many tons. They lie scattered over the surface for a distance of about 4 miles. One mile and a half west of this line, across a pond in West Gardiner, these minerals are found associated with zircon, as in South Litchfield. On some of the West Gardiner farms there are ledges of rocks that are evidently the source of these boulders. The boulders occur principally on the farms of Moses True, Capt. Joseph Wharff, and Rufus Smith.

The deep-blue and azure-blue sodalite and cancrinite, a rich yellow, and occasionally in hexagonal crystals, occur sparingly in seams in this tough elæolite and lepidomelane rock. The seams are from 1 millimeter to very nearly 1 inch in thickness; some of the white seams found are evidently altered sodalite; the cancrinite has been found 2 inches thick.

Violet and azure-blue sodalite have been found associated with elæolite, biotite, and zircon in a syenite vein at Salem, Massachusetts. Enough has been found within the last two years at South Litchfield to give it some gem importance. A number of distinct hexagonal crystals of fine waxy yellow cancrinite, as a rule embedded in the deep-blue sodalite, have also been found; also pink and greenish masses, and masses of rich yellow, 2 inches in thickness, which could be used the same as sodalite.

Scapolite.—The pink and purplish scapolite found at Boston, Massachusetts, will polish nicely and form a neat ornamental gem stone.

Lazulite.—Lazulite in dark-blue crystals and crystalline masses is found at Crowder's and Chubb's mountains in Gaston county, North Carolina, and at Coffee Gap, Sauratown mountains, Stokes county. At Graves mountain, Lincoln county, are found the finest sky and dark-blue crystals known. This mineral would make an opaque gem or ornamental stone, as the color, although lighter, is often as rich as lapis-lazuli.

Cobaltite is occasionally cut abroad and resembles a flesh-colored pyrite when cut. It is not found of fair quality at any American locality.

Zincite, franklinite, and willemite(a), as found intermixed in the zinc mines at Franklin, New Jersey, are at times ground into charms and paperweights and ornaments of different kinds, principally by the miners. They do not admit of a very fine polish, however, though they present a good appearance. A curious brown serpentine containing zinc, described by Prof. C. U. Shepard, was also cut and polished by the miners here.

Enstatite and bronzite.—Enstatite and bronzite are found half a mile

• See also "Mineral Resources of the United States, 1882," page 496.

west of Texas, Pennsylvania, and in beautiful massive foliated varieties. Bronzite was observed by Dr. Genth (*a*) near Crump's serpentine quarry, near Media, in Middletown township, and also near Henry Hipple's, in Marple township, forming the mass of Castle rock; also in Newton township near the lime kiln, and near Radnor's, Delaware county. Bronzite and enstatite occur in large quantities at Bare Hills, Maryland.

Titanite.—At Bridgewater station, Delaware county, Pennsylvania, some remarkably fine crystals of titanite have been found. Some of them, over 1 inch long and very transparent in parts, are a rich greenish yellow and a vitreous golden, equaling in color the finest from the Tyrol, and some would afford gems weighing from 10 to 20 carats each, that would show a play of colors rather adamantine than opalescent. Some of the fine crystals from this locality are now in the cabinet of Mr. C. S. Bement, the W. S. Vaux cabinet, Academy of Natural Sciences, Philadelphia, and in the Peabody museum, New Haven.

Many yellow crystals (*b*) over 1 inch long have been found in the hornblende gneiss on the Schuylkill near Philadelphia, and yellow crystals with sunstone at W. Cloud's farm and Pearce's paper mill, in Kennett township, Chester county, Pennsylvania.

Chlorastrolite.—One of the largest known perfect chlorastrolites is in the cabinet of Mr. M. T. Lynde, of Brooklyn, Long Island, a gem measuring $1\frac{1}{2}$ by $1\frac{1}{8}$ inches. A fine pair of chlorastrolites over half an inch across are in the possession of Mr. F. A. Canfield.

Datolite.—The compact, opaque, white, creamy, and flesh-colored varieties of datolite found at the Minnesota, Quincy, Marquette, Ashbed, and other mines in the copper region of Lake Superior, admit of a very high polish, and make an excellent opaque gem or ornamental stone. Notably one especially fine nodule over 4 inches across, with a flesh-colored center shading off into gray and creamy tints, was found at the Delaware mine, and is in the cabinet of Mr. C. S. Bement.

Thompsonite.—Large quantities of thompsonite have been cut into gem stones during the last year, the cutting consisting almost entirely of a rounding off of the pebble so as to show the concentric and other markings to the best perfection. Some of them, over an inch in diameter, have been polished. As a rule the small ones are the finest material. The lintonite is really a variety of the thompsonite and polishes very nicely, either alone or when occurring with the flesh-colored forms of thompsonite.

Natrolite.—Many veins of natrolite, and more particularly one large surface, representing over 300 square feet of the mineral, were met with at shaft No. 2 of the West Shore railroad, at Weehawken, New Jersey. Although this quantity afforded millions of crystals, scarcely any were stout enough to afford gems of this beautiful limpid and white mineral,

a "Preliminary report on the Mineralogy of Pennsylvania," page 63.

b *Ibid.*, page 27.

so abundantly found here and all along Bergen hill where any tunneling has been carried on.

Fine crystals are found in the Lake Superior copper region. None has been sold for gems in the United States, though it is occasionally used as an initial gem for the letter "N" in initial jewelry.

Pectolite.—Among the Eskimo implements collected by the United States Signal Service at Point Barrow, Alaska, and examined by Prof. F. W. Clarke (*a*), was a supposed jade, which he found on analysis to be a new and interesting variety of compact light-green pectolite; specific gravity, 2.873. This was obtained from some point east of Point Barrow, on the Kowak river, and forms an interesting and unexpected addition to this line of gem stones.

Apophyllite (also called fish-eye stone) is really too soft for gem purposes, though repeated references are made to it by gem writers.

The Erie tunnel, Bergen hill, afforded thousands of fine doubly-terminated detached crystals, less than one-fourth inch in diameter, that were really beautiful as ornaments; this same tunnel afforded a single crystal 4 inches in diameter. Some beautiful ones have also been found at the Cliff mine and other localities in the Lake Superior copper region, at times being perfect specimens of limpidity. The West Shore railroad tunnel at Weehawken, New Jersey, was the first locality in the United States to produce pink and flesh-colored crystals. Many beautiful ones were found here, though not as fine as the Andreasberg or the Mexican varieties. This and the Lake Superior locality would both afford material for cutting.

Apatite.—Apatite was found in such remarkably perfect and fine-colored crystals at the tourmaline locality at Auburn, Maine, by Mr. N. H. Perry, that the hill on which the tourmalines were found has been named Mount Apatite. These crystals were transparent green, pink, and violet, and so much resembled tourmaline as at times to have been mistaken for it. Some of the local collectors attempted cutting some of them, but the hardness is too low for a transparent gem.

Crocidolite.—Crocidolite was observed by Col. Joseph Wilcox (*b*) in long, delicate fibers of a blue color, in one of the western counties of North Carolina.

Mr. Theo. D. Rand found a dark-bluish, fibrous mineral at the Falls of the Schuylkill, and Prof. W. T. Roepper (*c*) found at Coopersburg, associated with white and brownish-white garnet, bluish-white crystalline fibrous coatings, which may belong here.

Crocidolite was also observed near Cumberland, Rhode Island, and at Eland Fountain, Orange river, New Jersey, though none of gem value has yet been found in the United States.

Serpentine.—The many fine varieties of serpentine found in the United

a *American Journal of Science*, III., Vol. XXXVIII., page 63.

b "Minerals and Mineral Localities of North Carolina," 1881, page 41.

c "Preliminary report on the Mineralogy of Pennsylvania," page 10,

States would admit of use in some cases as ornaments. The dark-green noble serpentine of Newburyport, Massachusetts, was cut into oak and other leaf-like forms, very effectively indeed, by Mr. F. Osgood, of that place. The handsome yellow serpentine of Montville is also of the precious variety.

The beautiful varieties of serpentine or verd antique from Harford county, Maryland, admit of a fine polish.

The serpentines of Saint Lawrence county, as also those of Cornwall, Monroe, and Warwick townships, Orange county, the ophiolite of New York city and vicinity, the serpentine of New Rochelle, New York, also some of the Hoboken, New Jersey, and the Staten Island varieties are useful for ornamental and occasionally for gem purposes.

At Stoneham, Maine, green and red damourite(a), altered from topaz, was cut into different odd forms and charms by local collectors. At Deer Isle, also, serpentine of a very light-green color occurs.

The serpentine of Texas, Mineral Hill, Newtown, Marple, Middletown, and other localities in Delaware county, Pennsylvania, are also very fine.

The serpentine from the neighborhood of Patterson(b), Caldwell county, North Carolina, is of a dark greenish-black color, and admits of a fine polish.

The serpentinous substance named pelhamine by Prof. C. U. Shepard(c) admits of a very good polish and with a very curious effect.

Dr. F. A. Genth mentions as being found at Easton, Pennsylvania, a bowenite frequently containing a small quantity of tremolite; it is of a greenish and reddish-white color and of great tenacity. This is evidently the so-called jade mentioned in the report for 1882. The easy working of this material, and the effective designs that can be made from it, recommend it as having fully as much merit for tourists' jewelry as the various teeth, beans, and other like things that are sold for this purpose.

Fluorite.—The clear varieties of colored transparent fluorite are designated as false ruby, emerald, sapphire, topaz, amethyst, etc. Many fine specimens of the green have been found at Muscalonge lake, Saint Lawrence county, New York, at times crystals over 1 foot across.

The Hardin county, Illinois, localities are the largest deposits in the United States, and some thousands of tons are annually mined here; crystals of the richest purple, yellow, red, rose-colored, green, and other varieties are very common. It differs from the English in that the crystalline faces in nearly all cases are dull and the colors show only by transmitted light. Some crystals 1 foot across were observed here.

On the Cumberland river, Tennessee, some of the finest American crystals of a blue-green variety have been found; wine and honey-

a *American Journal of Science*, May, 1885.

b Genth and Kerr's "Minerals of North Carolina," page 57.

c "Contributions to Mineralogy," 1876.

yellow ones also at Saint Louis, Missouri, in the geodes in the limestone. Fine crystals are found at Pike's peak, Colorado.

One of the most remarkable varieties of this mineral is a chlorophane from the microlite localities^(a) at Amelia Court House, Virginia. This fluoresces by the heat of the hand, and when a cut stone was placed in a vial of warm water, showed distinctly in a dark room, thus making a new form of gem, *i. e.*, a fluorescent gem stone, though not hard enough for any kind of wear.

Fossil coral.—The Iowa fossil corals have during the last year been sold more largely than heretofore for jewelry, paper weights, and specimens. One Philadelphia lapidary states that he sold over \$250 worth in one year. It is sold to some extent at Iowa City and other places in Iowa, as well as at the regular tourists' stopping places all over the United States.

Lepidolite.—Lepidolite has been found in large quantities in the past at Mount Mica, Paris, Maine, which has afforded masses of 50 pounds of very fine color; at Hebron and Norway, and more recently at Auburn, also at Mount Black, Rumford, Maine. As this mineral is used to some extent abroad for ornaments, such as dishes, vases, paper weights, etc., the similar utilization of the American material is suggested.

Aragonite and satin spar.—The aragonite "satin spar," from near Dubuque, Iowa, especially in such fine form as at Rice's cave, and in such remarkably fine forms as the "floss ferri" variety, from near Rapid City, Dakota, would admit of the same uses as common satin spar.

The satin spar (gypsum) ornaments, such as beads, eggs, and a variety of others, sold at Niagara Falls and many of the tourist places, are almost without exception imported from Wales, though some few common white gypsum ornaments are at times cut from gypsum found near Niagara. On Goat island large masses are often found, and occasionally even under the falls, where all the material for all the ornaments sold here is supposed to have been found. Fine selenite occurs here, but no satin spar.

Malachite.—One very fine, compact, fibrous mass of dark green malachite, that would cut a beautiful cube 1 inch square, from the McCulloch mine, Virginia, is in the cabinet of Mr. C. S. Bement.

Hoffmann mentions it in massive concretions in Copper cañon, Galena district, and at Mineral Hill, Nevada. Some of the copper mines of Arizona and New Mexico will undoubtedly furnish fine specimens when they are more developed.

Mr. F. E. Monteverde has some gem specimens of malachite of very good quality, over 1 inch across, from the Copper Queen mine, Bisbee, Arizona. Malachite has been found recently at the Globe and Arizona mines in fibrous and mammillary masses, and in seams from 3 to 4 inches in thickness and of very fine color, in many respects equaling the finest

from Russia. A number of fancy articles have been made from it. At Ducktown, Tennessee, some fine radiated masses have been found that would polish well.

At the Jones mine, Berks county, Pennsylvania, very dark green and finely mottled malachite was found that would cut into fine gems over 2 inches across. Some very fine specimens from here are in the cabinet of Mr. W. W. Jefferis. The material from this locality equals any from Russia, but the supply is very limited.

Malachite is found in North Carolina in Guilford, Cabarrus, and Mecklenburg counties. At Silver Hill and Conrad Hill, in Davidson county, the fibrous variety has been observed, and at a number of other localities in the State, but rarely of any gem value. In the United States subtreasury, in New York City, are a few fine gem pieces of malachite from the Copper Knob mine in Ashe county, North Carolina.

Chrysocolla.—A beautiful compact chrysocolla, mixed with quartz, is found at the Allouez mine, Houghton, Lake Superior region. Some of the specimens would furnish fine, rich, bluish-green gems one-half inch square.

Beautiful specimens, botryoidal and massive, greenish blue in color, have been found at the Jones mine, near Morgantown, Berks county, Pennsylvania; and a fine specimen from some Arizona locality, coated with chalcedony, made some beautiful gems when the chalcedony was polished, allowing the botryoidal chrysocolla to show through. In one case these markings resemble a human head.

Anthracite is used to some extent as jewelry, being carved and turned into small trinkets, such as compass cases, boots, hearts, anchors, and other small charms. It could readily be made into beads and round ornaments to be used for scarf pins, lace pins, bracelets, etc., in the same way as jet. It is also turned into cups, saucers, vases, candlesticks, and paper weights, and is carved by hand into a variety of small ornaments. The objects made often have one or more ridges of the rough coal, the other portions being highly polished, thus making a striking contrast. Most of the anthracite is worked at Mountain Top, near Glen Summit, Lucerne county, Pennsylvania. The material used is obtained at the Franklin mine at Ashley, the Spring Tunnel mine at Summit Hill, and at Nanticoke, Pennsylvania. These articles are sold at Scranton, Wilkes Barre, Pittston, Mauch Chunk, and at the Summit Hill station on the Switchback railroad. From \$2,500 to \$3,000 worth of these anthracite objects are sold annually.

Catlinite or pipestone.—Catlinite, which is found in such large quantities in the Upper Missouri region, and especially in Pipestone county, Minnesota, is worked into a large variety of ornamental pipes, that are sold at from 75 cents or \$1 each to as much as \$5 and \$10; at times as high even as \$20 for very large pieces of carving. They are made in a variety of forms, mainly to sell readily, such as tomahawks with the pipe bowl in the back, and often pipes from 10 to 24 inches long have

one or more figures on the stem, which is sometimes made of several pieces, usually, however, of wood. Parts of the pipes are often laid out in designs that are filled in with lead.

This stone is also worked into a variety of ornaments and into small charms of different kinds. These are offered and find a ready sale to persons visiting Minnehaha Falls, Lake Minnetonka, various hotels in Saint Paul and Minneapolis, and other cities in Minnesota and Dakota as far west as Fort Sully. The amount sold annually is perhaps \$10,000 to \$15,000 worth. This stone should surely find more uses from its compactness, easy working, and the fine polish it admits of. One curious spotted variety is very beautiful, and would make a good contrast with the regular red pipestone.

Catlinite is also found at Rice lake, Barron county, Wisconsin.

Amber.—Before the New York Academy of Sciences, February 5, 1883, I exhibited and described an elongated, twisted mass of amber(*a*) of a rich yellow color, but opaque, weighing 12 ounces, that had been found on the shore at Nantucket, Massachusetts, evidently from the Tertiary deposits there. This mass more closely resembled the true amber than any other American specimen yet seen.

The Rev. Phœbe Hanaford, at the same meeting, mentioned having found a small piece weighing about 1 ounce at the same locality. Amber has also been found at Martha's Vineyard and at Gay Head.

In a paper read before the New York Academy of Sciences, on the same date, I described a mass of amber 20 inches long, 6 inches wide, and 1 inch thick, and weighing 64 ounces, found at Kirby's marl pit, on Old Man's creek, near Harrisonville, Gloucester county, New Jersey. A one-fourth-inch section showed a light grayish-yellow color. A section one-fourth inch thick showed a light, very transparent yellowish-brown color. The entire mass was filled with botryoidal-shaped cavities filled with glauconite or greensand and a trace of vivianite. The hardness is the same as the Baltic amber, only slightly tougher and cutting more like horn, and the cut surface showing a curious pearly luster, differing in this respect from any other amber yet examined by me. This luster is not produced by the impurities, for the clearest parts show it the best. It admitted of a good polish. The specific gravity of a very pure piece of the carefully selected amber is 1.061, which is the lowest density on record, the usual amber range being from 1.065 to 1.081. It ignites in the same way as other ambers. It was found at a depth of 28 feet and under 20 feet of the Cretaceous marl, the amber being found in a 6-foot stratum of fossils.

Dr. N. L. Britton has observed traces of amber near Camden, New Jersey, in the Cretaceous deposits.

Dr. Charles C. Abbott(*b*) mentions having several times found small grains or pebbles of amber in the bed of Crosswick's creek. These he

a Now in the Amherst College cabinet.

b *Science*, Vol. I., page 594.

gave to Mr. W. S. Vaux, of Philadelphia, and they are now at the Academy of Natural Sciences. He suggests that they are derived from the beds of clay which are exposed in the bluff forming the southern bank of the creek. There are Cretaceous clays nearer Trenton than Crosswick's creek, in which occurs much fossil wood; in and on this grains of amber are not uncommon; they are usually very small and difficult to detect. The wood is soft and very recent in appearance, burning with an uncertain, flickering flame. The amber is evidently derived from the sap of the wood.

The late Professor Kerr^(a) mentioned the finding of succinite in lumps of several ounces weight in Pitt county and elsewhere, in the Tertiary marl beds of the eastern counties of North Carolina.

Dr. Troost^(b) mentions that at Cape Sable, on the northern side of Magothy river and western shore of Maryland amber of several varieties occurs. One is entirely opaque in concentric zones of every shade of red, yellow, and brown, thus displaying the most beautiful colors; another is a transparent yellow, and another is an earthy porous variety. It is found here in the lignite beds in some quantity. It also occurs on the Chesapeake and Delaware canal in Kent county, Delaware.

Mr. C. G. Yale, of San Francisco, California, says that amber is common in the lignite deposits on the peninsula of Alaska. It is also obtained in the alluvium in the delta of the Yukon river and in the vicinity of most of the Tertiary coal deposits on the Fox islands, being everywhere an article of ornament with the natives, who carve it into rude beads.

At no American locality is amber found of commercial value, and although the specimens above referred to are all called amber, they are undoubtedly, with the exception of the Nantasket amber, all from different trees from those producing the Baltic amber, and analyses of them would prove of considerable interest.

Jet.—Jet occurs in the Wet Mountain valley, Trinchera mesa, south-east Colorado, and in the coal seams of most coal-bearing rocks of Colorado. The beautiful specimens of El Paso county, although sold largely for specimens, are very little if at all used for ornamental purposes, from the fact mainly that although this perhaps rivals any known jet, black onyx has almost entirely superseded this material in the United States, owing to the greater hardness of the onyx and the cheapness with which it is furnished from Oberstein and Idar.

Meerschaum.—Sepiolite, or meerschaum, has occasionally been met with in compact masses of smooth earthy texture in the magnesia quarries in West Nottingham township, Chester county, Pennsylvania. Only a few small pieces have been found, but they were of good quality. It also occurs in grayish and yellowish-white masses in the serpentine near Stamp's tavern, in Concord township, Delaware county.

^a "Minerals and Mineral Localities of North Carolina," page 53.

^b *Silliman's Journal*, page 182, 1832.

Masses weighing 1 pound, of a pure white material, have been found on the John Smith farm, Middletown, in the same county.

It has been observed at the Cheever iron mine, Richmond, Massachusetts, of equally good quality, in pieces over 1 inch across.

It has also been found in the serpentine at New Rochelle, Westchester county, New York.

PRODUCTION OF PRECIOUS STONES IN THE UNITED STATES.

While it is impossible to obtain exact returns of the values of the precious stones found in the United States, it is believed that the estimates given in the following table represent, roughly, the total values and the proportionate values of the several mineralogical species. Gold quartz, the value of which should be more properly perhaps included under the head of gold mining, is added at the close of the list.

Estimated production of precious stones in the United States in 1883 and 1884.

Species.	1883.			1884.		
	Value of stones found and sold as specimens and curiosities, occasionally polished to beautify or show structure.	Value of stones found and sold to be cut into gems.	Total.	Value of stones found and sold as specimens and curiosities, occasionally polished to beautify or show structure.	Value of stones found and sold to be cut into gems.	Total.
Diamond				\$800	\$800	
Sapphire gems	\$200	\$2,000	\$2,200	1,500	1,750	
Chrysoberyl	100		100	25	25	
Topaz	1,000		1,000	200	300	500
Beryl	200	300	500	300	400	700
Emeralds	500		500			
Hiddenite	100	500	600			
Tourmaline				500	2,000	
Smoky quartz	2,500	7,500	10,000	2,000	10,000	12,000
Quartz	10,000	1,500	11,500	10,000	1,500	11,500
Silicified wood	5,000		5,000	10,000	500	10,500
Garnets	1,000	5,000	6,000	1,000	2,000	4,000
Anthracite		2,500	2,500		2,500	2,500
Pyrite	1,500	500	2,000	2,000	1,000	3,000
Amazonstone	3,500	250	3,750	2,500	250	2,750
Catlinite	10,000		10,000	10,000		10,000
Arrow points	1,000		1,000	1,000		1,000
Tribolites	500		500	500		500
Sagenitic rutile	500	500	1,000	500	500	1,000
Hornblende in quartz	500	100	600	500	100	600
Peridot	50	250	300	50	100	150
Thompsonite	250	500	750	250	500	750
Diopside	200	100	300			
Agate	1,000	500	1,500	4,000	500	4,500
Chlorastrolite	500	1,000	1,500	500	1,000	1,500
Turquoise	1,500	500	2,000	1,500	500	2,000
Moss agate	1,000	20,000	21,000	1,000	2,000	3,000
Amethyst	2,000	250	2,250	2,000	250	2,250
Jasper	2,000	500	2,500	2,000	500	2,500
Sunstone	250	200	450	250	200	450
Fossil coral	500	250	750	500	250	750
Total	47,350	44,700	92,050	54,325	28,650	82,975
Gold quartz	40,000	75,000	115,000	40,000	100,000	140,000

IMPORTS.

Diamonds and other precious stones imported and entered for consumption in the United States, 1867 to 1884 inclusive.

Fiscal years ending June 30—	Glazier's.	Dust.	Rough or uncut.	Diamonds and other stones not set.	Set in gold or other metal.	Total.
1867.....	\$906			\$1,317,420	\$291	\$1,318,617
1868.....	484			1,060,544	1,465	1,062,493
1869.....	445	140		1,997,282	23	1,997,890
1870.....	9,372	71		1,768,324	1,504	1,779,271
1871.....	976	17		2,349,482	256	2,350,731
1872.....	2,386	89,707		2,939,155	2,400	3,033,648
1873.....		40,424	\$176,426	2,917,216	326	3,134,392
1874.....		68,621	144,629	2,158,172	114	2,371,536
1875.....		32,518	211,920	3,234,319		3,478,757
1876.....		20,678	186,404	2,409,516	45	2,616,643
1877.....		45,264	78,033	2,110,215	1,734	2,235,246
1878.....		36,409	63,270	2,970,469	1,025	3,071,173
1879.....		18,889	104,158	3,841,335	538	3,964,920
1880.....		49,360	129,207	6,690,912	765	6,870,244
1881.....		51,409	233,596	8,320,315	1,307	8,606,627
1882.....		92,853	449,313	8,377,200	3,205	8,922,771
1883.....		82,628	443,996	7,598,176	2,081	8,126,881
1884.....	22,208	37,121	367,816	8,712,315	(a)	9,139,460

a Not specified.

Imports of substances not included in the foregoing table, 1868 to 1884 inclusive.

Fiscal years ending June 30—	Unmanufactured agates.	Bookbinders' and other manufactured agates.	Carnelian.	Brazil pebbles.	Amber.	Amber beads.	Unmanufactured coral.	Manufactured coral.	Unmanufactured meerschaum.	Total.
1868.....							\$62,270			\$62,270
1869.....		\$70	\$269		\$427		22,417		\$6,407	29,590
1870.....			766		1,433		18,975		3,998	25,172
1871.....			661		180		37,877		698	39,417
1872.....		529	207		2,426		883		2,194	65,637
1873.....	\$151	1,310		\$1,237	1,534	\$595	230	63,805	5,608	74,479
1874.....	177	1,524			1,448	1,057	527	28,152	2,970	32,155
1875.....	520	5,165			7,169	715	1,278	33,567	2,902	51,373
1876.....	293	1,567		57	15,502	187	109	33,559	21,939	73,156
1877.....	579	1,904	b 69		17,307	329	718	28,650	0,304	58,990
1878.....	82	464		76	13,215	1,119	1,252	12,667	16,308	45,123
1879.....	138	364			17,821	263	147	11,227	19,088	49,688
1880.....	57	2,346			30,890	2,317	62	5,492	30,849	77,383
1881.....	486	1,700		5	42,400	1,102	89	2,501	72,754	121,637
1882.....	901	5,084		111	72,479	4,174	1,474	669	56,118	141,610
1883.....	14	2,895			40,166	3,472	681	1,303	58,885	107,416
1884.....		6,100		3,490	56,301	4,692	158	(c)	43,169	113,918

b Not separately classified since 1877.

c Not specified.