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A VISIT TO THE DIAMOND MARKET

by

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As it was my object to investigate every possible source of supply in Europe for cut or polished diamonds, I stopped off in London to see if there were anything to the report we had heard that polished diamonds could be purchased cheaper in London than in Antwerp.

I had a very nice visit with one of the major diamond brokers in London and found that all polished goods were shipped to them direct from Antwerp, mostly on a consignment basis to show their customers in London. They also have some Canadian customers who apparently prefer to deal through a British connection. When they learned that the Traub Manufacturing Co. had been importing direct from Antwerp they admitted there was no advantage in buying in London either for them or for us.

From London I went direct to Amsterdam, and while numerous small cutters are still working quite regularly there, it is confined to full cuts almost entirely. The brokers in Amsterdam would like very much to retrieve the lost reputation for their fair city and again be known as the Diamond Market of the World. This change from Amsterdam to Antwerp has come about since the World War. There was a big demand for cheap eight facets after the war, and Antwerp was able to produce them at attractive prices and in quantities. As the buyers wanted more eight facets than other merchandise, they went to Antwerp to see them and the Amsterdam brokers began to go there too, that they might show their goods to these buyers. Now most of the Amsterdam brokers have permanent offices in Antwerp as well as Amsterdam. Another factor in this change I think has been that it is somewhat cheaper to stay in Antwerp than in Amsterdam.

To understand how the diamond market functions you must understand that there are two distinct lines of endeavor there and at least three different kinds of brokers. There is the rough diamond trading handled by a large group of brokers who trade among themselves in splitting up lots of rough which certain cutters cannot use to advantage and other cutters make a specialty of. The polished diamond trading is handled by two other distinct kinds of brokers which I shall call "Selling Brokers" and "Buying Brokers." American firms or importers deal through a buying broker. The selling broker is really a commission salesman for the cutter and may represent one cutter or several cutters and very often has papers from buying brokers to be closed out or resold in the market. It is the job of the selling broker to know where he can best sell the different grades, colors, etc., which the cutters produce. He usually has a somewhat regular clientele of buying brokers who have customers in the market from time to time for the type of goods produced by the cutter or cutters he is working with.

When an American buyer goes to Antwerp he sits in the office of his buying broker and interviews these selling brokers day after day, selecting from what they carry the papers he thinks meets his requirements. A buyer who has been going there for years becomes quite well known to various selling brokers and when his name is posted in the diamond club by his buying broker they know from past experience what type of goods he likes and usually buys. It resolves down, then, to price, and this subject has many possibilities. The cutter knows how much he paid for the rough and the cost of finishing it, but he endeavors always to get the maximum price for each paper regardless of cost. The selling broker may add whatever he thinks he can get in quoting prices and he has all the advantage because he can refuse any offer made on the lot, whereas the buyer must be prepared to pay his offer if it is accepted.

The usual procedure is to ask the price and then offer what you think it is worth or a little less, based upon other lots you have seen and the advice and counsel of your buying broker. If the selling broker thinks there is any possibility of the offer being accepted, he will "take a seal" on the paper at that price. This is done by having your buying broker check the weight, after which it is put into a special lightweight paper envelope with a heavily gummed flap which is folded and wrapped around the paper or papers and sealed securely. The offer is then written on the outside. The selling broker takes this package to the owner to see if he will sell at that price. If the offer is accepted the *buying* broker makes out an invoice in duplicate, showing the owner's name and price agreed upon as well as the number and weight of stones in each paper. The original is given to the selling broker, who turns it over to the owner, receiving 1% commission on the sale for his services.

The buying brokers charge from 2% to 5% for their services, depending upon the arrangement you agreed to when they were first engaged. His services include the use of his office, help in analyzing lots, checking weights and counts, assorting for color, make and perfection, as well as packing and clearing through the consul's office. If the lot has been left for a day or more with the buying broker for analyzing before making an offer, the owner or selling broker may take the sealed offer package to the diamond club and have the seal broken and the weight officially checked, after which it is resealed with their sticker and rubber stamp for a very small fee. This service is quite extensively used when the rough brokers deal among themselves. As they have no office except their pockets, they can get accurate and certified weights which are accepted everywhere in the diamond market.

It is generally recognized that the amount of activity at the weighing booth in the diamond club indicates the amount of business being done in the diamond market.

Besides the Diamond Club there is the Diamond Bourse and two smaller associations of a similar nature which are combined under the Federation of Belgian Bourses with a total membership of 4000.

Following is a typical assortment taken from a series of fine, top-grade rough, just as it was finished and assorted by the cutter. Seven separate papers.

130 ct.	large (20 per ct. to .25 ct. each)
65.00	small (50 per ct. to 20 per ct.)
15.00	cape or yellow (all sizes)
33.00	1st pique (all sizes)
43.00	2nd pique (all sizes)
16.00	3rd pique (all sizes)
4.00	rejections (all sizes)
306. ct.	total in the seven papers

The large and small range from very fine color to definite off-color, and also contain the slightly imperfect and a few "flats" or spread stones, as well as some with broken culets and small naturals at the girdle. The rejections contain only those stones so filled with imperfections as to be dead white or almost black, depending on the type of inclusions. Other degrees of imperfections are distributed among the first, second and third piques.

All prices quoted in Antwerp are in gold guilders, which figure at $.68 each in dollars. In Amsterdam they quote in both gold guilders and paper guilders, the latter being the current rate of exchange for Netherlands currency.

At the present time the two major workers' unions report from 45% to 55% of their members unemployed.

"TRUE-STAR"

A student of the Certified Gemologist courses of the Gemological Institute of America, Robert Strothman of Milwaukee, some time ago discovered a novel method of producing asterism and chatoyancy artificially. His method is to back a transparent cabochon (of any material whatsoever) with foil on which one or more systems of parallel lines have been inscribed. These parallel lines act somewhat as do the striae of natural star stones and cat's-eyes, producing lines of light of right angle to the striae. By varying the number of systems of lines, stars of any desired number of rays may be produced. A patent on this construction has been granted.

Synthetic ruby and sapphire backed with foil having three sets of parallel striae to produce six-rayed stars have been put on the market by the firm of S. Buchsbaum & Co., of which Milton Herzog—another Certified Gemologist student—is a member. These are being marketed under the trade name "True-Star," made up in rings, cuff links, etc.

The stones quite lack much of the beauty of natural star ruby and sapphire. Furthermore, the foil backing, which is held in place by a coating of some sort of plastic, tends to separate readily. However, the stones are mounted in backed-up designs and are guaranteed; they will probably enjoy a brisk sale.

A GEMOLOGICAL ENCYCLOPEDIA

(Continued from last issue)

by HENRY E. BRIGGS, Ph.D.

ZIRCON (Continued)

Emeraldite—Green zircon.

Blue Zircons—of natural origin are sold as such, and those which are heat altered are often sold as "starlite," although they are now being offered to some extent as merely blue zircons, as the natural are sold.

Jargoons—Zircons of a smoky color or lacking in transparency.

"Matura Diamond"—has been applied to colorless zircon, but it has also been sold as "sparkelite." It should, however, be sold for what it is—colorless zircon.

The color of zircons is not stable under the influence of high temperature, and the colors of the stones may be altered by heat treatment. The bulk of blue-colored stones sold on the market as blue zircons, "Starlite" zircons, etc., are stones which have been heat-treated. The brownish stones will change to a blue color when heated to a certain degree in a furnace. The blue-green stone can be rendered a clear blue by the same process. Also the colored stones can be rendered colorless by a higher temperature, and often can be rendered more transparent. Altered zircons are not as valuable as are those which occur naturally of a desirable color. A great many of these gems are treated in the rough state in Siam and sold to cutters, thus the fact that a gem is purchased in the rough with a certain color does not mean that the gem is unaltered. Dichroism is fairly marked, especially in the blue stones, growing fainter in the light yellows; but nevertheless it is readily distinguishable.

Zircons of gem quality are found in Ceylon, Burma, Australia, France, and Russia. Zircons occur in the United States, but not in gem quality.

GARNET

Garnet has come to be used in the jewelry trade to designate a good many red stones. Some of these are gems of the garnet group, and some mere imitations. Garnet is the name of a group of gems which vary in composition and, consequently, vary greatly in appearance and in properties.

Many of the garnets are very common and consequently very cheap and, therefore, are often sold under deceptive names such as "Cape Ruby," "Montana Ruby," "Uralian Emerald," etc. This questionable practice tends to enhance the price of the stones sold under such names.

The whole group crystallize in the cubic system and are found in well-defined crystals of the various forms and also in rolled pebbles and in granular masses. All of the group are isotropic and, therefore, not dichroic. Since the properties and composition vary, they will be treated under each gem in the group mentioned below:

Grossularite. This species of garnet is composed of calcium and aluminum in the form of a silicate. The formula is $Ca_3Al_2(SiO_4)_3$. It is quite obvious that this member of the group would be colorless if it were pure. However, it is never found in that state and seldom in any degree of transparency. Hessonite or cinnamon-stone (or essonite, as it is sometimes called) is of a brown color and is the most transparent of any of the grossularites. However, it has a peculiar granular structure which may be seen in even cut gems. Grossularite also occurs in pink and green to white or grey. Some of this material closely resembles jade in appearance, especially that coming from Transvaal, South Africa, and from southern Oregon. Most of the brown rough comes from Ceylon, where it is called cinnamon-stone. The hardness of grossularite is 6½ to 7; the gravity 3.4 to 4.3; fracture is conchoidal; index of refraction 1.735; dispersion .028; its luster is resinous to vitreous.

Pyrope. This species of garnet is a silicate of magnesium and aluminum, the formula being $Mg_3Al_2(SiO_4)_3$. Pyrope is usually a fine ruby-red, but sometimes runs into a deep red which looks black in reflected light. The color here is due to impurities also, but it is never found in the pure state, i.e. in the colorless state. Pyrope is found in gem grades in Arizona, Montana and New Mexico in the United States, and in South Africa in the diamond-bearing gravel of the rivers.

The hardness of pyrope is 7 to 7½; the specific gravity, 3.7 to 3.8; index of refraction, 1.705; dispersion, .027; luster resinous to vitreous.

Almandite. This garnet is a silicate of iron and aluminum. The formula is $Fe_3Al_2(SiO_4)_3$. Almandite is a deep red to violet-red or black. It was undoubtedly the "carbuncle" of the ancients. It is indeed beautiful when cut, but unfortunately most of the almandite found is too deep in color to cut into faceted gems and is employed as an abrasive material or in making cheap jewels for fine instruments and watches. In almandite we occasionally see an asteriated stone showing a four-rayed star which is not only novel but beautiful. Almandite of gem grade occurs in India, Australia, Ceylon, Uruguay, Brazil, and in the United States in Colorado.

The hardness of almandite is 7 to 7½; the specific gravity 3.9 to 4.2; the index of refraction 1.83; the dispersion .024; the luster vitreous to resinous.

Spessartite. This species of garnet is a silicate of manganese and aluminum. The formula is written $Mn_3Al_2(SiO_4)_3$. Spessartite is usually of a rather poor brown color but also occurs in brownish red and orange-red to deep orange-red. It is not very popular in jewelry as its colors are not as pleasing as are those of the other garnets. Spessartite occurs in Ceylon, Brazil, Madagascar, and in Nevada. The hardness of spessartite is 7 to 7½; the specific gravity is 4.0 to 4.3; index of refraction 1.80; dispersion .025; luster vitreous to resinous.

Rhodolite is a mixture of pyrope and almandite. It is found in Macon County, North Carolina.

(To be continued)

THE GEMS OF COLORADO

by

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Almost since its earliest discoveries of gold and silver, Colorado has held a leading place in the production of gems, ranking among the first half dozen states in value of output. Over a hundred localities may be named as having yielded material of gem quality, representing about forty mineral species and varieties, as well as the organic substance, jet. The first gems were obtained by scientists who used them for study purposes; then prospectors, individually or as small companies, mined them commercially; and in recent years mineral collectors have been responsible for an increasingly large proportion of the total. The history of gem mining in Colorado would make an interesting paper in itself.

Colorado is about evenly divided into three major north-south topographic zones—on the east, the Great Plains; on the west, the Colorado Plateau; and in the center, the Rocky Mountains. It is to the building of the Rockies that Colorado is responsible for practically all its rich mineral resources, and the gems are no exception. Most of them either were formed by depositional or metamorphic processes associated with the mountain-making activities, or were exposed by the uplift that followed most of the compressional folding. Igneous rocks, especially those of granite composition and the closely related pegmatites, predominate among the rocks that contain the gem minerals.

(Beryl—Aquamarine)

Fine gem aquamarine occurs in the highest mineral locality in North America, on the sides and virtually at the top of Mount Antero, in the Sawatch Range, 14,245 feet above the sea. The "Antero Lode" is one of the important gem deposits of the country, and the surrounding region has produced a good quantity of aquamarine since 1884 or 1885. The crystals occur in miarolitic cavities in pegmatite veins and lenses that represent the residual phase of solidification of a post-Cretaceous granite magma, which is, in turn, a facies of a somewhat earlier quartz monzonite batholith. The common Antero beryl has a fairly typical bright blue color. Most of the crystals are badly fractured, apparently as a result of freezing and thawing of ground water, rendering them opaque. The gem variety is usually blue to pale blue-green, but some specimens are of the prized deep blue of foreign stones. There are many crystals that contain a transparent center but that are opaque at the ends. The length ranges up to 20 centimeters, though the average one that would be classified as large would be from 5 to 8 centimeters long. They are etched in a manner that was first noticed on crystals from Antero, though similar etch figures have since been described elsewhere. The isolation at a high altitude of the source of supply, the interesting mineralogy of the area, the peculiar characteristics of the crystals, and the beauty of the gems when fashioned, have all combined to make the Antero aquamarine of appeal to students, collectors, and dealers everywhere. The best collections are those of the Field Museum of Natural History (Chicago), the American Museum of Natural History (New York), and Harvard University (Cambridge, Mass.).

(Corundum—Sapphire)

Blue gem sapphire has been found as tabular crystals in corundum schist at the abandoned Calumet iron mine near the once prosperous gold-mining town of Turret, Chaffee County, which now has a population of one. Colorless, pale to deep blue, and pale greenish transparent sapphire was taken a number of years ago from a corundum deposit near Canon City in Fremont County.

(Feldspar—Amazonstone)

Colorado amazonstone was made known to the world by a large display of it at the Centennial Exposition in Philadelphia in 1876, and the quality and quantity of the specimens and their low prices drove the Russian material from the market. Long the best known place in the state, Pikes Peak has supplied its name to most of the gems found in central Colorado up to forty miles from the mountain itself. In recent years the individual localities have been more frequently referred to by their own names — Crystal Park, Crystal Peak, Devil's Head, etc., which together are the most important source of present-day amazonstone. The mineral occurs in miarolitic cavities in pegmatite, part of the Pikes Peak granite. Many thousands of fine crystals and groups up to a foot in length have been obtained. The color is gray to bright blue and green, usually varying from place to place, often in bands, within the crystal. Iron oxide from weathered mica stains many of the cleavage cracks. Sales of cut amazonstone, much of it to tourists in Denver and Colorado Springs, have gone above $1,000 annually for most of the past years.

(Feldspar—Moonstone)

Gem moonstone pebbles, "many of them equal to the Ceylon moonstone," have come from near Durango and at Wolf Creek Pass, both in the southwestern part of the state. In the gem collection of the United States National Museum in Washington there is a cabochon moonstone from Colorado measuring 7x3 millimeters and weighing .95 carat.

(Turquoise)

Colorado turquoise is surpassed by none produced today in its excellence of color. The state is second only to Nevada in mining activity, and four deposits are known, all in the central part of Colorado, two in the San Luis Valley and two in the mountains. The Hall mine in the Cochetopa Hills region near Villagrove is at present the most important gem deposit in Colorado, employing three men and producing fine nugget and vein material which is sold to dealers in Indian goods in neighboring states.

(To be concluded)

The Use of Clerici's Solution to Determine Specific Gravity

by

D. H. WILSON

Lieutenant, U. S. Navy

This method requires considerable time to weigh the bottle, the water, and the solution as the bottle must be completely dry before the solution is inserted. However, since there is a definite relationship between the S.G. of Clerici's Solution and the R.I. of Clerici's Solution, a curve of various S.G.'s of Clerici's Solutions against their respective R.I.'s can be made. Having this curve, I merely have to float an unknown stone on a solution and add water until the stone is just in suspension. Now my solution is of the same S.G. as the stone. I place a small drop of this solution on a refractometer, cover this drop with a garnet or zircon, and read the R.I. of the liquid. I enter my curve with this R.I. and find the S.G. of the liquid, which is the S.G. of the stone. The curve eliminates the weighing of the bottle, water and solution. One point which confuses many persons is that although the S.G. of the solution is the same as the S.G. of the stone, the R.I. of the solution differs from the R.I. of the stone. There is a relation between the R.I. of the liquid and the S.G. of the stone, but there is no constant relation between the R.I. of the stone and the S.G. of the stone.

A separate curve should be made for each batch of the solution as the malonic acid, formic acid or thallium carbonate may differ. To obtain the curve, weigh the pycnometer; weigh the pycnometer filled with water and obtain the weight of the water. Now weigh a pycnometer full of the liquid in bottle No. 5 of about 4.03 S.G. With this data obtain the S.G. of that particular liquid. Next, get the R.I. of the liquid. You now have your first point on the curve. Continue this operation for the solutions of approximately 3.73, 3.54, 3.10 and 2.66 to get four more points on your curve, five points in all. Now plot the curve, which should be a straight line.

A few hints on weighing: Do not touch the bottle any more than necessary, in order to avoid changes in temperature. To dry out the bottle, wash with water, then with ether or alcohol. Blow air on the inside of the bottle to dry. If you have a chemist make up your solution, it is a good idea to let him make your curve, as he can keep it at room temperature while making his reading.

There follows the directions for making Clerici's Solution as used by Dr. Samuel G. Gordon, Assistant Curator of Minerals, Academy of Natural Sciences of Philadelphia:

Materials needed:

- 100 grams thallium carbonate
- 25 grams malonic acid (Eastman Co.)
- 402 grams formic acid

1. Make up following solutions: 11.1 gms. malonic acid in water.

2. Dissolve 50 grams of thallium carbonate in above solution of malonic acid. (Add slowly to avoid effervescence.)

3. Dissolve 50 grams of thallium carbonate in 10.6 milliliters (cc.) of 90% formic acid (dilute latter with water first).

Mix the solutions, filter, evaporate on a porcelain dish until an almandine garnet floats.

Solution can be diluted with drops of distilled water until densities desired are reached; or density can be increased by evaporation.

After long use, solution may become discolored; color can be restored by filtering through Fuller's earth.

This solution should probably be made up by a chemist. Thallium carbonate is rather hard to obtain in 100-gram lots at a reasonable price. Akatos, Inc., 55 Van Dam Street, New York City, currently charges $10.00 F.O.B. New York, for 100 grams. The same amount costs over $30.00 in Philadelphia at Arthur Thomas Co. The malonic acid and formic acid are cheap. Most chemists have a supply on hand.

The most practical and quickest method is the use of 5 or 6 liquids to obtain an approximate S.G. It is doubtful whether the average jeweler would need an exact S.G. once in five years. However, if you do need exactness it can be had from the S.G.-R.I. chart.

THE END

AID IN SPECIFIC GRAVITY WORK

A suggestion by Edward Wigglesworth, Ph.D., C.G., Boston, Mass.

Specific Gravity is one of our best means of identification, but it is not used as much as it should be as the process is time-consuming and the results are not sufficiently accurate unless one is fairly expert in handling the scales. The difficulty arises because of the friction of the water surface on the wire supporting the stone when the weight in water is being taken. The scales do not swing freely and so an accurate reading is not obtained. Also, very frequently small bubbles of air adhere to the stone and these are difficult to dislodge, or may remain undetected. Both these difficulties may be easily overcome by using carbon tetrachloride in place of water. This liquid may be obtained at any drug store and is inexpensive. Most people are familiar with it under the trade name of "Carbona." The weighing is done in exactly the same manner as when using water, only one finds that the balance swings nearly as freely as in air and that no air bubbles attach themselves to the stone or wire basket. The computation is made exactly as if water were used, but it is necessary to multiply the result by 1.58 to correct for the lower specific gravity of carbon tetrachloride. I find this method not only more accurate than when water is used but also much quicker. Without hurrying I have obtained the specific gravity of a 0.60 carat stone to within .01 in between five and six minutes. A lesser advantage is that the stone comes out of the test perfectly cleaned for the diamondscope or microscope.

Synthetic (?) Diamonds

by

R. SHIPLEY, JR.

Director of Research, G.I.A.

In the Summer, 1939, issue of *Gems and Gemology* appeared an article by Dr. J. Willard Hershey in which he commented upon certain of the findings of the Gemological Institute and those scientists who were associated with the Institute in testing the specimens which Dr. Hershey submitted.

These specimens, when they were sent, were at least inferred by Dr. Hershey to be synthetic diamonds which he had manufactured. On testing these it was found that of the stones three were diamonds, but two (in vials No. 1 and No. 2) were very obviously of natural origin. The third (in vial No. 5) was a rather unusual specimen and it was thought that this might perhaps be a synthetic stone. The other two specimens, No. 3 and No. 4, were proved to be quartz by refractive index and optic character, and by spectographic analysis. Dr. Hershey, in his rebuttal, maintains that these could not be quartz since they did not dissolve in hydrofluoric acid. The specimens showed very definite effects of acid solution, and it seems logical to assume that they were attacked but had not time to be totally destroyed by the hydrofluoric acid in which they were immersed.

Dr. Hershey, by quoting only a portion of a letter from the writer, attempted to place the Institute in the position of having identified stones No. 1 and No. 4 as genuine diamonds and then having reversed this opinion.[1] The reason for the assumption on the part of the Institute staff that certain of the Hershey stones were not of synthetic origin was a letter of July 16, 1938, signed by Dr. Hershey, in which he states:

"I would be very glad if you would *not* publish any of your results until after you have completed your work and report the results to me. I would like to give you some explanation what we know before this is done. I am very anxious to know what you find out about No. 2, No. 3 and No. 5. As I told you before, please do not powder No. 2 and No. 5. I will then gladly give you some reprints of our published work and other information."

From this it was presumed that stones No. 1 and No. 4 were not the same as the rest of the material. Stone No. 1 obviously being natural diamond, the several scientists working with the stones felt that in view of Dr. Hershey's greater interest in No. 2, No. 3 and No. 5, he might consider No. 4 also natural material.

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1 The paragraph of the letter mentioned is, in full:

"Both Drs. Sturdivant and Clements and myself are very much concerned about what we feel is the method in which you have handled this matter. We are all of the opinion, though I sincerely hope that we are wrong, that the stones which you sent us are both known genuine diamonds and material produced by your process. As we interpret your inferences, stones No. 2, No.3 and No. 5 seem to be material produced by you, whereas stones No. 1 and No. 4 (to which, because of their clearer crystal form we have been giving particular attention) apparently are genuine diamonds."

Later correspondence tended to substantiate this, for in his letter of September 15, 1938, he stated:

"You asked in your letter of September 8th if I would permit you to destroy four or five in order to get an exact analysis by means of the spectograph. I will gladly do this if you first send these two to me insured so that I can see for certain which is four and which is five before this is done."

Dr. Hershey's attitude in his article seems to be that the G.I.A., due to its affiliations with the jewelry trade, was unfair in the report of its findings and, furthermore, that it is unwilling to admit the production of synthetic diamonds even if reasonable evidence could be furnished. This is far from the case. Concerning the fragments which Dr. Hershey claimed to have produced, even if all should be proved to be diamonds, this would have no effect on the diamond market. All five specimens are much too small and of too poor quality to be of any possible value as gems.

Furthermore, the Institute is still willing to concede that there is a possibility that the diamond in the paper which Dr. Hershey designates as No. 5 may be of synthetic origin. However, the Institute is firm in its belief that No. 3 and No. 4 are not diamonds and that No. 1 and No. 2 are diamonds which have occurred naturally. However, in view of the circumstances which have surrounded the sending of these stones to the Institute for testing, there is reason for considerable doubt concerning the synthetic origin even of No. 5.

GEMOLOGICAL GLOSSARY

(Continued from last issue)

(With phonetic pronunciation system.)

Terms in quotation marks are considered incorrect.

Rennet (ren′et or ren′it). An extract made from the mucous membrane of the calf. Used in the making of cheese and other milk products.

Repeated Twinning. A laminated structure produced by a great number of tabular individuals, twinned to form a whole. See also Twin Crystal.

Reproduction (ree″proe-duk′shun). A term used to include reconstructed stones, synthetic stones, and also cultured or cultivated pearls in a similar manner to the use of the word for the finer copies of the original works of art.

Resin (rez′-in). A solid to semisolid, transparent to opaque organic substance. Usually yellow to brown in color, but resins—especially the synthetic products—may occur in almost any color.

Resin Opal. Wax, honey, to ochreous-yellow variety of common opal with a resinous luster.

Resinous (rez′i-nus). Luster like that of yellow resins.

Reticulated (ree-tik′ue-late″ed). Having slender crystals or fibers crossing like the meshes of a net.

Rhinestone (rine′stone). Rock crystal (quartz).

Rhodochrosite (roe″doe-kroe′site). A semitranslucent brown to red carbonate of magnesium, used rarely as a gem stone.

Rhodolite (roe′doe-lite). A fine red-purple garnet, intermediate between pyrope and almandite in the garnet group.

Rhodonite (roe′doe-nite). A gem mineral. Purplish-red to red-brown, translucent to opaque mineral sometimes used as a gem stone. Refractive index 1.73, specific gravity 3.5, hardness 5½-6½. $Mn\,Si\,O_3$.

Rhombic (rom′bik). A crystallographic system with three axes, each perpendicular to the plane of the other two, but with no two axes of the same length.

Rhombohedral System (rom″boe-hede′ral). A division of the hexagonal system in crystallography.

Rhomb (rom or romb). A form bounded by three parallel pairs of lozenge-shaped faces.

R. I. An abbreviation for refractive index.

Riband Agate. (ribe′and). Banded agate.

Richelieu pearls (ree″she″lyu′. English, reesh′-e-loo″). Trade-marked name for both solid and wax imitation pearls.

Ring Agate. Agate with differently colored bands arranged in concentric circles.

Ring-arounds. Term applied by American fishermen to pearls having a discolored ring around them.

Rivers. Diamonds from the rivers or alluvial mines of Africa. Also, refers to the finest color grade of diamonds.

River Agate. Moss-agate pebbles found in brooks and streams.

River Sapphire. Light-colored sapphire from Montana.

Roasting. Heating at a low red heat with a strongly oxidizing blowpipe flame, for the purpose of driving off sulphur, arsenic, etc.

Roberts-Victor. The name of a diamond mine in South Africa. Also, a fine-quality diamond from this mine.

Rock Amber. Same as block amber.

Rock Crystal. Clear, colorless quartz.

"Rock Ruby." Red pyrope garnet.

"Rocky Mountain Ruby." Garnet.

Rolled Pebbles. Pebbles which have been worn by water transportation to a comparatively smooth and round shape.

Romansovite (roe'manz-oe-vite). A brown garnet.

Rondelle (ron-del'). A round, flat disc, usually pierced through the flat surfaces for use as beads.

Röntgen Ray (runt'gen). X-rays.

Rosaline (roe'za-lin). Thulite.

Rose. A form of cutting diamonds, confined usually to small stones, and by which pieces too small for brilliants are sometimes utilized.

"Rose Kunzite." Pink synthetic sapphire or spinel.

Rose Opal. Quinzite. A pink variety of common opal colored with organic matter.

Rose Pearls. Pink, iridescent, freshwater baroques.

Rose Quartz. A light red to purplish red (pink to rose) translucent to semi-transparent gem variety of quartz. Rarely asteriated.

Rose Topaz. Pink topaz.

Roselite (roe'ze-lite). Pink garnet.

Rosette (roe-zet'). A cluster of flakes or scales resembling a rose.

Rosin (ros'in). A variant of resin.

Rosolite. A rose-pink garnet from Mexico. See landerite.

Rottenstone (rot''n stone'). An easily powdered siliceous stone, the residue of a siliceous limestone from which the carbonate of lime has been removed by the solvent action of water. Used as a polishing powder. Known also as Tripoli.

Rouge (roozh). Formerly prepared by reducing hematite to fine powder. Now a red amorphous powder consisting of ferric oxide, usually prepared by calcining ferrous sulphate. Jewelers' rouge is a fine, gently calcined variety; is sometimes prepared from ferrous oxalate.

Rough. Gem mineral which has not yet been cut and polished.

Roumanite. See Rumanite.

Royalite. Trade-marked name of a purplish red glass.

Royal Topaz. Blue topaz.

Rozircon (roe"zur-kon' or roe-zir'kon). Trade-marked name for a pink synthetic spinel.

Rubasse (roo-bos'). Quartz artificially stained red.

Rubellite (roo-bel'ite). Red tourmaline.

Rubicelle (roo'bi-sel). Yellow to orange-red spinel.

Rubolite (roo'bo-lite). Red opal from Texas.

Ruby (roo'bi). The red variety of corundum, one of the most important gem stones. Occurs rarely as star ruby, still less frequently as ruby cat's-eye.

Rumanite (roo'man-ite). Yellowish brown and reddish brown to black amber from the Province of Buzau, Rumania.

"Russian Crystal." Colorless selenite (gypsum).

Rutile (roo'til or roo'tel). A red to black mineral occasionally used as a gem.

(To be continued)

Photography in Gemology

(Continued from last issue)

Filters are really of no value in connection with photomicrography of gem stones. When photographs of an interior of a colored stone are taken, the material of the stone itself acts as a filter and colors the inclusions with the color of the body of the stone. Therefore, any filter which will alter the appearance of the inclusions will alter the appearance of the body in the stone itself in an equal amount and the cumulative effect is zero. In rare instances, inclusions of definite colors occur in colorless stones. These can be made to contrast more or less with the body of the stone by selection of suitable filters.

With photography becoming one of the outstanding hobbies in the United States, most amateur photographers are learning to develop and print their own negatives. In work as technical as the photographing of fine stones, development and printing by the photographer is recommended, since a professional photo-finisher, accustomed to handling subjects of a very different nature, often does not understand what to develop for and, therefore, destroys what might otherwise have been a first-class negative. This trouble has been experienced on several occasions by the G.I.A. laboratory—even after the photographer was told in detail just what to expect as he developed the work. In general, it is desirable with gem stones to photograph on panchromatic film at as nearly normal conditions as possible, i.e., without attempting to increase or decrease the contrast as compared with that registered by the average human eye. The film should be then developed for as much contrast as possible to secure in it without producing a negative which is too contrasty to be printed satisfactorily. The negative, if sufficiently contrasty, may be then printed on a normal or soft paper which can be given long development in order to bring up details and to secure a long range of tones. This method is used in the G.I.A. laboratory when photographs for direct study are desired. When photographs for printed reproductions (as in *Gems & Gemology*) are desired, both the negative and the print are made as contrasty as practical, since printed reproductions of photographs noticeably tend to "go softer" than the original.

Photographs of gem stones can be made fascinating by work in color. Several satisfactory color films are now on the market. Of these, Eastman's Kodachrome is preferred in the G.I.A. laboratory. However, Kodachrome has the disadvantage of being much more difficult to duplicate than materials such as the Finley-Eastman plate. However, Kodachrome transparencies can be projected by means of an inexpensive projector with truly beautiful effects. With any color film a filter to compensate the light will probably have to be used. However, it has been found in the G.I.A. laboratory that very good results can be obtained by use of photoflood lamps and Kodachrome type A (designed for use with artificial light) with no filter being used. A further advantage of Kodachrome is that it will reproduce faint colors, such as the light blue body color of an aquamarine or the delicate dispersion colors of a diamond much more clearly and beautifully than will other, denser processes.

The exposure of color film is extremely important; even slight variations cause appreciable error in the reproduction of gem colors. The method for using the exposure meter outlined above is sufficiently accurate, however, to guarantee very satisfactory results if care is taken. It will probably be necessary for each user of color film to calibrate his own equipment, as exposure meters, even of the same model, vary appreciably; and the shutters of the finest cameras may vary enough to cause noticeable variations in color rendition.

The article above is designed to give the average jeweler-gemologist a starting point for photography of gem stones. In order to avoid excessive length, names of manufacturers and details of the use of particular camera equipment, etc., have been omitted. However, anyone who wishes further information on any subject may contact the publishers of *Gems & Gemology* and detailed information on any phase of gem stone photography will be sent. In requesting information, describe in detail the equipment which is available, including light sources and the arrangement and also complete description of the subject which is to be photographed.

THE END