Gems & Gemology

A bi-monthly periodical, without paid advertising, supported by subscriptions from Gemologists and other gem enthusiasts, aims to increase the gem merchant's knowledge and ability in order that he may protect more thoroughly his customers' best interests.

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EDITORIAL FORUM

Important Announcement

In the first issue of *Gems & Gemology*, published in January, 1934, we announced that our policy would be to give our readers gemological information and to report each new development in the field of gemology. We followed this policy for several issues. With the November-December, 1934, issue we altered it somewhat to follow a plan of presenting material which would be of more general interest to all retail jewelers. We hoped to develop a service of which the majority of all the retail jewelers ethically eligible for membership in the A.G.S. would avail themselves. This course has been followed throughout the past year.

However, following this plan made it necessary to delete much scientific material—of value to the jeweler who is a conscientious student of his merchandise—in favor of the more popular subjects, which were of value to a greater number of jewelers. It has now been proved that, even in its present form, *Gems & Gemology* is more valued by those jewelers who wish to make a serious study of their merchandise and methods of selling it.

We have also found that not only Registered Jewelers and Certified Gemologists, but also the majority of our other readers are saving each copy of *Gems & Gemology*, re-arranging and filing its pages in binders, and thus compiling gemological reference books of permanent value.

Beginning with our first issue in 1936, we will institute a policy of limiting our material almost exclusively to that which is of distinct value for permanent reference. Future publications will be more in the nature of loose-leaf installments of reference books than issues of a magazine. Much heavier and more durable paper will be used. Each article will be so printed that pages on which it appears can be segregated for filing with other pages concerning the same subject.

Only subjects of importance to Certified Gemologists and Registered Jewelers and other students of gems and precious metals will be included. Special attention will be given to the compilation of material which will keep the knowledge of both Certified Gemologists and Registered Jewelers constantly up to date. For them, *Gems & Gemology* will serve as a source of current and advanced information with which every practicing gemological student should be

Gems & Gemology is the official organ of the American Gem Society and in it will appear the *Confidential Services* of the Gemological Institute of America. In harmony with its position of maintaining an unbiased and uninfluenced position in the jewelry trade, no advertising is accepted. *Gems & Gemology* does not intend to overlap the field of any other periodical in America or England.

Contributors are advised not to submit manuscripts without first assuring themselves that the information contained in them is of scientific accuracy. Manuscripts not accompanied by return postage will be held thirty days and destroyed.

Any opinions expressed in signed articles are understood to be the views of the author and not of the publishers.

familiar. Both practicing Certified Gemologists and Registered Jewelers will be required to answer annual questionnaires on the subject of specially indicated articles before their yearly re-registration cards and signs will be issued.

These changes, while they obviously will increase the value of each page of *Gems & Gemology*, will reduce the total number of articles published, and at the same time will *increase* the amount of material of value to all jewelers or laymen interested in the scientific study of gems and precious metals. Because the difficulty of securing suitable articles of this nature, or of preparing them ourselves, is far greater than is the case with more popular material, the number of issues of *Gems & Gemology* in its new form of a loose-leaf reference service will be reduced to four each year: Spring, Summer, Fall and Winter.

The *Gemological Glossary*, Briggs' *Encyclopedia*, the *Selected Bibliography* and, the *Book Reviews* will of course continue as will articles on various gem-stones. News of the A.G.S. will be presented in very condensed form.

Our intention is to "make every page count" and give to those persons who are conscientiously interested in attempting to perfect their knowledge of our subject even more valuable information than formerly.

JAMES NEWTON

James Newton, junior member of the S. J. Newton firm of Long Beach, California, died of pneumonia Saturday, November 30. He was a young man; in fact, he had been married less than a year before his death. Mr. Newton was one of the first American jewelers to undertake the study of gemology; he was one of the eleven men to receive the title *Theoretical Gemologist* in 1931. At the time of his death, he was working toward his *Certified Gemologist*.

NATURAL BLUE ZIRCONS*

The *Gemological Institute of America* maintains a constant vigilance in an attempt to clarify doubtful or disputed statements which appear in gemological literature. Questionnaires regarding such questions are addressed to recognized authorities from time to time.

One of these statements of great interest both to the American jeweler and to his customer at the present time, concerns the possibility of the occurrence of the zircon in a natural blue color.

The policy of the Institute in such controversial subjects is to accept no statement as accurate, except when made by a person generally accepted as an authority who has, himself, answered the questionnaire as a result of personal research or experience.

The majority of published statements have been to the effect that there was no conclusive evidence of the natural occurrence of blue zircon. Recently a manuscript was received from Lt. Col. J. F. Halford-Watkins of Upper Burma, which indicated that natural blue zircons were known to him. This manuscript was published in an English periodical. In answer to a subsequent inquiry, he states that some years ago he actually saw blue zircons taken from mines in Ceylon, and has seen bluish zircons in the rough which were alleged to have been found naturally in that color in Siam. Certain rough zircons may, of course, be easily changed to blue, but the statement of this experienced gem mining engineer that he had seen blue zircon taken from a Ceylon mine even if it were several years ago, is of great gemological importance. Excerpts from his statement follows:

"Of the natural blue stones I have seen in Ceylon, some were of a very fine bright blue colour, somewhat resembling a good deep aquamarine and others were paler. During these investigations we actually mined stones of these colours and there could be no question of their having been planted. Some thirty years ago it would have been possible to obtain a dozen or so of such authentic natural blue stones at almost any time, but I doubt if it would be possible to find a single one on the Island available for sale today." Lt. Col. J. F. Halford-Watkins.

No scientific color nomenclature being yet in existence, it is difficult to envision the exact meaning of a "bright" blue or whether the blue is the greenish-blue hue of many aquamarines or the nearly exact blue hue of others. The term—good aquamarine—would indicate that the stones seen by the authority were of a lighter tone than the *finest* qualities of heated blue zircons now on the market.

This natural blue zircon from Ceylon seems never to have been found in commercial quantities at any time and no single specimens have been reported as having been found since those mentioned above. The blue zircons now on the market are all apparently produced by heating brown and reddish-brown stones found in Siam which, before heating, are devoid of beauty.

*G.I.A. Research Service.

The Heat Treatment of Siamese Zircons*

by

C. A. ALLEN

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Any attempt to describe the heat treatment of Siamese zircons may well be prefaced by the remark that on a subject concerning which, as this, so many diverse procedures have been reported, it is perhaps best to keep within the realm of one's own experience, bearing in mind that approximate, or identical, results may possibly be obtained by methods differing in detail.

While there are zircon mines within the territory of Siam which are worked to some extent today, the bulk of zircon rough, called Siamese rough, that reaches Bangkok at the present time comes from the province of Annam, French Indo-China, from a region difficult of access, lying between the towns of Veun Kham, on the right bank of the Meh Khong river approximately two hundred forty miles north of Pnom Penh, and Kontoum, approximately one hundred thirty-five miles due east of Veun Kham, the mines being about a ten days' journey from Bangkok.

The rough mined in this region is in the nature of washed pebbles, a large percentage showing evidences of crystal faces, and ranging from a light-brownish appearance through all the shades of that color to a rather deep reddish-brown. There are many mines in the locality mentioned, and by experience resulting from purely empirical methods the stone dealers in Bangkok have come to recognize different peculiarities in the rough from different mines, and vary the heating process accordingly. The rough from certain mines commands, in the open market, a much higher price than that from other mines because it is recognized that the results from treating such material are more uniform in reaching the desired standards of transparency and color.

The charcoal stoves used in the process are the common type of open clay stoves used by nearly every family in the land for cooking purposes. They are about ten inches high and twelve inches in diameter at the top; near the base is an aperture for draft; and immediately above the upper edge of this aperture is a grate, merely a shelf of clay pierced with holes. This is called a single stove.

A double stove is the combination resulting from another of the same size and shape, but without the draft aperture and grate, placed upside down on the single stove. A double stove with a chimney made of thin iron, four to five feet high, is used together with a forced draft when the most intense heat the charcoal is capable of giving is desired.

The clay crucibles generally used

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are three and three-quarters inches high by two and one-half inches in diameter at the top.

Whites

As already intimated, the method of heating as well as the results from heating, largely depend upon the quality of the rough and the particular locality from which it has come. In obtaining whites, a chemical is used. This consists of one ounce of arsenous acid, one ounce of silver nitrate, five ounces of soda hypophosphite, and one pound of sodium chloride, thoroughly mixed.

If the rough have come from what are locally known as the Bor Kao and the Bor Tukom mines, about ten ounces is placed in a crucible and ten grammes of the mixture is poured over it; the crucible is placed on the grate of a double stove with a chimney—indicating that an intense heat is required—then covered with charcoal and heated for about one and one-half to two hours, or until the energy of the charcoal has been expended. When this has occurred the crucible is removed and allowed to cool, after which the rough is poured out. The result should be a goodly percentage of transparent stones which may then be cut and polished.

Assuming, however, the rough has come from a territory known as Moung Kha, a somewhat different treatment is prescribed. It is placed in a crucible and heated in a single stove until red-hot. The result should be that some of the rough will have a yellowish, or a very light-bluish, appearance, while some will have become varying shades of blue. The blues are sorted out, but the yellowish and the very light-bluish pieces are rough ground and are then heated a second time in a double stove with the solution as described above, the result being that some will be a transparent white, but the majority variously tinted. The whites are sorted out and the others are reheated, frequently from three to six times, before all that will become a clear white have done so. These are then cut and polished. The balance, sometimes as high as eighty percent of the original lot, may be milky or tinted, and are usually disposed of locally or in other eastern countries, since only the first quality whites are desired by the trade in the United States and in Europe.

To test the stones after they have been polished, the natives place them in the sun which, in Bangkok, almost any day of the year registers between 145 and 160 degrees Fahrenheit, until they become warm. If the stones retain their color and clarity they are passed; but should there be a reversion to any brownish, yellowish, or bluish tint they are heated again in the same way but with more of the solution, more charcoal, and with a fan—either hand or electric—applied to force a draft.

The formula used varies with different dealers, but long experience has convinced my shop manager that the one given is as satisfactory as any, and more so than some.

It is interesting to note that the rough from some localities, particularly those known as the Bor Koh mines, cannot be turned into whites.

Blues

The heating of the rough from other than the Bor Kao and the Bor Tukom mines to obtain the blue color appears to be an intermediate process between the first or the second heating for whites, as the case may

be, and that for browns, described later.

A crucible is filled with rough, placed on the grate of a single stove, surrounded with charcoal, and the fire fanned until the crucible is red-hot. It is then removed and emptied after having been allowed to cool. All shades of blue should be the result, but some will appear whitish, some yellowish, and others light-bluish. These latter, i.e., the whitish, yellowish, and light-bluish, are separated for changing into whites later.

Of the remainder, those which are of a satisfactory blue color are sorted out; the others, generally of all sorts of nondescript colors, are placed in a double stove without a chimney, and with no fan, and are reheated for from one to two hours. The result should be an assortment of various blues. Again, those of a satisfactory color are sorted out, and the others once more are heated in the same manner but with less charcoal. This heating should improve in color as many as can be improved excepting a few which, because of their individual peculiarities, require as many as one to three additional and similar heatings before their blue color can be brought out, if at all.

It should be said that, though not all the rough is of a satisfactory blue after the second heating, nevertheless it is generally cut after this heating so that the actual quality of the color may be discerned. To protect the cut stones, they are covered with tiny sand-like particles of rough zircon material to exclude any foreign matter.

Browns

The rough is first changed into blues, as described; these will be of all shades from the very light to the gem quality. Among them will also be stones with a light-greenish cast, a dark-greenish cast, and a brownish-cast, all of which may usually be turned into browns by reheating in a single stove and continuing the heat until the energy of the charcoal is expended. The light-greenish blues and the brownish-blues should then have become browns of different shades; the dark-greenish blues should have become a deep brown or a reddish-brown.

Occasionally, a piece of the natural rough may be of sufficient depth of color to warrant cutting without first being heated, but this is not frequent, and the practice is to heat all the rough.

A genuinely red color is extremely rare in zircons from either the Siamese or the Annamese source. It is thought that the heavy heating destroys that in a stone which would permit it to become a genuine red in color. If what turn out in the first heating to be a dark-greenish could be picked out of the original rough before the heating, and a less intense heat applied, it is believed by some Bangkok dealers that the supply of ruby and garnet red zircons would be more abundant, but this is pure speculation. As it is, a fine red color appears to be the accidental meeting of a particular piece of rough with a particular temperature.

No one yet, to my knowledge, has discovered a way to tell before heating, by observation of the rough, just what the result after heating will be. The dissimilar chemical constituency of the rough, even from proximate localities, appears to prevent this. I have been told by Bangkok dealers that they can, to some

extent, predict the result after heating by inspecting a piece of the unheated rough, but on viewing the result it seemed to me that they were wrong as often as they were right. The methods described, based entirely upon experience, appear to be the only known methods of heating the zircon in Siam; and when it is understood that the procedures described are those generally, but not always, followed in detail by the various zircon dealers, it is obvious that much remains to be discovered if precise knowledge is to be had.

From all this, however, one bit of information appears to be evident. Speaking very generally, stones which, under a certain temperature, would become blue, turn to yellow or brown if this temperature is exceeded; and if the temperature which produces browns is extended, and a chemical used, the possibility is that either a clear or a milky white will be obtained, while poor quality whites are obtained, at times, by an increase of temperature only.

Speaking of particular stones, some blues will not change color under any temperature up to 2,600 degrees Fahrenheit, nor will some browns; but my experience has been that most whites will become off-color at that temperature. On the other hand, it would seem that many, perhaps a majority, of blues which, for some reason, have partially lost their attractive color, may have that color either partly or wholly restored by being heated in a temperature not exceeding approximately 600 degrees Fahrenheit, while the color of others cannot, apparently, be restored once it has been lost. Some browns, though not all, may likewise be restored in color by the application of the same temperature; but in attempting to restore the color of both blues and browns great care must be taken not to raise the temperature too high or the color that is there may be permanently destroyed.

The temperatures given are those obtained with an electric furnace. With reference to the temperatures of the charcoal stoves, this is a matter of speculation since no pyrometers are attached to any of the stoves in Bangkok at the present time. It cannot be too strongly emphasized that there are certain differences in the rough from various localities, and that the experience in heating gained from one lot will probably be of little or no use when working with another lot, if systematic results are sought, unless one is positively assured that they both have come from the same mine.

NEW TYPE OF OPAL DOUBLET

A San Francisco lapidary seems to have developed a very interesting and attractive method of constructing opal doublets not previously recorded in gemological literature. The process is to first cut a hollowed section (intaglio) of black chalcedony and then to fit a polished slab of opal into the hollow. This produces a doublet which appears from the top to be a section of opal framed by a narrow border of black chalcedony. In addition to being attractive in appearance, it is reported that the stones wear much better than the usual type of opal doublet due to the protection which this style of manufacture gives against chipping along the separation plane.

GEMOLOGICAL GLOSSARY

(Continued from last issue)

Flash Opal. Opal in which the colors show as a single color.

Flat. In connection with price quotation, means price per grain regardless of size, C.

Flat Ends. Thin cleavages from diamonds.

Flats. Thin, flat portions of diamond crystal.

Flaws (in gems). Inclusions of other substances, internal fractures or visible imperfect crystallization within a gem-stone.

Fleches d'amour (flesh"da"moor'). Sagenite (quarts).

Flexible. Capable of being bent without breaking, but not returning to its original position.

Flint. A massive, somewhat impure variety of quartz, in color usually gray to brown or nearly black, breaking with a conchoidal fracture with sharp edges. It is very hard, and strikes fire with steel. It is the chief material of the stone implements of primitive man. (Webster.)

Flint Glasses. Glasses containing an appreciable amount of lead and include light flint, medium flint, heavy silicate flints, extra heavy silicate flints, etc. To the last three varieties the term lead glass is sometimes applied. See also "Full Crystal," Cut Glass, Common Pressed Glass, Optical Glass, Strass.

Floating-light. See Cymophane.

Floating-opal. Small pieces of hydrophane or bits of gem opal, placed in glycerine in transparent drop-shaped glass containers, are known in the trade as floating-opals.

Floating-reef. Inclusions of the surrounding reef in the blue or yellow ground of the diamond pipes.

Float-Stone. A variety of opal that floats on water.

Flohmig Amber or Fatty Amber. Resembles goose fat and is full of tiny bubbles, but not as opaque as Cloudy Amber.

Floors. Flat areas of ground on which the diamond-bearing rock of the African mines is weathered.

Flower Stone. Beach pebbles (chalcedony).

Fluor (floo'ore).Same as Fluorite.

Fluorescence (floo"oe-res'ens). The property possessed by some substances of emitting visible light when exposed to ultra-violet cathode rays, X-rays. etc.

Fluorite, Fluor, or Fluorspar (floo'-ore-ite). Mineral in cubic system. Hardness 4, refractive index 1.43. Transparent to translucent. Red, blue, green, gray, yellow, orange, violet, etc. Known as "Blue John," "False Ruby," "False Sapphire," "Mother of Emerald."

Fluorspar (floo'ore-spar). Same as Fluorite.

Flux (fluks). To melt, to fuse. As a noun, a fluid or substance which may be used to fuse some other material.

Foamy or Frothy Amber. Opaque. Chalky white—will not take polish.

Foil Backs. (1) Genuine foil backs are gems backed with colored foil or similar material of color to improve appearance of stone. (2)

Semi-genuine, or imitation foil backs are backed by foil or similar material of the color which changes their appearance to resemble that of a more valuable stone. See also Assembled Stones.

Foiling. A thin leaf of metal silvered and burnished and afterwards coated with transparent colors; employed to give color or brilliancy to pastes and inferior stones. Diamonds usually backed with a black varnish composed of lamp black and oil of mastic.

Folia (foe'li-a). Thin flakes or leaves; lamellae.

Foliated (foe'li-ate-ed). Composed of or easily splitting into thin flakes or plates.

"Fools Gold." A popular name for pyrite.

Fortification Agate. Agate with parallel zigzag lines.

Foss (fos). A sort of meandering furrow on the surface of a rough diamond.

Fosse (fos). See Foss.

Fossil (fos'il). Originally, any rock, mineral or other object dug out of the earth. Now, any remains, impression, or trace, of an animal or plant of past geological ages, which has been preserved in a stratified deposit or a cave. The term is frequently further restricted to remains of a stony nature, as those which have undergone more or less petrification. The term is applied to foot-prints or tracks of animals which have been preserved on the surface of the strata. (Webster.) See also Petrification.

Fossil Coral. Coral replaced by silica; called Beekite.

Fossil Resin. See Amber.

Fossil Turquoise. See Bone Turquoise.

Fossiliferous (fos"il-if'er-us). Containing fossils, remains of plants or animals.

Fracture. Fracture is the term used to describe the chipping or breaking of the surface of a stone in a direction other than that of cleavage plane.

Frangibility (fran"ji-bil'i-ti). Capability of being broken; breakable; brittleness; fragility.

Fresh Water Pearls. Pearls from the Unio; a fresh water mussel of the family Unionidae.

Friable (frei'a-bl). Readily broken into grains; crumbling easily.

Frost Stone. In 1912 chalcedony containing inclusions of white opal was discovered about 30 miles from Barstow, California. This polished beautifully and was put on the market under the name of frost stone, and met with a ready sale.

Frothy Amber. See Foamy Amber.

"Full Crystal." See "English Crystal."

Furrowed. Having deep grooves or striations.

Fused Quartz. See Quartz Glass.

Fused Stones. May refer to any gem substitute produced by means of fusion; especially synthetic stones and glass.

Fusibility. The capacity for being fused or melted in the blowpipe.

Gadolinite (gad'oe-lin-ite). Velvety-black yttrium, beryllium, iron silicate, and silicates of other elements.

Gahnite (gan'ite). Green spinel.

(To be continued)

Buying a Diamond—a Customer's View

The following excerpt is reprinted with permission from the **Southern Jeweler.** ***It has a moral for every diamond salesman.***

At the first store on my list, I was ushered into the diamond room and various styles of rings were placed on the table before me. I was given an expensive cigar, a light, and seated in a comfortable chair while being quoted prices that were well above my limit. I very patiently explained that I could not pay so much, and could I see something for less. I could. In fact, I was informed that right in that store, I could see the largest assortment of diamond jewelry to be found in the city. I was not, however, looking for an assortment. One piece was all I wanted. But that one must be of good taste. The salesman continued to parade them across the table, until some two or three dozen rings were there to confuse me, mostly gaudy and flashy and ranging in prices all the way from Alpha to Omega.

When I asked for something a little more delicate, a little more refined, something for a young lady of taste, the salesman probably thought I was going highbrow on him; he ignored my remarks. I began questioning him about the color and grade of the stones which were nearest to my wants. A peculiar light came into his eyes and he wanted to know who I had been talking to, but showed no inclination to set me right on the subjects which I was most interested in. He did finally tell me to take his advice and buy diamonds only from someone whom I could trust, as diamonds were sold strictly on confidence; and his expression told me that I could trust hardly anyone beside himself. This was no help to me, as I knew no one who sold diamonds and therefore one's statement meant as much to me as another's.

Still he showed no inclination to discuss technical points, further than stating that the mounting was platinum or 18-karat gold. These things were obvious. Other technical points, he hastened to explain, I would not understand anyway. By this time I was beginning to doubt his ability to explain, and after his flattering compliment, I reached for my hat and indicated I would look around before making up my mind. Right here a few careful explanations might have made a sale, but apparently one sale more or less meant nothing to him.

Failing to realize that I was not interested in a ring simply because it was priced high or low, he brought out two or three others that were nearer what I had in mind. On these, he said, I might have a special price. I wondered why a special price when I had not asked it or indicated that I wanted a better price, and I left the store feeling that buying an engagement ring was as hazardous as the salesman had indicated—like taking a bride for better or for worse.

I paused before the window of the second store on my list and found there a rather neat display of diamond pieces ranging from a few dollars up to a few thousand. Here, I thought, I should find just what I

want. After giving the pieces displayed more than a mere glance, while giving the salesman hovering just inside the door a chance to work up to a keen pitch of anticipation, I walked in and asked to see a solitaire, naming the price I wanted to pay and asking if terms could be arranged.

I was assured that these matters could be taken care of and was passed on to the diamond salesman, who came forward and greeted me courteously, though not gushingly, and led the way back to the merchandise I had asked to see. He began by setting three pieces before me, all approximating the price I had asked for. Realizing, by my expression, no doubt, that none of these registered, he removed them and produced four others. Two of these caught my eye immediately. The salesman, quick to sense this, removed the other two and concentrated on the two for which I had shown preference. He was careful to move any pieces that might cause confusion.

Then, without my asking for it, he began a detailed description and classification of each stone. Color, brilliance, perfection of stone and cutting, weight and other technical points were covered carefully and thoroughly, without exaggeration or undue emphasis, and in plain, easily understood terms. Each point was given its proper relation to the whole in a manner that was convincing. Any questions I asked were answered quickly, intelligently, and in a manner that indicated he knew his subject from both a technical and sales standpoint. His sales talk was not high-pressure, but rather it leaned toward sales psychology—an intelligent attitude of helpfulness. I made up my mind that here was the man I would trade with.

DIAMOND MARKET

The most outstanding feature of the diamond market at the present time is its obvious strength. Amsterdam, and particularly Antwerp, the cutting centers, report activity greatly increased over that of a year ago. The United States is again, as it has always been in the past, the best customer for these cutting centers. Moreover, the Diamond Corporation continues to raise prices of rough, and ready sales evidently are always found for this material when "sights" are presented. At the present time it is reported that no more sales of rough diamonds will be made before January, 1936. Some criticism of the Corporation's policy has been heard, especially from Amsterdam cutters who claim that too much rough is being sold; but in general all parties interested in the diamond trade are pleased with the policy which the Corporation is following. All indications point to gradually rising prices for rough and cut diamonds, and to a constant, though perhaps leisurely, increase in demand for the stones.

BOOK REVIEWS

***Elements of Geology*, by Eliott Blackwelder and Harlan H. Barrows. New York, 1911, American Book Co.**

This is obviously intended primarily as a textbook. Its material is arranged in ideal order for study, but the book must be read consecutively from beginning to end if the beginner is to understand it thoroughly. It presents a very fine discussion of the elements of physical and historical geology For a complete comprehension of all the subjects presented, a series of lectures by a geological teacher would probably be desirable in addition to studying the textbook. However, this cannot be construed as a criticism of the work, since it follows the expressed purpose of the authors to produce a text which was "not a manual or reference book."

Elements of Geology makes interesting reading when followed from beginning to end. Questions are asked throughout the text, referring to material previously presented; these undoubtedly aid in the obtaining of a clearer understanding of the subject.

This text is recommended to any student who wishes to secure a well-grounded elementary knowledge of geology.

***Diamond, A Descriptive Treatise*, by J. R. Sutton, M.A., Sc.D., 1928, London, Thomas Murby & Co., New York, D. Van Nostrand Co.**

Dr. Sutton's treatise is largely the result of his own practical experience. Many of his statements are drawn from actual observations made during his some thirty-five years in the South African diamond fields. His experience was largely gained in Grigualand West and he was also employed by De Beers Consolidated Mines. Therefore, the discussion concerns primarily the diamonds found in South Africa. Physical properties, crystallography, and theories regarding the origin of diamond are explained in particular.

The author presents many interesting facts, which constitute extremely valuable information even though one may tend to disagree with the conclusions which Dr. Sutton draws from his data. He disregards other texts and descriptions on diamond and presents his facts as he interprets them. His book, therefore, is of great value despite the fact that many of its conclusions are open to question.

Of particular interest is Dr. Sutton's refutation of the often repeated assertion that diamonds from different sources vary considerably in hardness. On the other hand, he supports the theory that diamond "separated from the magma first as a plastic crystal, becoming solid later on," a theory which has long since been abandoned by the majority of authorities.

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Essay about the origin and virtues of gems. [In his works, v. iii., 1772.] London, 1672. Several editions in Latin.

(To be continued)

A GEMOLOGICAL ENCYCLOPEDIA

(Continued from last issue)

HENRY E. BRIGGS, Ph.D.

Still later man succeeded in producing some of the gems synthetically. And for many centuries before the production of synthetics, slabs of genuine stones were cemented or fused on to glass bases. And sometimes two thin genuine stones were cemented together, thus making a piece sufficiently deep to cut one large and consequently much more valuable stone.

It is necessary for the gemologist to be familiar with these artificial gems and we will touch upon each kind in this chapter.

IMITATION GEMS

Under this heading we will consider the materials made from colored glass or a special kind of glass known as "Strass". Sometimes this glass is merely pressed into molds while it is in a molten state, thus forming the gems without the process of cutting with its higher cost. However, occasionally we see one which is perfectly cut and polished. Many times the cutting of these pastes consists of a polishing operation only which is done on a blank which has been pressed into shape. The polishing operation gives the desirable sharp angles which is often not obtained in mere pressing, and also it will give a superior finish. The following are examples of the many dozens of mixtures used to imitate gems:

Formula for Strass. One part crushed rock crystal, three parts of cream of tartar, melt in a crucible. Pour this mass in luke warm water, adding nitric acid as long as it will boil. Dry and add 1½ parts of white lead. Take 1½ parts of this mixture and add ½ part calcined borax, melt and cool in cold water by pouring directly from the crucible into the cold water. Now to this add ½ parts of saltpeter and melt. The result will be a colorless and highly refractive glass called "Strass" after its inventor.

Another composition used in making artificial gems is composed of 300 parts of rock crystal, 470 parts of red lead, 163 parts of pure potash, 22 parts of borax, and one part of white arsenic.

When imitating colored gems these pastes are colored with various salts.

Gablonz, Czecho-Slovakia, is the most important producer of glass imitation gems and other glass adornment.

Glass imitations or pastes may be very easily identified, except in the case of carefully imitated "Moldavite." Moldavite is a glass of natural origin and it is a difficult task to discriminate between the genuine and the natural. It is entirely possible to make the artificial in every way the same as the natural. In the cases of glass imitations of other gems, we do not meet this difficulty. In most cases it will be found that the paste has a different hardness and specific gravity than the natural gem in question. Then too

the greater part of the gems are anisotropic, that is doubly refractive, while the pastes are of course singly refractive, being amorphous. It is indeed seldom that the pastes have the same index of refraction that the gems have that they are made to imitate. Consequently this will afford a quick means of discrimination. Then in the cases where dichroism is known to be marked in the natural gem, imitations can easily be detected with the aid of the dichroscope.

Other imitations on the market are bakelite and celluloid. The bakelite is used mostly to imitate amber. It is composed of phenol and formaldehyde and when vigorously rubbed will give off an odor which is entirely different from the pleasant odor of amber. Perhaps the quickest test is that of the salt water immersion. A glass of water to which has been added a couple of teaspoons of table salt will float the specimen if it is true amber. On the other hand bakelite will sink at once. This is due to the difference in specific gravity of bakelite and amber. Celluloid imitations will only have to be rubbed briskly to note the odor of camphor which will identify them as celluloid.

DOUBLETS AND TRIPLETS

There are three different types of doublets and one type of triplet. The doublets are mainly divided into two classes, the true and the false. The true doublets consist of two pieces of gem crystal cemented together so as to afford sufficient depth for cutting, such as two slabs of emerald which are too thin to be cut into gems of a breadth which their surface area would permit. These two stones are carefully faced and cemented together thus forming a single block of sufficient depth to cut one large gem. Of course, a single large gem would be worth more than the total value of the two thin pieces. The cement which is used to join the doublets is of a transparent type and seems to have most remarkable strength. Diamonds, emeralds and rubies are often made in doublets. However, the making of ruby doublets is now practically a thing of the past as far as true doublets are concerned. The detection of the true doublet is not always a very simple matter and will sometimes require very careful examination. The joint is made exactly on the girdle in fine true doublets and this fact of course makes it an easy matter to overlook the extremely thin film of cement, especially in a well-done job.

The gem's girdle should be very carefully examined under a high power loupe or preferably a low power microscope. Often the film of cement can be detected this way. If the gem be immersed in a solution with a refractive index near that of the gem fragments, the film of cement (usually of a lower index) will often be more transparent than the remainder of the piece. Lastly the soaking of the gem in alcohol, chloroform or acetone will sometimes cause the frauds to part since the cement will be dissolved.

(To be continued)

Notes on Gem Cutting

by
GEORGE H. MARCHER, Q.C.G.
Los Angeles

Correct Proportions

The lower third of the pavilion is the most important part of a brilliant. This area may be seen simultaneously through the table and through the facets around the table when looking directly into a well-cut brilliant. This means that nearly all the brilliancy depends on this part for its existence. Flaws near the culet may be repeated throughout the face of the stone, and a patch of beautiful color may likewise be increased and thus enrich the appearance of the entire gem. Similarly a deceiving tint from an indelible pencil on the outside imparts a false color to a diamond. Soapy dirt allowed to accumulate around the culet more seriously damages the brilliancy than it does on any other part of the stone. Sometimes while finishing the inside of a ring, a workman allows the back of the gem to become abraided by carborundum cloth. This ruins the beauty of the stone by making the entire stone frosted in appearance.

The height of the bezel usually should be maintained at about one-fourth the total thickness, but when a stone is excessively deep in color, such as dark garnets and sapphires, this height may be sacrificed somewhat to lighten the color.

Flaws in Gems

Badly flawed faceted stones are at their worst when cut brilliant. The irregularity of the flaws in contrast with the mechanical simplicity of the radiating facet lines, seems to give the flaws emphasis. And flaws are easily noticed in a stone which is cut with long step facets, especially if the gem be of a light color so one can see into it readily. The most favorable cut for a flawed stone seems to be one with a large number of triangular facets which tend to disguise flaws.

The girdle should be as thin as needed strength will permit. If too thick, it is unsightly from the outside and it may reflect into the brilliancy from within and appear like a flaw. If too thin, its strength is impaired while being set or while in use. Diamonds usually are cut with a thin girdle that is left unpolished, but the girdles of large, fine ones are occasionally polished. Other gem stones should have polished girdles as thin as are practicable and should consist of two bevels, one above the other.

Styles of Cut

While the round diamond-cut produces the most life, it is the least ornamental in design. Its outline has none of the decorative element of variety, as its curvature is the same all the way around. A circular stone offers less opportunity for the lines composing the stone to "lead out" into the lines composing the mounting, thus offering but little assistance toward unity, another element of design. Recent fashion, too, quite definitely favors shapes other than round. Modern, or contemporary, art deals more extensively with straight lines and angles which require the use of calibre gems and baguette diamonds as auxiliary stones. This influence

naturally suggests that the chief stone should also conform to such lines and angles.

Simple and conservative shapes, such as round, eliptical and cushion-antique, are favored when cutting rare and valuable gems. Such shapes conserve the material best. The simple dignity of such forms creates fewer distractions from other features of beauty less dependent on excessive ornamentation.

The eliptical, or "oval" shape, is pleasing to the eye because its differing curvature of outline contains the element of variety. Its faults are that it produces less brilliancy and, again, it does not so well suit present fashions. It is a style that has been used much during the last hundred years, and it lends itself well to antique designs, which please many people.

The rectangular and octagonal styles of cutting are better than the eliptical shape for brilliancy as more of their reflecting facets lie opposite one another. This permits light to reflect across more effectively. The corner points are liable to break while in use, but modern styles accept them. The corner facets of the oblong octagon shape cannot be opposite other facets, so the brilliancy suffers a bit. If such faceted stones are step-cut, the parallel lines are not so artistic. If flaws are visible, their irregular shapes contrast with the severe, parallel lines of the facets, and the flaws become more noticeable.

Phenomenal Gems

The adularescence of the moonstone is more satisfactory when the "light" presents itself in the very top of the stone. If it is to be worn in a vertical position, as in a scarf pin, the "light" becomes more effective when placed somewhat toward the upper end of the stone, then illumination, which usually comes from above causes the adularescence to appear lower where it belongs. The back should be convex and polished.

A star sapphire contains three series of straight lines or filaments like silk. The lines in each series are parallel with what was the base of the crystal and they extend through all parallel planes, and the lines of each series are parallel respectively with what was one of the sides of the crystal, which places each series of 60° with one another.

When such a stone is cut cabochon, a path of light is seen wherever the lustrous sides of these lines present themselves along the rounded contour of the gem. A round cabochon shows uniformity in the width of the "arms" of the star and evenness in the distance of the separation. An eliptical cabochon shows a greater width of the "arms" on the sides than on the ends, with a corresponding distortion of the star itself. If the top of the stone is made a bit conical it tends to sharpen the star and to hold it to the center. These observations, of course, apply to any asteria.

A cat's eye contains but one series of parallel filaments. Such a stone develops a sharper streak when cut into an eliptical cabochon with a sharper curvature extending lengthwise along its top. This tends to cheapen the appearance so it should be done with caution and deliberation.

An opal often has but a thin zone of fire. The proper fashioning of such an opal is to make the top as high as the zone of fire will permit

and leave extra material on the back by cutting it convex, for strength.

Engraved Cutting

Among engraved stones the cameo is of first importance. A cameo is a miniature sculpture with the subject produced in relief. Since the details are in better view of the workman, the cameo can be executed with more subtlety of artistic detail than the intaglio, which has its subject carved below the surface of the background. As the carving must be done with minute diamond-charged wheels or burs, the tools tend to obstruct the view. This is especially the case with the intaglio.

(THE END)

EMERALD FILTER TESTED*

The Gemological Institute of America has completed a series of tests on the emerald filter developed by the students of the classes of the British Gemmological Association. It has been found that the filter performs the work of distinguishing emeralds from the majority of substitutes, as well as from other genuine green stones, exactly in accordance with claims made for it. These claims are:

"Emeralds will appear distinctly red (the better the quality the brighter the red), whereas Green Pastes, Doublets, and almost all green stones except Demantoid & Zircon (which appear reddish) appear green.

"Synthetic Blue Spinels (imitating Blue Zircon or Aquamarine) may also be detected by their red colour.

"Rubies appear a characteristic brilliant fluorescent red."

The "Chelsea Colour Filter" is the best instrument of its sort ever to be received by the G.I.A. It is priced at five shillings, and at present sells in America for about $2.00, including duty.

*G.I.A. Confidential Service.

Educational Exhibits and Lectures Presented In Various Cities

An educational feature consisting of a lecture accompanied by a complete comprehensive exhibit of synthetic boules, photographs and sketches of synthetic stone manufacturing equipment, enlarged microphotos of inclusions in genuine and synthetic stones and a special illuminator display of actual genuine and synthetic stones illustrating the difference in imperfections, was presented by A.G.S. Guilds in various cities.

It is by means of familiarity with the difference of the inclusions or so-called imperfections which the synthetic stones contain as distinguished from the genuine stones which makes it possible to definitely detect synthetics. This traveling exhibit would probably not be of great educational value to the trade if a demonstration of the manner of detecting synthetics had not been included, however, with the addition of this extraordinary demonstration, the exhibit becomes an extremely valuable one for every jeweler to see.

The lecture and exhibit have already been presented before the New Jersey Guild at Douglas Hotel, Newark, October 11, by Donald J. Cooper; before the Eastern Pennsylvania Guild at Academy of Natural Sciences of Philadelphia, October 17, by Dr. Samuel G. Gordon, and before the Cleveland Guild at Case School of Applied Science, October 25. The synthetic display will be exhibited and explained at the coming meetings of several other Guilds.

GEMOLOGICAL STUDENTS FROM ABROAD

Two more foreign jewelers have begun gemological courses with American organizations.

Mr. Friedrich F. A. Meinecke of Guatemala City, Guatemala, has enrolled in the elementary course of the American Gem Society and has expressed his hope to be able to continue in the Gemological Institute's *Certified Gemologist* course.

Mr. H. Tillander of Helsingfors, Finland, who recently completed the study courses of the British National Association of Goldsmiths, obtained its Diploma, and won the Tully medal as an outstanding gemological student, is taking special correspondence work with the Gemological Institute. His intention is to take the examinations of the G.I.A. in February, 1936, and earn the title, *Certified Gemologist*.

PURCHASES MINNEAPOLIS STORE

Word has recently been received by *Gems & Gemology* that Henry Snyder, formerly with the Louis Esser Company of Milwaukee, has purchased the old-established firm of White and McNaught of Minneapolis.

Mr. Snyder is one of the country's more advanced gemological students and prior to his purchase of the Minneapolis firm was Chairman of the A.G.S. Certification Committee for Wisconsin. He rendered outstanding service in forwarding the gemological movement in Wisconsin and assisted in founding the Wisconsin Guild.

GUILDS

Devoted to News and Activities of Educational Organizations and of Vocational Study Groups and Their Members.

Rulings Regarding A.G.S. Membership Classification and A.G.S. and G.I.A. Titles*

As revised for 1936, as a result of votes of A.G.S. Guilds and G.I.A. Board of Governors, and subject in the future only to possible minor changes in requirements for preparation.

AMERICAN GEM SOCIETY

Associate Member, A.G.S. (Not a title usable in advertising—a membership classification.) A subscriber to *Gems & Gemology* who, after subscribing is approved by National and Regional Certification Boards. Eligible for selection as member of Regional Guild.

Graduate Member, A.G.S. (Not a title usable in advertising—a membership classification.) A person successfully passing the examination at completion of A.G.S. course on gems, metals and jewelry and who has been approved by A.G.S. Certification Boards. *Yearly requirement:* Payment of A.G.S. annual dues, which includes *Gems & Gemology.*

REGISTERED JEWELER, A.G.S. (A title.) Limited to retail jewelers or their employees who (1) become Graduate Members and whose firm is approved by Certification Boards; (2) complete the A.G.S. courses on display, merchandising and salesmanship, or their equivalent in commercial accomplishment; (3) pass special examinations on diamond grading and on nomenclature of gems and metals; and (4) possess two years practical experience in buying or selling gems and precious metals. *Yearly requirements:* Answering of a questionnaire on those educational articles in *Gems & Gemology* especially prepared to keep R.J.'s up to date. Yearly approval of Certification Boards. Payment of A.G.S. annual dues and nominal registration fee which includes registration cards and a window sign (shown below) issued yearly.

GEMOLOGICAL INSTITUTE OF AMERICA

JUNIOR GEMOLOGIST. (Replacing the now obsolete title Qualifying Certified Gemologist.) An A.G.S. Graduate Member who has also passed exam at completion of G.I.A. Course No. 1.

CERTIFIED GEMOLOGIST. (A title.) A person who, after approval by A.G.S. Regional and National Certification Boards, has passed the C.G. examinations prescribed by the G.I.A. Examinations Board (see page 267), and whose record has been approved by the G.I.A. Examinations Board and Board of Governors.

Practicing Certified Gemologists. Certified Gemologists in retail trade who have also met A.G.S. Registered Jeweler educational requirements (2),

*A.G.S. Research Service.

(3) and (4). *Yearly requirements:* Yearly approval of the A.G.S. Certification Boards and Board of Governors, and annual questionnaire on those articles in *Gems & Gemology* which are prepared to keep C.G.'s up to date as well as those similarly prepared for R.J.'s. Payment of A.G.S. dues and nominal registration fee covering both R.J. and C.G. classifications, which include registration cards and signs, like the following, issued yearly.

TITLES AWARDED

During the months of November and December the following persons have passed examinations and have been awarded titles:

Certified Gemologist

California

David H. Howell, Pasadena.

Paul J. Noack, Manufacturing Jeweler, San Bernardino.

Virginia

George C. Barclay, Barclay & Sons, Newport News.

Qualifying Certified Gemologist

(Junior Gemologist)

Washington

Dorothy L. Sartori, Sartori & Wolff, Spokane.

Pennsylvania

John Fellin, Fellin's, Hazleton.

Washington, D. C.

William H. Wright, Galt & Bro., Inc.

SELLING DIAMONDS

Quite often a salesman will get the type of customer who only has a few minutes, but wants to look at a diamond. I have found that by informing him that it will take at least a half an hour to show and explain my merchandise, I usually arouse interest.

I have also found that by telling how a diamond may be colored, by explaining about "swindled" stones and various other cutting imperfections I soon make the customer realize that freedom from carbon and blue white color (which the average jeweler stresses only) are only two small items in the perfection of a diamond.

I always allow the customer to examine the stone with a diamond loupe meanwhile explaining Trade Commissions ruling on loupes and pointing out the fact that we use 10x loupe. I may not make the sale then, but it surely makes it harder for the uneducated jeweler to talk intelligently to this customer if he should decide to stop and shop.

No high pressure is used, but a surprisingly high percentage of lookers come back and buy, and tell us that we are the only people they talked to who seemed to intelligently know our merchandise. Note by Burt Umstead, Glendale, Calif.

A.G.S. GUILD AND STUDY GROUP MEETINGS To Be Held in January

January 7th—Metropolitan Chicago Chapter under the leadership of Dr. A. J. Walcott at the Illinois Room of Palmer House.

January 7th—Boston Study Group—under the leadership of Dr. Edward Wigglesworth at the Boston Society of Natural History.

January 8th—Cincinnati Study Group at the University of Cincinnati, to be held under leadership of Professor Otto Von Schlichten.

January 10th—New Jersey Study Group—under the leadership of Dr. A. C. Hawkins.

January 10th—No. Ohio Study Group under leadership of Professor Richard Barrett of Case School of Applied Science, Cleveland.

January 16th—Eastern Pennsylvania Study Group. Under the leadership of Dr. Samuel G. Gordon at the Academy of Natural Sciences of Philadelphia.

January 16th—Wisconsin Study Group under leadership of Dr. A. J. Walcott, to be held at Pfister Hotel.

January 27th—Washington D. C. Study Group at Raleigh Hotel under leadership of Dr. W. F. Foshag.

The Tri-State Study Group will meet in Pittsburgh under Prof. R. E. Sherrill. Date not yet definitely set.

Study Group and Guild Meetings Held in November

November 5th—Guild meeting of the Metropolitan Chicago Chapter was held in the Illinois Room of the Palmer House. Synthetic exhibit was shown and the talk about the exhibit was delivered by F. Otto Zeitz, Q.C.G.

November 12th—Boston Study Group—Boston Society of Natural History—Study Group meeting held under leadership of Dr. Edward Wigglesworth. The synthetic display was shown and discussed.

November 8th—New Jersey Study Group—Douglas Hotel, Newark—Study Group meeting held under leadership of Dr. A. C. Hawkins. Reviewed Optical Properties and the Cutting of Gems.

November 20th—Cincinnati Study Group—University of Cincinnati—Study Group meeting held under leadership of Professor Otto Von Schlichten. Use of the petrographic microscope and Zeiss total reflectometer was demonstrated. Demonstration of double refraction in thin sections explained in an elementary way. Pleochroism of tourmaline was demonstrated in thin sections under the microscope. Discussion of total reflection and the relationship which the critical angle bears to the index of refraction.

November 21st—Wisconsin Study Group—Hotel Pfister, Milwaukee—Study Group meeting held under leadership of Dr. A. J. Walcott. Polarizing Microscope and Polariscope discussed.

November 21st—Eastern Pensylvania Study Group—Academy of Natural Sciences of Philadelphia—Study Group meeting held under leadership of Dr. Samuel G. Gordon—Color was discussed along the lines of Course No. 012.

November 22nd—Northern Ohio Study Group—Case School of Applied Science—Cleveland—Study Group meeting held under leader-

ship of Dr. Richard L. Barrett.—Assignments No. 4 and No. 5, of Course No. 012, on Crystallography were discussed.

November 25th—Washington, D. C. Study Group—Hotel Raleigh, Washington, D. C. Study Group meeting held under leadership of Dr. W. F. Foshag. Optical properties, dispersion, dichroism and refraction were discussed.

CLEVELAND STUDY GROUP HOLDS UNUSUAL MEETINGS

The Cleveland Study Group has offered its members a number of fine meetings on subjects aside from those which were covered at usual sessions. This group has studied the subject of fluorescence of gem-minerals, and several of the members have constructed displays illustrating this phenomenon. Students have also been allowed to make a close study of the many gem-mineral specimens in the collection of the Case School of Applied Science in Cleveland. An outstanding meeting was held when the group visited the Carter Diamond Tool Company to witness the actual manufacture of synthetic rubies and sapphires. Dr. Richard L. Barrett of the Case School is the instructor for the group; much credit is also due to Clayton G. Allbery, Secretary of the Northern Ohio Guild, who has been instrumental in arranging several of the special meetings.

Cleveland Study Group

Instructor: Richard L. Barrett, Case School of Applied Science.

Members:

Clayton Allbery, Cleveland
Louis J. Binder, Cleveland
Frank Bromley, Shaker Heights
Chas. Carolyne, Youngstown
V. E. Chittenden, Akron
C. J. Cornell, Cleveland
Harry A. Erickson, Cleveland
M. F. Fournier, Lakewood
R. C. Hoover, Akron
John B. Hudgeon, Bedford
Earl E. Jones, Cleveland
Roy Klever, Bowling Green
H. M. Lewis, Cleveland
H. B. McCague, Cleveland
Geo. N. Nelson, Cleveland
E. Howard Phillips, Conneaut
Chas. W. Post, Brady Lake
Edw. W. Powers, Youngstown
W. A. Ritzi, Parma

GEMS PRESENTED FOR EXAMS

The Gemological Institute of America acknowledges receipt of a number of cut stones from Martin L. Ehrmann, New York gem dealer, to be used in the Certified Gemologist examinations. These stones are particularly valuable since they consist of several specimens which, although fairly well-known, are difficult to obtain. Included in the stones sent were a number of genuine spinels and several zircons of unusual colors.

STUDIES AT G.I.A. HEADQUARTERS

Dorothy Sartori, daughter of Mr. A. J. Sartori of the firm of Sartori and Wolff of Spokane, Washington, has been working as a special student at the G.I.A. headquarters in Los Angeles. Miss Sartori is preparing herself as a Certified Gemologist. She is associated with her father in the jewelry business.

She has been studying especially to perfect herself in various laboratory methods of identification.

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(JANUARY, 1934, TO DECEMBER, 1935)

ATTENTION, REGISTERED JEWELERS AND CERTIFIED GEMOLOGISTS

Subjects upon which Registered Jewelers of the A.G.S. will be examined for annual re-registration are indexed under *Research Service, A.G.S.* Those subjects upon which Certified Gemologists will be examined for yearly re-registration include articles indexed under both *Research Service, A.G.S.* and *Research Service, G.I.A.*

Instrument Prices Climb

The price of almost every gem-testing instrument is expected to advance during the coming year. The Gemological Institute recommends that any person who contemplates buying apparatus purchase it as soon as possible, thus taking advantage of the present lower prices. It will be noted that several of the prices listed below have already advanced over those quoted in the advertisement in the March-April, 1934, issue of *Gems & Gemology*.

Refractometers

G. F. Herbert Smith Refractometer.....$ 85.00
Tully Refractometer.....$123.25

Polariscope and Dichroscope

Shipley Hand Polariscope.....$ 18.00
Dichroscope .....$ 8.50

Loupes

10x Eye-Loupe, G.I.A., registered aplanatic triplet lens in duralumin eye-cup.....$ 12.50
10x, 14x, or 20x aplanatic Hand Magnifier (Bausch and Lomb) .....$ 7.50

Specific Gravity Attachment

S. G. attachments for diamond balance. Include stand, water container, wire to hold stone and wire for counterbalance.....$ 2.00

Hardness Testing Equipment

Set of Five Hardness Points on key chain.....$ 2.00
Set of Five Hardness Points in leather case.....$ 7.50
Hardness Plates .....$ 20.00

Microscopes

Compound Microscope (magnifications 40x to 200x) especially valuable for detecting synthetics....$133.50
Compound Microscope, same as above, but with accessories for polarized light.....$162.00
Compound Microscope, completely equipped gem-testing model.....$337.50

Spectroscopes

Direct-vision hand spectroscopes, in case.....$ 20.00
Prism spectroscope, with wave-length scale, on tripod .....$ 50.00

All prices subject to change without notice. All prices F.O.B. Los Angeles. Further information concerning any instrument sent upon receipt of inquiry.

GEMOLOGICAL INSTITUTE OF AMERICA

3511 West Sixth Los Angeles