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.

VOLUME I JANUARY, 1934 NUMBER 1

In This Issue:

Published by

THE GEMOLOGICAL INSTITUTE OF AMERICA

3511 W. Sixth Street Los Angeles, Calif.

Gems and Gemology is the official organ of the American Gem Society and with it is included the Bi-Monthly Confidential Service of the Gemological Institute of America. It is published as a part of the educational gem and jewelry program of the American Gem Society by the Gemological Institute. The Gemological Institute of America is a non-profit educational institution directed by voluntary boards consisting of international gem authorities and appointees of American jewelry trade associations. It confines its activities to the furnishing of education, books, instruments and educational publicity material of a gemological or jewelry nature. In harmony with its policy of maintaining an unbiased and uninfluenced position in the gem and jewelry trade, no advertising is accepted in this or any other of its publications. *Gems and Gemology* will not overlap the field of any other periodical in America or England.

IN OUR NEXT ISSUE

G. Frederick Shepherd leaves the diamond exhibit and takes us on a personally conducted tour of the various gem displays throughout the Fair. This will prove a good guide for those who plan to attend the Fair when it is reopened next summer.

The Regent Diamond once was pawned to buy "horse furniture" for Napoleon's armies. The story of this famous gem will be presented by Robert M. Shipley.

In the present issue, the gem course at Colgate is described. Our next issue will contain a complete account of the formation of the gem classes at Columbia, their history, and their present purposes. Dr. Paul F. Kerr, one of the best-known gemologists in America, writes the article.

Milton Gravender will review the properties and interesting points of another gem species.

Dr. H. E. Briggs will continue his Encyclopedia, going further into his general discussion of the properties, optical and physical, of gem-stones.

The diamond market will be reviewed briefly in every issue.

An article will be carried which will deal further with the subject of diamond loupes.

EDITORIAL

It is our purpose to give our readers accurate and up-to-date information concerning gem-stones. We intend to print not only new developments in the field of gems but also interesting points which will serve the jeweler as sales-tools. Furthermore, we shall publish news of students of gemology throughout the world.

It is a difficult matter to gather the material which we print. We have no paid writers who send articles for our approval. Neither have we any news agency at our back. The items which we print we have solicited, largely through the mails.

But this very fact makes *Gems and Gemology* of more value. It is the only magazine of its sort published in the United States. In fact, to the best of our knowledge, the English *Gemmologist* is the only other magazine printed which covers a similar field.

Gems and Gemology carries no paid advertising. Therefore, our policy is an entirely independent one. We are not required to meet the demands —in the material we publish—of any large advertiser. How well we have succeeded in gathering this material and in presenting it, is for our readers to judge. We shall appreciate your candid criticism.

FORUM

"Diamonds," says Mr. H. Paul Juergens of Chicago, "are ornaments, pure and simple, enjoyed only by those who can afford to wear them." This is an interesting angle on a question which promises to become more discussed than it already is. The Institute, in its courses, has maintained that investment or "security" value of diamonds should be used as a sales-tool. Some of those whose experience qualifies them to speak agree with the Institute, some very definitely do not.

Mr. John Vondey of San Bernardino, California, who is also one of the Institute's staunchest supporters, bolts the party on this question and agrees with Mr. Juergens. Mr. Vondey says he "is not in accord with this investment or security selling of diamonds. People buy diamonds to wear . . . "

Both Mr. Juergens and Mr. Vondey have behind their statements years of experience in conducting honest jewelry business.

But, on the other side, we have the statement of Mr. H. E. Hawk of Columbus, Ohio, that, "As long as real estate, especially *lots*, is called investment, diamonds can well and more favorably be so classified."

And Mr. E. Howard Phillips of Conneaut, Ohio, remarks in part, "stocks, bonds, real estate—haven't half the assurance of a rise in value that have diamonds. They (diamonds) are an investment!"

Ohio, at least, agrees with us. What do the rest of you think?

THE CODE AUTHORITIES

The choice of the members of Code Authorities of both the Retail Jewelers Trade and Precious Jewelry Producers Trade deserve universal commendation. If these very excellent and generous-intentioned men are not supported in every manner by all sincere members of their respective trades, then those trades deserve the fate which will probably overcome them.

ROBERT M. SHIPLEY,
Pres. Gemological Institute of America.

Corundum Determinations

During the past six months our students have sent us quite a volume of corundum gems for determination. A ruby we received had been purchased from a bankrupt Helena, Montana firm thirty years ago and at a price of almost $80 per carat. The stone was of a pale red color and had evidently been cut in the Orient. An examination under the microscope at once proved the stone to be synthetic and of very poor quality.

A sapphire and a ruby bought in the Orient by a traveler from the Mid-West were sent to us. The ruby proved to be synthetic and the sapphire was genuine. A fourth stone was a ruby of about a carat and a half of a fine deep red color. A letter accompanying the gem intimated that its sender suspected it of being either synthetic or reconstructed. Examination in the laboratory definitely established the ruby as a genuine.

GEMOLOGY AT COLGATE UNIVERSITY

DAVID W. TRAINER, Jr., Ph.D.

Geology, mineralogy and the related courses in physics and chemistry all of which are equally important for a well rounded training in gemology, are a very definite part of the physical science curriculum at Colgate. The instruction in gemology includes a semester course of elementary lectures, which are elective and are open to students of all classes. The purpose of these lectures is to stimulate interest in the subject of gems and to teach the elementary facts concerning the physical properties of minerals and how these effect the properties and value of the more important gem minerals. Besides the elementary lectures, work with a limited number of students is conducted in the actual determination of cut stones, the grinding and polishing of semi-precious stones, and the preparation of reports on individual gem minerals. The usual physical and optical methods are used in the determination procedure.

Colgate is very fortunate in being fairly well equipped with instruments and has an excellent collection of minerals which are well exhibited and may be used for study purposes. The collection of cut stones used for laboratory determinations is not as extensive from the standpoint of variety of species as one might wish but it is sufficient to illustrate all of the important determinative methods.

The author has found that cutting equipment for teaching the properties of gems is invaluable. The cutting equipment used in the Colgate laboratory is extremely simple and includes vertical grinding wheels and polishing devices as well as horizontal laps for making faceted cuts. This type of creative work is especially interesting to many undergraduates.

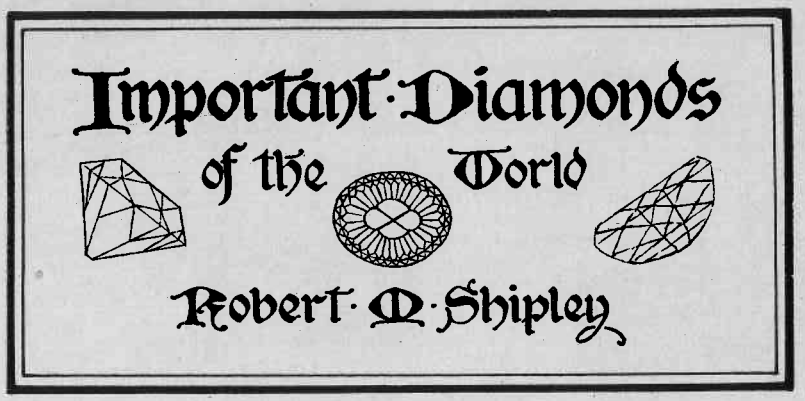
The library facilities are very good and include all the standard works on gems and mineralogy, and as well survey reports and statistical information related to the subject. This information is of value to the student in preparing reports on individual gems.

The elementary lecture course attracts a fair number, fifty to seventy-five, when the enrollment of the University, which is only 950 students, is considered. The special work usually includes five students and an effort is made with this group to arouse sufficient interest in the subject so that the student will either continue the work after graduation or make a practical application of the material which he has learned in the trade or business.

DIAMOND MARKET UNCERTAIN

Reports from abroad indicate that the diamond market is still very unfavorable. The Diamond Corporation sold a large lot of Congo diamonds recently to a powerful group of buyers. The *Belgian Diamond Industry* infers that financial conditions forced the Corporation to dispose of this lot of diamonds at a price which was rather unfavorable.

The condition of the diamond market in America was given as the reason for a 20% slump in prices at Johannesburg by the German *Goldschmiede Zeitung*. This paper also reports that the Diamond Corporation has announced that no more of its London "sights" of rough diamonds will be held until February 15th.



THE ORLOFF

The early origin of this exquisite jewel—perhaps the fourth largest of cut diamonds—is shrouded in mystery. The exact date of the entry of the Orloff into the history of nations and into the lives of men is debated by world authorities. By some it is thought to be the Great Mogul—the fabulous stone but once seen by European eyes—whose present location is unknown. The known history of the Orloff began when it served as the eye of an Indian idol. It is now among the financial reserves of one of the world's richest nations.

The story of the journey of this gem to the Occident from that vast Oriental jewel-box, India, is of more than passing interest. Near Trichinopoly, in Mysore, a native state in southern India, there is in the river Cauvery an island called Srirangen. Near the western shore of the island there stood a Hindu temple, enclosed within seven walls. Within the innermost shrine of the temple stood the idol of a god. Its eyes were two great gems—one of these the Orloff. This was a massive diamond, of the shape of half an egg, and in weight almost 200 carats.

A French grenadier—a deserter—lived in the neighborhood of the temple. He learned of this great treasure, and devoted many years of his worthless life to gaining possession of it. He must have embraced the Hindu faith, for no Christian was admitted beyond the fourth of the seven enclosures of the temple. The grenadier obtained employment within the walls; and after many years of carefully planned labor, he was admitted as a frequent worshipper at the inner shrine because of his apparent devotion to the god and to the priests.

The French soldier laid his plans carefully. The moment for which he had waited came. A stormy night. The idol in fitful shadows. He pried one diamond eye from its socket. Then he lost his courage. Leaving the other diamond behind, he fled. He successfully scaled the walls and swam the river. In a raging tempest, he escaped through the jungle to the English army—Madras—and safety.

At Madras, the ex-soldier was last heard of when he found a purchaser for the diamond, at $10,000, in the person of an English sea-captain. The skipper sold the stone for $60,000 to a Jewish merchant, who in turn sold it to a notorious Persian scalawag named Khojeh.

This was in the year 1775. At this time, the Court of Russia was gay and extravagant. Khojeh determined to travel to the Russian Court to find a buyer for the jewel. He was fortunate: In Amsterdam, while on his

journey to the Court, Khojeh met the Russian prince Gregory Orloff. The prince had been the lover of Catherine the Great, Empress of the Russias. But at the time, he was out of her favor.

Catherine had a passion for gems; her emeralds formed one of the finest jewel collections in the world, and her love for amethysts has become legend. Orloff knew her love for gems, so it was an easy matter for Khojeh to sell him the great diamond. By presenting it to Catherine, Orloff hoped to win back her favor. The Persian was able, within a single day, to sell the diamond to Orloff for about $450,000 and an annuity of $20,000.

The Prince presented this gem to Catherine; and while it is recorded that she returned other valuable gifts, nevertheless Orloff never regained his former high estate. Catherine had the diamond—now called the "Orloff"—after its donor—mounted in the Royal Scepter, and it became the symbol of sovereignity of a vast Empire.

THE ORLOFF DIAMOND
Now in the Emperor's sceptre among the Russian Crown Jewels.

There is a legend in Russia that as Napoleon was approaching Moscow, the Orloff diamond was secreted in the tomb of a priest in the Kremlin. When Napoleon entered Moscow, he ordered that the gem be sought. Its hiding place was learned. Napoleon in person, accompanied by his bodyguard, proceeded to the Kremlin to seize the stone. The tomb was opened and the great gem lay before the despoiler. One of the bodyguard extended a hand to take the Orloff, but before he had touched the jewel, the ghost of the dead priest rose and cursed the invaders.

Napoleon and his bodyguard were then supposed to have fled from the Kremlin. But there seems to be sufficient reason to suppose this incident

untrue. It is doubtful that the little Corsican general who had put most of Europe at the feet of his conquering armies would flee before the ghost of a single dead priest.

The Orloff survives in the Diamond Treasure of the Union of Soviet Republics, in Moscow. The exact weight of the gem is 199.6 carats. It is ⅞ of an inch in height, 1¼ inches wide, and 1⅜ inches long. It is still mounted in the scepter of the Romanoffs, but the royal hands of this once-mighty family will never again wield the diamond as an emblem of sovereignity.

Diamond Replica Used in Motion Picture

Metro-Goldwyn-Mayer Motion Picture Studios rented a collection of Famous Diamonds from the Institute's headquarters. The replica of the "Star of the South" is to feature in a photoplay which M. G. M. is producing.

Owner of Famous Jewels Visits America

The actual "Star of the South" is among the jewels owned by His Highness the Gaekwar of Baroda. The Gaekwar has been reported to hold in his treasury 75 million dollars worth of gems.

His Highness was in this country last fall. He spent several days at the Biltmore Hotel in Santa Barbara before sailing for his native country. During His Highness' stay in Santa Barbara, Mr. Shipley, president of the Institute, was fortunate enough to secure an appointment with him. Mr. and Mrs. Shipley drove to Santa Barbara from Los Angeles, and were rewarded with a very fine interview. The Gaekwar showed a lively interest in the educational activities of the Institute, and inquired as to the possibility of securing courses for the keepers of his jewels. He was very generous in promising to have any of the Institute's questions regarding the gems in his possession answered after he returns to Baroda.

His Highness told Mr. Shipley that the "Star of the South" and the "English Dresden" are mounted together in a necklace which is in his treasury. The "Akbar Shah" and the "Empress Eugenie" were reported about 1870 to be among the jewels in his treasury. However, the Gaekwar could not remember having seen the gems. He looked at the replicas which Mr. Shipley had brought and said that the stones might be among his treasury, but that they were rather small and he probably would not have noticed them. The "Akbar Shah" is reported to weigh 71 carats and the "Empress Eugenie" 51 carats!

An article concerning Mr. Shipley's visit to the Gaekwar and the diamonds His Highness owns will be published in an early issue of *Gems and Gemology*.

Famous Diamonds Shown

The Gemological Institute displayed two of its window shows—the Cullinan and Famous Diamonds in the Los Angeles Public Library last month. These are the duplicates of those which featured in the diamond exhibits at the World's Fair last summer. The displays in the Los Angeles Library attracted a great deal of interest, as they do wherever they are shown. Students of the Institute may secure these exhibits for their home town libraries and museums if they desire.

NEW NAMES OF GEMS AND GEM SUBSTITUTES

A brochure from Ceylon advertises the following stones. Can you tell us what their true species are?

Pushparagam	(Padparadscha?)
Cinnaman	(Garnet?)
Chemical Diamond	
Synthetic Diamond	(Synthetic White Sapphire?)
Gomedagam	(Cinnaman? Garnet?)

Two other gems have been reported to the Institute. We are seeking information concerning:

Seal Sapphire
Sherry Topaz

Danburyite as a New Gem

The English *Gemmologist* announces a new gem-stone—Danburyite. Danburyite evidently is usually found in the colors yellow or brownish yellow. It has properties rather close to those of Topaz; Refractive Index, 1.633; Hardness, 7; Specific Gravity, 3.0.

Books Received for Review

The following books have been presented to the Institute to be reviewed in following issues of *Gems and Gemology:*

Louis Bouton—*La Perle*—G. Doin & Cie., Paris.
Sir William Bragg—*The Universe of Light*—MacMillan, New York.
Floyd L. Darrow—*Story of Chemistry*—Bobbs-Merrill, Indianapolis, Ind.
J. W. Evans, G. M. Davies—*Elementary Crystallography*—Thos. Murby & Co., London.
H. H. Read—*Rutley's Mineralogy*—Thos. Murby & Co., London.
E. A. Smith—*Working in Precious Metals*—N. A. G. Press, London.
J. P. Sutton—*Diamond*—Thos. Murby & Co., London.

Prince Adds to Institute's Gem Collection

Prince M. U. M. Salie of Ceylon presented the Institute a collection of cut stones. These include a fine Peridot, a grass-green Tourmaline, a blue Zircon, a golden Zircon, and a precious Moonstone. These gems are all of the finest quality, both of perfection and color. They range in size from one and one-half carats to almost five carats. Prince Salie's gift is a very valuable addition to the collection of the Institute.

Gemologists Present Talks

Mr. Leslie Grey, of Culver City, California, addressed his Rotary Club a few days ago. His subject was the diamond, its properties, and its intrinsic value. Mr. F. Otto Zeiss of Chicago recently appeared before his Kiwanis Club and presented a similar talk. Several other students throughout the country are preparing to give gem talks in the near future.

CHRYSOBERYL

(Alexandrite, Cat's-Eye and Chrysolite)

MILTON D. GRAVENDER

Among gem-stones few are more interesting than those known as phenomenal gems. These fascinate many persons who otherwise are but slightly interested in colored gems. Diamonds and emeralds, as well as most other stones, exhibit beautiful but solid colors and their appearance under changing lights does not appreciably vary. Phenomenal gems include those which show unusual reflected patterns or effects—the sapphire and ruby asterias, and the opal, moonstone and others, among which is the cat's-eye, a variety of chrysoberyl. Other phenomenal gems are those which, under varying conditions of light, change their color. To this class belongs the alexandrite, also a variety of the mineral chrysoberyl. It has the extraordinary quality of appearing green in daylight and red under artificial light.

Cutting gems in the Orient.

The discovery of the alexandrite is stated to have been made in 1831 on the day Alexander, the Second, reached his majority, and was therefore named Alexandrite by Nordenskjold, the mineralogist. Although in Russia it was used as the birthstone for August, due to its comparatively recent discovery, it does not have the usual romance or tradition associated with other similarly valuable stones. The oriental cat's-eye is used by the natives of Ceylon as a charm against the evil spirit. This stone is prized very highly by the natives of India.

Unlike the alexandrite and cat's-eye varieties, both of which show phenomena, there is beautiful transparent yellow green or chrysolite colored chrysoberyl which like chrysolite colored sapphire, some jewelers call "Oriental Chrysolite" much to the annoyance of the scientists who believe such terms confusing to the layman. Other transparent varieties of chrysoberyl which do not show phenomena are golden, blue-white, blue-green, olive-green, and greenish-brown. Rare and little known, they are almost as brilliant, hard, and tough as the ruby and sapphire.

Alexandrite and cat's-eye are the most beautiful varieties of the chrysoberyl family, and if they were better known in America, they perhaps would be as popular as rubies, emeralds, diamonds, and sapphires, since their fine qualities are extremely rare. Cat's-eye has been popular as an engagement ring gems amongst members of the present British royal family. The public,

who are connoisseurs of beauty and more especially those who like individual things, are particularly drawn to the alexandrite and cat's-eye, since like most phenomenal gems, no two of them are ever exactly alike. The term, "cymophane" is usually applied to a cat's eye, in which the pupil of the eye is not so straight or well-defined, but in which a cloudy light only "floats" about as the stone moves.

Chrysoberyl is in composition an aluminate of beryllium, containing some oxides. It is closely related to spinel, and less closely to beryl. The finest alexandrite variety appears almost emerald-green when viewed in most directions and shows flashes of red in others. In artificial light, however, the green color is lost and the red alone becomes apparent, columbine red being the most favored hue. The variety that suggests the pupil of an eye of a cat has a broadish band of light running across the stone when cut en-cabochon with a high center, and is known as cat's-eye. Apple-green and honey-yellow are most highly prized while a fine dark green is also desirable.

Transparent chrysoberyl is found most extensively in Brazil, Ceylon, and South Africa. The alexandrite is found in the Ural Mountains in Russia, and Ceylon. The latter produces the largest and as a rule the finest quality. An unimportant amount is found in Tasmania. The cat's-eye is found in Ceylon, China, and Brazil.

Synthetic blue sapphires and spinels which display the phenomena of changing to purple, purplish-red or dark wine color under artificial light seem often to be mistakenly sold as synthetic alexandrite. The mineral quartz supplies a chatoyant or cat's-eye like variety which displays the same phenomena but never possesses the beauty of color, finely drawn pupil, or silky appearance of chrysoberyl variety. Correctly known as Quartz Cat's-eye, it is sometimes called "Occidental" Cat's-eye to distinguish it from the chrysoberyl to which the name "Oriental" Cat's-eye is then applied. The toughness of these stones is very pronounced, and they rank next to the ruby and sapphire in hardness. Alexandrite and Cat's-eye are both gems especially appropriate for men.

This is an excerpt from Mr. Gravender's booklet, *Fascinating Facts About Gem-Stones*, which has been prepared as a popular handbook for distribution among jewelers' customers. Information concerning the booklet may be secured by writing to the Institute.

OLIVER CUMMINGS FARRINGTON

1864-1933

Oliver Cummings Farrington, for thirty-nine years Curator of Geology at Field Museum, passed away on November 2, 1933, at the Billings Memorial Hospital, Chicago. He was sixty-nine years old at the time of his death.

He received his bachelor's and master's degrees in science at the University of Maine and his doctorate at Yale. He was a frequent contributor to scientific journals on subjects of mineralogy, meteorites and geology and was the author of "Gems and Gem Minerals" and "Meteorites".

Dr. Farrington was a member of the Advisory Board of the Gemological Institute. Even during the years of his failing health he gave his time and interest to the affairs of this organization. Through his passing, the Institute has lost one of its ablest and most revered advisors.

TEST YOUR LOUPE

ROBERT M. SHIPLEY

The N.R.A. code for retail jewelers as signed by the President provides that a seven-power loupe shall be standard for grading diamonds. This will undoubtedly cause many a jeweler to purchase a new glass to take the place of the low-powered one he is now using. Most cutters and importers of diamonds and most reliable diamond dealers have been using a 10-power loupe since long before there was need for codes.

Investigation has shown that a majority of retail jewelers are using a loupe whose power they probably do not know. It has become a common thing in the trade to grade diamonds with a watchmaker's loupe. Many jewelers have started as watchmakers and have continued to use their old magnifiers after they began their work with diamonds. Few watchmakers' loupes are as strong as seven-power. However, those glasses which have a double lens arrangement will usually be found to meet the code requirements. It has been our experience that the latter type of loupe is from seven- to ten-power. Men who have been using a single-lens magnifier will have to check their instrument and probably they will find that they must buy a new one.

You can check the power of your favorite glass in a very simple manner. Take some object of known size and focus your loupe on it. The object should be very small—about one-sixteenth of an inch long. A very short pencil mark on a piece of paper will serve the purpose well. Move the loupe until the object is magnified as much as possible but is still in focus. Then lay a ruler—preferably a transparent scale graduated in millimeters—across the surface of the lens which is nearest your eye. You can thus measure the apparent size of the object upon which you have focused. Now put aside the loupe and measure the true size of the object. Divide the apparent size of the object as seen through the loupe by its true size; the result will be the power of your loupe. For instance, you have made a mark 1-16 of an inch long on a piece of paper to serve as an object. After focusing your loupe and measuring through the glass you find the apparent size of the pencil mark to be ⅜ of an inch long. ⅜ equals 6-16. 6-16 divided by 1-16 equals 6. Your loupe is only six-power, and you will have to get a new one to meet the code requirements.

If your magnifier is of the monocle type, that is, equipped with a holder to fit in the eye-socket, you will have to follow a rather unusual procedure to learn its power. The most satisfactory simple method which we have found in the laboratory is to make a short pencil mark on a piece of thin white paper, hold the paper against a window or lighted show-case, and lay the loupe over the mark with the lens toward you. Most monocle loupes will be focused on the paper when placed in this position. Now lay your ruler across the lens, measure the apparent size of the mark, and proceed as above

to determine the magnification. It is preferable to use a millimeter scale in determining the power of loupes. For instance in this latter case you have made a pencil mark 1.5 millimeters long. Measured through the glass, the mark appears to be 15mm. long. Therefore the power of the loupe is 15 divided by 1.5, or 10.

Some jewelers have bought their loupes by *focal length* rather than by power. As a rule, the shorter the focal length, the greater is the power of the lens. To take an example, a Zeiss aplanatic magnifier with a focal length of 32 millimeters or approximately 1.26 inches is a 10-power. A focal length of 23 millimeters or about .906 inches implies 8-power; 18mm. or about .709 inch implies 6-power. Thus in general a lens with a focal length of more than 30mm. or about 1¼ inches is less than a 7-power, and therefore does not meet the code requirements. However, this rule does not hold in every case; some loupes are made with a longer focal length than the above scale outlines.

The focal length of a lens may be determined with but fair accuracy. Hold the loupe before a sheet of white paper and focus the image of some distant object upon the surface of the paper. The distance from the paper to the loupe in this position is the focal length. However, the method is but a check and not absolutely accurate.

The mere fact that a loupe magnifies seven diameters does not recommend it as a good glass to use on diamonds. A jeweler's loupe should be corrected both for color and for spherical aberration. If a loupe is not corrected for color—i. e., for chromic aberration—it will not focus sharply. A glass of this sort breaks up white light into the colors of the spectrum. An image seen through it will not be sharply outlined but will show rainbow colors at its edges. An image as small as an inclusion in a diamond might be so blurred as to be indiscernible.

The second correction—for spherical aberration—is even more necessary. An ordinary glass, whose surface outline follows the circumference of a circle, focuses upon only one point. If a surface of any area, such as the interior of a diamond, is to be observed, the glass must be moved about and focused upon every single point within the stone. This takes a great deal of time and causes undue eye-strain. However, loupes are made corrected for spherical aberration. Their surfaces are ground in a curve which varies from the circumference of a circle. With a loupe which is corrected for spherical aberration the whole field of view through the loupe is visible and in focus. Thus the entire field can be observed at one time and without moving the glass about. This saves time and prevents a certain amount of eye-strain.

Chromatic aberration is overcome by using a multiple-lens magnifier with both crown and flint glass lenses. Loupes which have the corrections for both chromatic and spherical aberrations are usually known as triple aplanats, aplanatic triplets, or some similar name. By triplet is meant that the loupe is made up of three separate lenses.

The Gemological Institute has tested the four following makes of aplanatic loupes and announces these results:

Bausch and Lomb Optical Company, Rochester, N. Y. Coddingtons, Triple Aplanats, and Hastings Triplets in both 7x and 10x hand loupes. The Hastings is somewhat better than the Aplanat. The Coddington is a one-piece lens and not as fine a glass as either of the triplets. These are perhaps the only 7x loupes on the American market. Eye-loupes (uncorrected) made in 1.7x, 2x, 2.2x, 2.5x, 3x, 3.3x, 4x, 5x, 7x, and 10x, not recommended. *Prices:* 7x and 10x Triple Aplanats, $6.00; 7x and 10x Hastings Triplets, $7.50; 7x and 10x, Coddingtons, $3.00; eye-loupes, 90c to $2.25.

Spencer Lens Company, Buffalo, N. Y. We received for testing only a 9x eye-loupe. This is a triple aplanat mounted in an eye-piece. The power is impractical for the jeweler and the loupe seems to be over-corrected, causing the center of the field to be out of focus. Spencer also makes triple

aplanats in 6x, 9x, and 12x hand loupes with the conventional folding cases. We did not receive any of these for testing. *Prices:* 9x aplanat eye-loupe, $8.50; 6x, 9x, and 12x aplanats in folding cases, $6.00.

Carl Zeiss, Jena, Switzerland. 6x, 8x, and 10x in triple aplanatic magnifier hand loupes. The 10x is the best loupe we have found on the American market. The 6x and 8x are of equally fine quality and are better than any similar power lenses we have tested. Zeiss also makes eye-loupes the strongest of which is but 5x and not strong enough to meet code requirements. *Prices:* 6x, 8x, and 10x Aplanatic magnifiers in folding cases, $6.50. Without folding cases, $5.50. Eye-loupes, 4x and 5x, $3.50.

Carl Zeiss has mounted the 10x triple aplanatic magnifier in a holder to fit the eye. The aplanat is so mounted in the holder that it may be focused to fit the individual eye.

J. H. Steward, London, England. 10x triple aplanat. This is the finest hand loupe we have ever seen. Largest field and the clearest focus. *Price:* About $9.50, varies with rate of exchange.

Talks Available for Delivery

The American Gem Society is preparing for its members a number of talks suitable for delivery before men's service clubs, women's clubs, and college or high school classes. The talks will be so prepared as to be delivered in one-half and one-hour periods. Rough gem-minerals, replicas, and instruments will be sent with the talks for illustration purposes. Also, the Society will furnish the speaker with a condensed outline to follow while delivering the talk. These talks are somewhat more in the popular vein than are those which have been made available by the Gemological Institute of America, and do not have as much of a scientific background.

PREPARED

1. *The Diamond.* The qualities which produce its value. The stability of its value in comparison with other commodities.

IN PREPARATION

1. *The Romance of Gems.*
2. *The Diamond and Other Gem-Stones.* How they have grown and where they are found.
3. *Famous Diamonds of the World.*

Information about securing these talks and accompanying material may be obtained by writing to the Educational Publicity Department, American Gem Society, 555 South Alexandria, Los Angeles, California.

Vocational Research Groups

Ten groups have been organized recently in various sections of the United States. This follows a new scheme of education just being developed by the Institute by which several jewelers meet and study together instead of taking the course separately. The success of the new system is evidenced by the fact that not one of the ten organized groups has stopped its work.

THE AMERICAN GEM SOCIETY

MARGARET FINFROCK

The American Gem Society is designed to make America "Gem-Conscious." It will educate the public in the appreciation of gems and will create a demand for diamonds and other gem-stones for the jeweler. It will accomplish this by educational campaigns among jewelers, teachers, librarians, men's and women's clubs, and scoutmasters. Through them the public will be reached by means of educational campaigns in jewelers' windows, direct mail campaigns, prepared newspaper mat services, and by talks over radios, in clubs, and in college and school auditoriums.

Membership will include persons sufficiently interested in gem stones to subscribe to the magazine *Gems and Gemology*. Therefore it is imperative that every jeweler be at least sufficiently interested to subscribe and thus become an ASSOCIATE MEMBER OF THE AMERICAN GEM SOCIETY.

It is equally important that a majority of jewelers prepare to meet the increased interest of the layman with all fundamental facts concerning gem stones by becoming GRADUATE MEMBERS OF THE AMERICAN GEM SOCIETY. The American Gem Society is endeavoring to supply a fundamental knowledge of gem stone facts to every jeweler of proven integrity, who wishes to be prepared to answer the questions of the public. The Gemological Institute of America is discontinuing its *preparatory course* and the A. G. S. is offering an improved course, written by Robert M. Shipley. This covers the material formerly contained in the Institute's preparatory course, but with stress laid upon gem salesmanship and selling points of gem stones, with specially designed semi-monthly educational window features. Thus it is within the reach of any jeweler to qualify as a GRADUATE MEMBER of the AMERICAN GEM SOCIETY in one of the following ways:

First, by passing the examination of the AMERICAN GEM SOCIETY, if qualified to do so. Second, by research work or private tutoring, if not already qualified. (Recommendations regarding research or tutors available from Gemological Institute of America.) Third, by taking the organized course offered by the AMERICAN GEM SOCIETY.

This examination will be accepted as an entrance examination by the Institute, should a GRADUATE MEMBER later decide to become a CERTIFIED GEMOLOGIST. With the contemplated nation-wide dissemination of education regarding gems the public may be expected to confine their patronage to those jewelers who thus evidence a sound knowledge of gems. CERTIFIED GEMOLOGISTS already are being trained by the Gemological Institute of America. This title carries with it the distinction of an expert with scientific knowledge and laboratory experience, who is equipped to determine the identity of gem stones. Formerly the opportunity of a course of study in gem stones in America was only offered to those jewelers who desired to become CERTIFIED GEMOLOGISTS.

Those who have passed the Institute course 012 together with those educational and trade authorities throughout the country who by their pioneer interest in the Gemological movement and knowledge of this or related subjects are qualified to become Honorary members, will be mentioned nationally as Charter members of the A. G. S. It is the plan of the National Gem Society to have regional chapters throughout the country. These chapters may be formed by any person or persons interested in gems, providing there is a membership of at least 5 graduate members. Membership in the Gem Society will consist of:

(1) Associate members—Every subscriber to *Gems and Gemology*, the magazine of the Society.

(2) Graduate members—Associate members who have passed the examination in a fundamental, scientific knowledge of gems.

(3) Honorary members—Elected by local chapters because of their outstanding knowledge of gems.

(4) Advisory members—Educators in colleges, high schools, grade schools, scout executives, etc., fitted to assist the efficiency of members in the dissemination of gem-appreciation among their students.

Thus membership is open to any person who might be interested in gems and it gives the jeweler an opportunity to become a leader in his community by becoming a charter member of his local chapter of the A. G. S.

Meetings of the Gem Society will be held every two months and the National Society will develop, for use in these meetings, lectures upon gemological subjects, slides, photographs and any material that might prove of value to the program. It is also suggested that each chapter hold a gem style show once a year to which jewelers may invite their customers or prospective customers. The display of gems and talks on jewelry fashioning will be featured.

Dues in the National A. G. S. are $3.50 per year; this includes a subscription to this magazine *Gems and Gemology*.

The public's confidence can be restored only through education of the jeweler and of the public. If the jeweler is sure of the stones he sells and if his customers are sufficiently informed to be convinced of the dealer's knowledge, then sales of gem stones will again become an important part of the jewelry business. The American Gem Society feels that in its formation it has brought to the jeweler a sound, intellectual means of gaining the confidence of the people and an opportunity for gem sales never before realized. When the public is educated to recognize whether or not a jeweler knows his subject, it may be expected to buy exclusively from those who possess a fundamental knowledge of gem stones. Graduate members of the Gem Society and the man who is studying will not only gain in the confidence of his community but he will have the satisfaction of having sold with a stone a sense of appreciation to his customer which makes for greater happiness. A knowledge which increases anyone's appreciation of the beauty and value of esthetic objects, increases happiness.

If you have passed examinations which qualify you as a GRADUATE MEMBER sieze this opportunity to become a charter member of your local chapter of the A. G. S. Write to the American Gem Society for instructions on how to proceed with the formation of a chapter. If you have never studied gem stones, subscribe to this magazine and become an Associate member of the A. G. S. and immediately begin to prepare for graduate membership.

To those who are taking the course for Graduate membership, will be sent two assignments for study each month for a period of twelve months or twenty-four assignments in all for a nominal cost. The students receive an attractive frame to hold the series of display signs and photos which are sent to him for use in his window. The signs carry important facts about gems and gemology which will attract the public passing his window. The photographs will demonstrate the properties of gem stones and points about which the average customer is not aware. This serves as splendid publicity all during the time the student is working and prepares his customers for his announcement when he becomes a GRADUATE MEMBER of the AMERICAN GEM SOCIETY. Verbal courses are also being offered in University evening extension courses, or if a jeweler possesses sufficient incentive, he may do individual research as suggested beginning in our next number, arrange for tutoring with persons qualified and recommended by the Institute, or otherwise prepare to pass the examination. However, one of these steps should be taken or the Society's course begun immediately. The message written in the article following this is to be reprinted in pamphlet form and mailed to several million people in the United States, and the first question every jeweler should ask himself is "Am I prepared for my customers to ask me these questions?"

The exact text of this message to the public follows:

HOW TO SELECT YOUR JEWELER

Ever since primitive man first looked upon the exquisite beauty of rough gems or flashing metal lying upon the seashore or mountain path and laboriously fashioned them into ornaments for neck or arm, men and women have craved the possession of genuine jewels. Gems were probably worn before clothes and the trade is among the most ancient. Many persons believe they cannot afford genuine jewels in these ever-troublous times, but man has always possessed that which he desired. Genuine people want genuine things. There are jewels for every pocketbook. Lesser known inexpensive gems worn by cultured persons who "know", are often among the most admired of jewels. The lack of knowledge and appreciation of gems frequently prevents their acquisition. Not only diamonds but also a score of colored gems, enhanced by the art of accomplished metalsmiths, have brought happiness and pride of possession to millions of persons. Gold alone has proven to be as stable in value as gems. The love of jewels is latent in everyone and it often requires but a spark of interesting facts intelligently offered to create the desire of possession. Indeed, it is more often the uncertainty of obtaining the genuine which prevents their purchase.

Few persons have time to become familiar with the many gem substitutes and deceptions and the scientific tests for their detection. However, a

jeweler can prepare himself in a knowledge of possible deceptions. The customer wants to be assured that his jeweler possesses such knowledge. The most frequent query is how to select one's jeweler. One fears the merchant whose profits are obtained from a deliberate and continued policy of misrepresentation. He fears almost as much the watch-maker jeweler who, having proven his ability to sell satisfaction or lasting happiness in watch repairs, nationally advertised silverware, or other lines, but because of his limited knowledge in gems, charges his customers an unnecessary price for inferior quality.

One too often follows the easiest way and, whether or not he shops around, finally buys "price" and regrets it always. The joy and happiness in jewels comes to you or to the loved one to whom you give, in the assurance that it is of the quality which you desire.

For generations the purchase from a firm with an old established reputation was sufficient safeguard of merchandise. In less hurried days, such firms had time to specialize in a knowledge of the gems and metals. Many still do; but some can no longer spare the time or money or are owned by careless successors of more conscientious founders.

The confidence of the buying public, severely shaken by repeated disappointments, was fast disappearing. However, the very trend of the times brings its own cures. A few jewelers wished to return to the guild ideas of their ancestors. They were of the mould who valued their good name to such an extent that they wished to know, themselves, the factors which made up the true value of the merchandise they sold. They wished to ask the confidence of their customers and in turn they knew they must merit that confidence through correct knowledge. Like those barbers who became surgeons in the 17th century, they too founded a profession in 1931.

In England there had been available to jewelers a two-year course in the science of gem-stones and precious metals known as Gemmology, which prepared for an examination for a certificate as a specialist.

This was a guarantee to the public of the merchant's knowledge. Those American retail jewelers who wished through similar knowledge to protect their customer's interest established two examinations, the passing of which permits the use of titles.

A highly specialized knowledge of gems and the precious metals would be difficult for the great mass of jewelers to obtain, although through both experience and study some had done so. The Gemological Institute of America was established, with an examining board which awards the title Certified Gemologist.

However, not every jeweler, with his many other obligations to the public, can become a specialist and a certified gemologist. So that the public may discriminate between the jeweler who has neither time nor inclination to learn accurate fundamental facts concerning gems, the American Gem Society was established with an examination which permits the use of the title *Graduate Member American Gem Society*, to any jeweler possessed of such fundamental knowledge. Many have already passed it. A year's course is necessary for those jewelers who have not yet studied the fundamentals of the science of gems.

The use of this title upon windows, letterheads, and in advertisements not only protects the trade against the competition of those merchants without knowledge of merchandise or ethics who were destroying trade, but the use of the title also protects the customer. For the first time the customer has a definite means of knowing whether his jeweler is a specialist—Certified Gemologist, or is at least qualified to make accurate statements regarding gems—Graduate Member of the American Gem Society.

You may already have selected a jeweler who may not yet have had time to take these newly-established examinations. True! But he m y be engaged in research work or pursuing a course or you may not have seen his announcement that he is preparing for examinations.

TO PROTECT YOURSELF IS SIMPLE. One infallible test will prove whether or not a merchant has sufficient knowledge to protect his customer. After his every statement that an article is the best quality or is the cheapest for the price, ask him—WHY? If he is honest and knows, he will welcome the question and will explain the facts about *that particular article* which make it so. The salesman who talks *only* of "special buys" or "large buying power" is no longer safe. "Buyer Beware" has been replaced by "Seller Beware." The public has been promised protection. ASK FOR IT!

If your jeweler does not display one of the above-mentioned titles which prove his to be a customer-protected store; ask WHY? When he says his merchandise is best, ask WHY? And especially when he says it is the cheapest, ask WHY?

Tutoring for American Gem Society Examinations

Persons with a practical working knowledge in gems, to which they have added but a limited scientific and theoretical knowledge through study, may find it unnecessary to take the course of the Society. A few weeks' or months' tutoring by mail will prepare such persons for examination. Others may need only to review the fundamental theoretical subjects and familiarize themselves with the required technique of creating gem appreciation by the use of the characteristics of gems as sales tools. For them the Society will furnish individual instructions for self-preparation based upon their particular needs. The Society is in a position to recommend tutors in various parts of the United States who would be capable of assisting candidates for the examination. Our readers may write to the Society for their names and addresses, or for advice as to the next step in their preparation.

Are You Already Qualified as a Graduate Member?

Students having passed the examination at the end of gemological courses at Colgate, Columbia, Michigan, Northwestern, Southern California and Wisconsin, or the entrance examination to the Gemological Institute of America, may qualify immediately as graduate members by writing to the Society.

Jewelers with ten or more years' experience in selling diamonds and gem-stones, who have also sufficiently studied the science of gems, may also qualify. Such persons should apply for examination immediately.

A GEMOLOGICAL ENCYCLOPEDIA

HENRY E. BRIGGS, Ph.D.

PREFACE

The Author in preparing this work has attempted to make it so simple and clear as to make it a desirable text for the beginner. And yet such accuracy and completeness, such careful and convenient arrangement has been incorporated in it that the Author believes the professional will find it an invaluable help and time-saver.

In every case the technical data given is the result of a test, calculation or experiment made by the Author in his own private laboratory. It has been checked and rechecked for error in order that the information given may be depended upon to be correct.

The information given, other than technical, has been compiled from over three hundred sources, and while the Author feels deeply indebted for this invaluable help, it would be cumbersome to mention here each source of help.

The result of ten years' study and research is contained in the pages that follow. I have spared no time or expense to make this work complete and reliable. I sincerely hope that my labors will lighten, so some extent, the burden of my readers.

H. E. B.

Columbia Falls, Montana,
January 1st, 1932.

A GEMOLOGICAL ENCYCLOPEDIA

CHAPTER 1

An Introduction to the Study of Gems

It will first be necessary for the reader to have a knowledge of the methods used to identify and classify gems and gem materials, before a comprehensive study of the gems proper can be commenced. Consequently we will discuss these subjects first.

Two of the most reliable tests, and probably the ones usually tried first are the specific gravity and hardness tests. These tests, like most everything else, are not infallible. In most cases however, they suffice to settle the question. If they fail to prove the matter beyond all doubt, then some other test should of course be applied. In any case never should anything be taken for granted, especially anything in connection with gems.

The Hardness Test

In applying this simple test certain facts must be taken into consideration, else the test will only mislead and perplex the beginner.

The test is made by rubbing together the sample and a substance of known hardness, as one of the prongs of a hardness gauge. It should be borne in mind however, that the sharp edge of an angle of a mineral can often be broken down by a material of inferior hardness if the test is applied at such a point. Consequently this test should be made on a plane surface and not on a sharp edge, since the sharp edge of a brittle mineral may be broken or crumbled off by a mineral or material which is much softer than the sample being tested. A beginner might easily mistake this crumbling of the mineral for abrasion and thus be misled. The test is made usually with a hardness gauge, a type of which is described later in this article. It can however be made with various substances of known hardness, but the gauge is so much more convenient.

A mineral is harder than another if it will cut or abrade it. In the same manner as we say a steel file is harder than a copper wire, since the steel file will cut the copper wire.

In describing hardness Mohs scale is usually the standard. The following is Mohs table of hardness. (No. 1 is the softest and No. 10 the hardest of minerals).

1. Talc—Very soft, being abraded even by the finger tips.
2. Gypsum—Easily scratched with the finger-nail.
3. Calcite—Easily scratched with a copper coin.
4. Fluorite—Easily scratched with apatite.
5. Apatite—Scratched by hard steel easily.
6. Feldspar—Scratched easily by quartz, but with difficulty with steel.
7. Quartz—Too hard to scratch with steel, but easily scratched with topaz.
8. Topaz—Easily scratched with corundum.
9. Corundum—Very, very easily scratched by diamond.
10. Diamond—Not scratched by any substance except diamond. The black amorphus variety being the hardest and toughest known substance. Diamond is not even approached in hardness by any other known substance. Hence diamonds are cut with diamond dust.

It is well to bear in mind that two minerals of the same hardness and toughness, if rubbed together, will be abraded equally. However if one be tougher than the other, the most brittle one is likely to suffer most.

A hardness gauge can easily and cheaply be made by mounting suitable materials as listed in above tabulation, in small handles or in a turret head. Each prong of the gauge should be marked with the hardness number and a case should be made so that the softer substances will not be destroyed when the gauge is carried in the pocket as it often is on field trips.

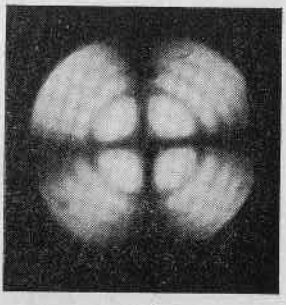
One should of course try to avoid this test on a cut gem for the obvious reasons. But in the event that the gem has a fairly wide girdle the test can often be applied to that point without injuring the stone, providing the operator is careful. It is much better to use some other test however.

(To be continued)

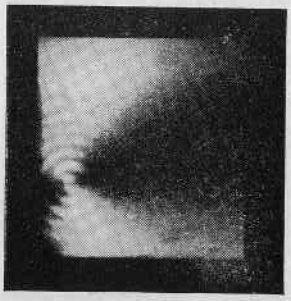
INTERFERENCE FIGURES FROM CUT GEM STONES

THOMAS CLEMENTS, *Chairman, Department of Geology, University of Southern California,* and ROBERT M. SHIPLEY, Jr.

The notes here set forth are the result of preliminary work on the study of cut gem stones under the polarizing microscope. The literature on the subject has not been thoroughly examined and it therefore is not claimed that similar results have not hitherto been recorded by other workers. It simply is because of local interest that it has been thought worthwhile to set down the results in this preliminary paper, a fuller and more complete report, with appropriate acknowledgements of earlier works, to follow later.



Uniaxial optic axis interference figure exhibited by tourmaline; microphotograph of thin section.



Biaxial figure (somewhat off center) of topaz; microphotograph of cut stone taken in G.I.A. laboratory.

The stones used were furnished through the courtesy of the Gemological Institute of America, with which the junior author is connected. The laboratory equipment was largely that of the Department of Geology of the University of Southern California.

The purpose of the work was to determine whether or not it would be possible to employ the polarizing microscope in the identification of cut stones. Its use in the study of mineral grains and thin sections is too well known to need mention here, but a cursory inspection of the literature at hand failed to reveal an application to cut stones, which, after all, are of much greater interest to the gem dealer than the former. It was the belief of the authors that it would be possible to obtain interference figures from the stones in convergent light, and by means of the optical properties thus disclosed to determine the particular mineral represented.

A petrographic microscope was employed. This was equipped with polarizer and analyzer, with converging lens and Bertrand lens, with quartz

wedge, mica plate and gypsum plate. An ordinary desk lamp served as a source of light. A brass slide with a counter-sunk, glass-bottomed compartment in which the stones could be immersed in oil or other media was found useful.

The first stone tested was quartz, cut as a brilliant, with the pavillion terminating not in a point, but in a culet parallel to the table. The stone was placed table down on a glass slide on the microscope stage, and the microscope brought to a focus on the surface of the culet. High power objective and ocular were used, giving a magnification of five hundred and sixty times. The analyzer was inserted in the path of light and the Bertrand lens pushed in place, the function of the latter being to bring into focus the light converging above the normal focus of the microscope. The strong converging lens was found to be unnecessary, since the stone itself acted as a converger.

The results proved to be very satisfactory. The Bertrand lens brought into focus a beautiful uniaxial interference figure with isochromes (the color rings in a uniaxial interference figure) showing at least six orders of color. The stone had been cut slightly off the optic axis, and therefore the figure was somewhat off-center, but the straight arms of the isogyre (uniaxial figure) as it rotated, as well as the circular shape of the color rings attested to its uniaxial character. Insertion of the quartz wedge caused a distinct movement of the color rings outward in two quadrants and inward in the alternate two as the colors fell and rose respectively. Since they moved outward in the quadrants at right angles to the vibration direction of the slow ray of the wedge, a positive optic sign was indicated, confirming the cut stone as quartz.

Other stones were then tried, with equally satisfactory results in most cases. Colorless topaz was readily distinguished from quartz and from colorless zircon by the distinctly biaxial character of the former as contrasted with the uniaxial nature of the other two. Ruby, sapphire, aquamarine, peridot, tourmaline and garnet likewise showed very definitely their optical characteristics.

The principal difficulty encountered was with those stones that possessed no culet. This, however, can be readily overcome by means of a simple device that will allow the stone to be held in any position desired in the path of light. The same device will also be helpful in the study of those stones that may be cut in directions other than normal to an optic axis or a bisectrix.

The conclusion of the authors is that the polarizing microscope can be used to determine the optical properties of cut gem stones, and that it therefore becomes a valuable adjunct to the gem expert's laboratory. It should be realized, however, that a knowledge of the technique and of optical mineralogy is essential to the satisfactory determination of gems by this method.

Constructs Dichroscope

Mr. C. A. Felt, a student in Prairie City, Oregon, has made a dichroscope for himself. He used a cleavage rhomb of calcite, a tube, and a simple lens. His results with the instrument, he writes, are very satisfactory.

DIAMONDS AT THE WORLD'S FAIR

G. FREDERICK SHEPHERD

Where is the *Diamond Mine?*
Where are the *Diamonds?*
Where is the *Tiffany Diamond?*
Where can I find the *Famous Jewels?*

These and a multitude of similar questions were asked of me during the 1933 Chicago World's Fair while I was representing the Museum of Science and Industry in the same building which housed the Diamond Exhibit. The diamond mine and the accompanying educational displays were first and foremost in the plans of every gemologist who visited the great Century of Progress, and, if the Exposition is held over for another year, is one of the first exhibits any lover of gems should see.

Under the excellent direction of Mr. Marion Mercer, a display of nearly three million dollars' worth of diamonds was assembled, the unique mine planned and constructed, and other important phases of the great diamond industry portrayed in a fascinating and educational manner. To the Chicago Jewelers Association, in conjunction with the Museum of Science and Industry, sponsors of the Diamond Exhibit, much credit is due for the vivid, thorough picture telling the "Story of Diamonds".

It is not my purpose here to repeat the story of the discovery of diamonds in South Africa in 1867. Nor shall I try to describe the origin and occurrence of these gems in "blue ground," or the primitive and modern methods of extraction, milling, and cutting of diamonds—stories already familiar to those who may read this article—and also familiar, now, to the thousands who detoured for a few minutes from their frantic effort to "cover the Fair" to see the marvelous diamond show.

My purpose is to describe the exhibit as it portrayed these facts to the public, making such a lasting impression that their friends came by thousands, asking: "Where is the Diamond Mine?"

Many were attracted by the clever display case with its three-fold protection—a self-locking safe, tear gas dispatchers, and an armed guard, in case of attempted theft; but many more were lured by the glistening Boule necklace and the Maximilian, Tiffany and other historic stones contained therein. Never satisfied with gazing at the jewels, the people would make room for others crowding around to get a glance at the much-talked-about diamonds.

But their hunger was not long unsatiated, for in the four corners of the same room were displayed the only collection of exact replicas of most of the famous historic crowns of the world. These included crowns of England, Spain, Russia, Portugal, Italy, Denmark, Sweden, Norway, Netherlands, Germany, Austria, Lombardy, and Siam; the Japanese Emperor's breast-

plate; the tiara of Pope Hermisdas, and the crowns of the Empress Josephine and of Nero. This collection is owned by Alfred J. Pitts of Fond du Lac, Wisconsin.

In the next room one could see beautiful replicas of the famous diamonds of the world, each one of which could relate a bloody history of lawless days in far-off places. The Cullinan, the largest diamond ever found, the "Great Mogul", and the "Kohinoor" are only three of a score or more diamonds which were reproduced.

Should you ask the average person of what use are diamonds, the answer would probably be for rings and other jewelry. But if you ask one who has seen the Diamond Exhibit at the World's Fair, you would be given a more factual answer. Of course, the gem stones attracted the great majority of people, but the diamond industry would hardly thrive on this trade alone. Many diamonds that are mined are not of sufficient good color or quality to be classed as gems. These less attractive stones, however, possess the same physical properties in other respects as do the gems. These have many industrial uses, such as grinding, cutting, and drilling. One room was given over to this important part of the story alone. The manufacture and use of diamond abrasives were well illustrated. Likewise, diamond drilling was represented by a portable Sullivan Diamond Drill with a large block of stone in which had been drilled a hole, two inches in diameter, by a bit studded with "borts" or industrial diamonds. Some of the other uses for diamonds shown or mentioned in carefully executed charts are:

Truing grinding wheels.

Truing pistons for automobile and airplane engines.

Drawing wire (through diamond dies).

Cutting and grinding lenses for spectacles.

Cutting and drilling plate glass.

Etching on metal.

Sound recording and reproduction.

Balancing delicate scales (diamond knife-edges).

Pivots in watches.

Hardness testing.

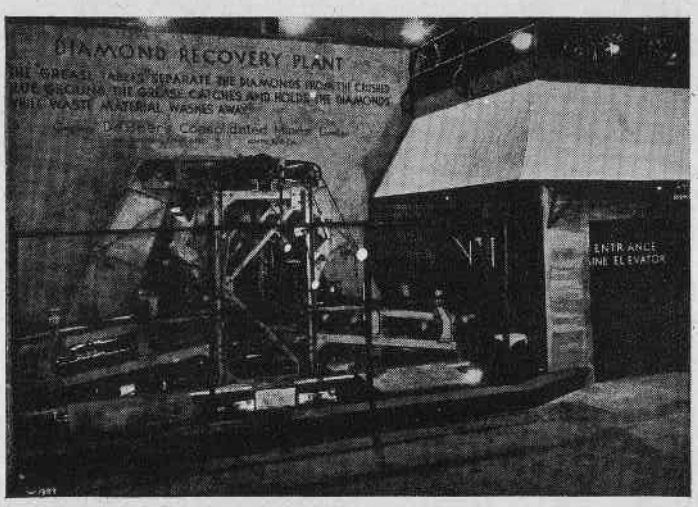
For the more than casually interested visitor and scholar, were many charts and displays telling how diamonds originate and how they occur in the necks of extinct volcanoes. Economic phases of the diamond industry were not neglected either. The importance of diamonds in international trade and even the geographic effect of diamond discoveries were there for those wishing to see the complete exhibit.

Sharing in importance was the carefully executed exhibit showing how placer diamond mining is carried on. A small model of a dredge was placed in a bed of gravel around which was painted a background representing the type of country in which placer mining takes place.

Elsewhere was a large diorama of the Kimberley Pipe. A diorama is a three-dimensional model with a two-dimensional background, built in perspective to give a vivid life-like picture of the subject being shown. In the case of the Kimberley Pipe, the visitor stands on the brink of this vast

open pit and looks out across the workings into the City of Kimberley and the adjoining country. While he watches the diorama, a voice tells the story of the discovery of diamonds in South Africa and how the small region was built up into a great modern civilization, the livelihood of which depends on the recovery of the precious stones.

Another part of the exhibit, which attracted a great deal of attention,



The Diamond Recovery Plant at the Century of Progress.

was the grease table on which the diamonds are separated from the blue ground. The ore as mined and crushed was actually run over the tables, which were constantly agitated. Diamonds, having an affinity for the vaseline used, adhered to the tables while all the other minerals and gangue rock were shaken off into conveyors which carried them to other parts of the plant. The grease tables were operated by men, experienced in the use of the machine, who explained in detail how the diamonds were extracted.

But the thrill of all came in actually taking the visitor into a reproduction of the 1540 foot level of the Kimberley Mine where he could see the native Kaffir boys at work. Little did the visitor care that he was illusioned into thinking he was being dropped 1540 feet in but a moment. To him, he was going down, his imagination picturing the view of the surface as he had seen it in the diorama. When the attendant called out: "Here we are at the 1540 foot level of the Kimberley Diamond Mine", that's just where he was, so complete was the illusion. Stepping out of the cage, he found himself in a narrow tunnel all sides of which were made of a rough, bluish-green rock, in which he was told the precious gems are found. Then he saw a compressed-air drill and was startled by its thundering noise as it bit

into the hard rock. One rough stone was embedded in the wall of the tunnel to show how a diamond would look if left there by the blast, but as the attendant explained that this occurred on the average once in a miner's lifetime, the romance of winning diamonds became more intense. The feverish slavery of the miner is only awarded after treacherous work in the mine and a tedious process in the mill and this all has to be followed by the expert cutting of the rough stone before the prize is won.

Farther on in the mine was the beginning of a new stope. Small models of miners were properly placed to show how caving or stoping in a mine is carried on. Here the attendant explained how the native miners were kept in the "compound" and were searched and examined by every effective method at the end of their contract to see if they had tried to conceal any diamonds in their clothing or flesh. Before leaving the mine, the visitor was shown a mine car loaded with the blue ground as it was filled at the bottom of a stope. Even the necessary water pump was not missing. When he reached the surface, he had actually been in a South African Diamond Mine.

Since the writing of this paper, I have been informed that the Chicago Jewelers Association have engaged Mr. Mercer for the coming year to lay out many improvements and additions to the Diamond Exhibit, as the reopening of the Fair next year seems probable. If he can improve upon the 1933 show, as the plans intend, it will be something you can't afford to miss.

NUMBER OF FAMOUS DIAMONDS INCREASED

Since our last publication, three large diamonds have been discovered, two of which rank among the four largest gem diamonds in the world. The first of these is a stone weighing in the neighborhood of 2000 carats which was discovered recently in an alluvial field in the state of Minas Geraes, Brazil. If the report is correct as to the size of the stone, it is the second largest in existence—ranking second only to the 3,024-carat Cullinan. The Institute's direct inquiries to the Brazilian government as to whether it is gem or industrial diamond were not answered. The Excelsior, formerly ranking as the second largest diamond, weighed 971 carats.

Daily newspapers report the finding of two large stones in the Pretoria district of Africa. They weigh respectively 560 and 726 carats. The larger of the two will rank fourth among the great diamonds. These stones were discovered in an alluvial deposit at Elands-Fontein. Elands-Fontein is three miles from the spot where the famous Cullinan was found. It will be recalled that the Cullinan in the rough showed a cleavage face along the whole of one side of the crystal. For this reason the authorities stated that the huge stone was but a part of the entire original crystal. The newspaper dispatches infer the possibility that the stones found at Elands-Fontein are the missing portions of the Cullinan.

New Booklet on Gems

Hudson's of Minneapolis have published a booklet on gems written by Milton D. Gravender of the firm. The booklet is unique in that it presents only authenticated facts and omits the weird beliefs which are incorrectly published in most booklets on gems.

GEMOLOGICAL GLOSSARY

The preparation of this Glossary was inspired by requests from public librarians who expressed a need for a careful and exhaustive work which would include the many trade terms and popular or deceiving names applied to the different varieties of gems. The pronouncing feature was added to supply a need of jeweler-students.

The definitions in the Glossary have been made as nearly self-contained as possible by defining elsewhere in the Glossary all but the most common words used in any definition. Exceptions to this rule are:

Chemical, geological, mineralogical and biological terms of an advanced nature only, and terms pertaining to the advanced study of the diamond.

Colors are not defined because descriptions of color are impossible to convey without reference to a color system familiar to both author and reader. An advanced Gemological Glossary and a Color Glossary are in preparation by the Institute. The former will contain advanced gemological, mineralogical and geological terms, especially those pertaining to the advanced study of diamonds. The color Glossary will be accompanied by the explanation of a color system. Names in quotation marks are terms that might be used in a confusing, misleading or unethical manner, and should be avoided or explained.

PRONUNCIATION GUIDE

It is impossible in this magazine to use a standard system of marking the pronunciation of words. No magazine printer carries a full set of vowel markings among his type. The key which we have adopted here is designed to give the reader a guide to word pronunciation, but shadings of voice in the pronunciation of vowels cannot be indicated.

In general, a vowel alone is to be sounded soft. For instance, the letter "a" alone should be sounded as the "a" in "cat". An "e" following a vowel indicates a long sound for that vowel. Thus "ae" should be sounded as the "a" in "mate". When a vowel appears in a syllable, the same rule holds. The syllable "it" is pronounced as in "fit"; "ite" is pronounced as in "bite". A primary accent (') indicates the syllable of a word which receives the greatest emphasis, a secondary accent (") indicates the syllable which receives the second greatest emphasis in the word.

Abalone (ab"a-lo'nee). The mollusc haliotis, also known as the "Ormer". See also Haliotis.

Aberration (ab"er-ae'shun). The failure of a lens or mirror to bring the light rays to the same focus. When due to the form of the lens or mirror it is called spherical aberration. When due to the different refrangibility of light of different colors, it is called chromic aberration.

Abrasive (ab-rae'siv). Substances such as emery (powdered corundum) used to wear away another substance by friction.

Absorption (ab-sorp'shun). (Selective) White light is a combination of the colors of the spectrum as seen in the rainbow. The color of a mineral is due to the absorp-

tion of certain portions of white light in its passage through the mineral. The remainder of the white light, namely that which is not absorbed in the mineral, blends to produce the color seen.

(Spectrum). By means of spectroscope, exactly what portions of white light absorbed by any substance may be determined. The unabsorbed light is dispersed in its passage through the spectroscope, forming a band of colors known as an absorption spectrum. Dark zones crossing the spectrum represent the light which has been absorbed.

Achroite (ak'roe-ite). Colorless tourmaline.

Accidental Pearls. Genuine natural pearls.

Acicular (a-sik'ue-lar). Needle like.

Acute. Sharply pointed.

Adamite (ad'am-ite). Trade name for artificial corundum manufactured for abrasive purposes.

Adamantine (ad"a-man'tin). Extraordinarily hard. From Adamas (Greek). The luster of the diamond.

Adductor muscle (a-duk'ter). A muscle passing across from one valve of a bi-valve to the other, for the purpose of closing the shell.

"Adelaide Ruby" (ad'e-lade). Blood-red pyrope (garnet) from South Africa.

Adularescence (coined word) (ad'-ue-la-res"ens). Reflection from thin platy twin individuals of adularia, causing interference of light and the resulting milky blue sheen, seen in the precious moonstone, often incorrectly called opalescence.

Adularia (ad'ue-la"ri-a). A transparent colorless gem variety of orthoclase, known also as moonstone.

African Jade. Green grossularite. Same as Transvaal Jade.

Agate (ag'at). A crypto-crystalline variety of quartz (chalcedony). Colored bands of material are usually arranged in parallel lines, which are sometimes flat but more often concentric. See also Banded Agate, Cloudy Agate, Eye Agate, Fortification Agate, Cloudy Agate, Moss Agate, Agatized Wood.

Agate jasper. Mixture of jasper and chalcedony.

Agatized wood (ag'a-tized). Clouded agate pseudomorphs after wood, some as petrified wood.

A jour (a-zhoor). French. Allowing light to penetrate.

Aggregates (ag're-gates). Clusters or groups.

"Alabandine Ruby" (al"a-ban'din). Red spinel of a violet tint.

Alabaster (al'a-bas"ter). A translucent to semi-transparent form of gypsum. Usually snow-white in color. Easily carved.

Alalite (al'a-lite). A mineral. Same as diopside.

"Alaska Diamond" (a-las'ka). Rock crystal.

Albandine (al'ban-din). Same as almandine.

Albite (al'bite). A variety of feldspar (Oligoclase), which furnishes a moonstone variety. See also aventurine.

Alencon Diamond (a-len'son). Rock crystal.

Aleppo Stone (a-lep'o). Eye agate.

Alexandrite (al'eg-zan"drite). A variety of chrysoberryl, emerald green in daylight, red by artificial light.

Alexandrite cat's eye. A chatoyant variety of alexandrite.

Alladinite (a-lad'in-ite). A casein resin used as a mould material for many common objects.

Allochromatic (al"o-kroe-mat'ik). (Coined word). Minerals perfectly colorless or white when pure. Due to the presence of an accidental impurity, they are often colored. The majority of gem minerals are allochromatic. See also Idiochromatic.

Alluvial (a-lue'vi-al). Washing away rocks, soil, or other mineral matter from one place and depositing them in others, which, after they have again been covered with soil, are known as alluvial deposits.

Almandine (al'man-din). A species of garnet, generally with a purplish tinge; sometimes called hyacinth garnet. Mineralogical name, Almandite.

Almandine Spinel. Violet red spinel.

Almandite (al'man-dite) mineralogical name for almandine garnet.

(To be continued)

SELECTED BIBLIOGRAPHY

Here we present the first installment of a comprehensive selected bibliography on gemology and subjects pertaining to it. In this issue appears the first group of titles under these subjects. The next issue will complete this present subject of geology and begin mineralogy. After mineralogy, selected bibliographies will be published on chemistry, physics, and biology. This will be followed by the very complete bibliography of gemology, including not only books but also magazine articles on the subject as a whole and upon individual gems. After the completion of the subject of gemology we shall publish a list of miscellaneous writings on allied material.

***** Indicates elementary and popular works suitable for the beginner as a simple introduction to the subject.
**** Indicates books suitable as reference books for a gemologist's library.
*** Indicates books for advanced students.
** Indicates books suitable for research work.
* Indicates works suitable only for specialists in geology.

*** Agar, William M., Flint, Richard Foster, and Longwell, Chester R. Geology from Original Sources (organized collateral readings for students in general geology), "reading references" included at end of each chapter. N. Y. Henry Holt. *1929.*

***** Benson, Allan Louis.
Story of Geology. N. Y. Cosmopolitan Book Corp. *1927.* Inexpensive, a popular book for light reading, valuable as an elementary introduction for the beginner or layman, entertaining, but not alone sufficient for a student, not illustrated.

***** Blackwelder, E.
Elements of Geology. N. Y. American Book Co. *1911.*

***** Bradley, John Hodgon.
The Earth and Its History, a Text Book of Geology. Boston, Ginn. *1928.* Recommended for the beginning student. Simple and not expensive.

*** Branner, J. C.
Syllabus of a Course of Lectures on Elementary Geology. Calif., Stanford University. *1908.*

***** Brewster, Edward Tenny.
This Puzzling Planet; the Earth's Unfinished Story; how men have read it in the past, and how they may read it now. Indianapolis, Bobbs Merrill Co. *1928.*

*** Brigham, Albert Perry.
Geology, revised and expanded by Frederick A. Burt. New York, London. D. Appleton & Co. *1928.*

*** Brown, Charles Barrington, and Debenham.
Structure and Surface; a book of field geology, London, Arnold. *1929.*

**** Chamberlin, Thomas Chrowder, and Salisbury, Rollin.
College Text Book of Geology. Rewritten and Revised by Rollin T. Chamberlin and Paul MacClintock. N. Y. H. Holt & Co. *1930.* An excellent reference book for a gemologist's library, complete, well illustrated, authentic.

(To be continued)

BOOK REVIEWS

A. McC. BECKLEY

Dana's "Text Book of Mineralogy", revised and enlarged by William F. Ford. Published by John Wiley & Sons, Inc., New York. $5.50.

This great and indispensable work on mineralogy has been greatly enlarged and thoroughly revised. It is safe to state that no other text book on mineralogy to date has taken the place of this work. No other book is so often quoted as a reference on mineralogy. It has been called "The Mineralogist's Bible".

The origin, occurrence and association of minerals is a new feature of this work. To students of gemology this section is perhaps the one disappointing feature of the book, by reason of its brevity.

The tables included in the appendix are especially recommended to gemologists as they are planned to give the student, at a glance, the minerals arranged according to chemical composition, systems of crystallization, crystalline habit, structure of massive minerals and physical characteristics. A very suggestive table is included where minerals, metallic and non-metallic are arranged according to color.

The indexes are admirable; a general index and an index to species. A satisfactory index is a blessing.

"Gems and Gem Materials" by Edward Henry Kraus and Edward Fuller Holden.* McGraw-Hill Book Co., N. Y. $3.00.

This brief review of Kraus and Holden's "Gems and Gem Materials" is written from the standpoint of an amateur student of gemology who has used the book constantly for the past two years.

The text embodies the material contained in a series of lectures on precious stones given at the University of Michigan and is an ideal text book from every point of view. This is the second edition carefully expanded and enlarged from the former edition of the work. *Gems and Gem Materials* is scientific in statement of fact, fascinating in the method of presentation. Dr. Kraus has the happy faculty of conveying, in his text, much of the charm of his lecture room.

Gems and Gem Materials, as the title suggests, includes all mineral species containing gem qualities as well as four of an organic nature, amber, pearl, coral and jet. Amber receives the lion's share of attention and so excellently is amber treated in the five pages alloted to it that the student regrets that the pearl is covered in but a single page; however, it is to be recalled that Dr. Kraus's specialty was mineralogy and that the pearl is a biological subject.

There is a remarkable chapter on manufactured gems, that every gemologist should be familiar with, and, by the way, the short chapter on the naming of gems should be memorized by every gemologist and jeweler.

---

*Edward Fuller Holden, the junior author, was drowned at North Deer Isle, Maine. "May this book serve as one of the monuments to his memory" writes Dr. Kraus.

NEW INSTITUTE MEMBERS

The following two firms have been elected to membership in the gemological Institute of America since our last publication:

Cowell and Hubbard Co., Cleveland, Ohio.

S. Joseph & Sons, Des Moines, Iowa.

SIXTEEN PASS EXAMINATION

QUALIFYING CERTIFIED GEMOLOGIST Certificates have been issued to the following students upon their successful completion of the QUALIFYING CERTIFIED GEMOLOGIST examination of the Institute since the publication of the last issue:

C. Alden Aldrich, Providence, R. I.
Albert Beck, Ludwigs', Walla Walla, Washington
Frank Blackstone, c/o John F. Vondey, San Bernardino, Calif.
Barney Bobek, Little Ferry, N. J.
S. P. Clauss, Mishawaka, Indiana
Milton D. Gravender, J. B. Hudson, Inc., Minneapolis, Minn.
John B. Hudgeon, Bedford, Ohio
H. Paul Juergens, Juergens & Andersen, Chicago, Ill.
Lew Koen, Wilkes-Barre, Pa.
Paul Noack, San Bernardino, California
Richard M. Pearl, Detroit, Michigan
Howard Smith, Redlands, California
F. B. Thurber, Tilden-Thurber Corp., Providence, R. I.
Fred Twogood, Riverside, California
John F. Vondey, San Bernardino, California
F. Otto Zeitz, Chicago, Illinois

Lack of space prevents our listing the Graduate Members of the American Gem Society in this issue. Their names will be published in the March number.