

Gems & Gemology

GEMS & GEMOLOGY is the quarterly official organ of the American Gem Society, and in it 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. Any opinions expressed in signed articles are understood to be the views of the author and not of the publishers.

VOLUME II

WINTER, 1936

NUMBER 4

In This Issue:

The Diamond Industry in 1936, <i>Sydney H. Ball</i>	67
A Spherical Diamond, <i>J. R. Sutton</i>	68
New Diamond Cuts Break More Easily, <i>J. W. Ware</i>	68
The Crown Jewels of England	69
Gemological Glossary	71
Construction of a Polarizing Microscope, <i>R. C. Hoover</i>	73
Book Reviews	75
Selected Bibliography	76
Notes on Diamond Grading	77
A Gemological Encyclopedia, <i>Henry E. Briggs</i>	79

Published by

THE AMERICAN GEM SOCIETY

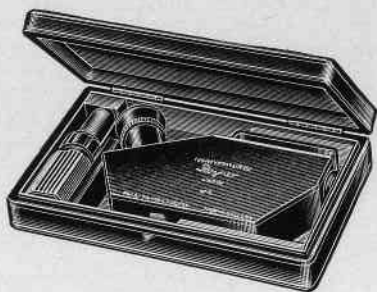
555 South Alexandria

Los Angeles, California

T H E

Rayner REFRACTOMETER

Simple — easy to operate — furnishes absolutely definite information to assist the identification of the majority of cutstones. The Rayner Refractometer is supplied in a sturdy carrying case which will slip into a coat pocket.



\$65 *including contact liquid*

F O R T H E L A R G E R L A B O R A T O R Y

T H E

Tully REFRACTOMETER

A larger instrument . . . provides more accurate readings, with rotating hemisphere for rapid estimation of double refraction — supplied in natural-finished hardwood case.

\$125 *including contact liquid*

Order from

GEMOLOGICAL INSTITUTE OF AMERICA

3511 WEST SIXTH ST., LOS ANGELES

The Diamond Industry in 1936*

by

SYDNEY H. BALL, Ph.D.

*Mining Engineer and Member of G.I.A.
Examinations Board, New York*

An improvement in the diamond industry in 1936 was foreseen in 1935, but the gain in the year has been more than had been expected. Practically all indices of the industry show an advance of from 25% to 40% over those of 1935. And that's why the jeweler is again learning to smile.

In 1936 production increased moderately over the 1935 rate (7,300,000 carats, worth \$30,000,000), but the increase was wholly from the larger mines, owned by those in control of the world industry. In March, De Beers reopened the Dutoitspan pipe mine, while the Congo, Angola, and Sierra Leone productions were slightly higher. Consolidated African Selection Trust (A. Chester Beatty interests) which operates in the last-named colony, is also said to be producing a few diamonds in French Guinea. The stock of diamonds in the hands of the Diamond Corporation and in those of the leading producers has, however, notably decreased. Sales of rough by the Corporation during the past two years have been as follows: 1934, £3,719,242; 1935, £6,235,080; sales in 1936 will almost certainly top £8,000,000. For the past three years diamonds for industrial uses have formed an increasing factor in the sales, and many diamonds which formerly went into low-priced jewelry are now being used up in industry. The gain in the Corporation's sales is highly satisfactory, but is

still but 70% of those of a really good year.

The share quotations of diamond mining companies, largely traded in in London, were strong early in the year, but in February the various threats to European peace led to the loss of most of the gain in a decline which extended to August, since when the shares have gained about 75%. The leaders have been De Beers deferred, Consolidated Diamond Mines of South-West Africa, and Consolidated African Selection Trust.

Imports of cut stones into the United States in the first ten months of 1936 totalled \$18,045,292 (140% of those of the corresponding months of 1935) and of uncut diamonds \$5,025,857 (155% of those of the corresponding months of 1935). Wholesale sales in the United States show for the first eleven months of 1936 an increase of 27% in comparison with the corresponding period of 1935 and retail sales by jewelers an increase of about 25%. Jewels of the more expensive type are beginning to move across the jewelers' counters, the repeal of the luxury sales tax on articles selling at over \$25 being undoubtedly a favorable factor, although the main one is that Americans are again luxury-minded. The Christmas trade was the best enjoyed since 1929. Stocks in the hands of diamond merchants are still low, but were perhaps slightly increased in 1936. At the

*G.I.A. Research Service.

year end, the jeweler was pleased to find his inventory showed a mark-up. The credit situation in the industry is easier.

Great Britain and India were also good customers, and France also began to purchase diamonds. Vienna and Budapest enjoyed a brisk trade during the summer tourist season. The reduction of the fantastic Japanese duty from 100% to 10% ad valorem in April, 1935, resulted in a 1000% increase in imports in the first year under the new and reasonable duty.

The scarcity in many markets of fine stones of one carat or more indicates a considerable amount of investment buying throughout the world, especially in Europe where many citizens fear the stability of

their respective currencies.

The price of all types of rough has been firm, with small increases in certain grades. Small cut goods have increased in price due to the higher prices for rough and to wage increases in the cutting industry. Sizes in better grades have increased 25% to 35% in price during the past year.

Employment among diamond cutters has increased about 25% as compared to a year ago, and the Belgian cutters have received a small wage increase.

The continued recovery of the industry is particularly satisfactory as it has been made in the face of political conditions in Europe which normally would have been expected to halt any tendency toward an advance.

A SPHERICAL DIAMOND

Diamonds from the South African pipe mines never show any signs of wear. Those from the gravels often do, mostly a little, sometimes much, but very rarely so much that all their surface features have become abraded away. Through the kindness of the Diamond Corporation I have recently become possessed of what may perhaps be unique: a whitish West African crystal of about half a carat worn down to almost a perfect sphere, as round as any quartz pebble from a river bed ever was, or as shot bort. Of course, it may have crystallized originally in a very rounded form; in this connection it is interesting to record that some years ago I obtained a stone from the Dutoitspan mine that was quite a good natural sphere.

J. R. SUTTON, Author of *Diamond, a Descriptive Treatise*.

NEW DIAMOND CUTS BREAK MORE EASILY

Regarding the indestructibility of diamond: It seems to me that the modern cut diamond (with top bezel facets of $34\frac{1}{2}^\circ$ or less) is *far less* indestructible than the older cut stone with a higher crown.

The modern cut diamond, although exhibiting better dispersion "fire" and more spread per carat weight, still, due to the smaller angle between the bezel and pavilion facets, becomes more fragile, and more easily broken about the girdle.

There seems to be an ever-increasing number of diamonds broken in customers' rings, and especially those diamonds with slightly swindled crowns. J. W. WARE, *Junior Gemologist and Registered Jeweler*, San Diego, Cal.

The Crown Jewels of England*



*St. Edward the Confessor's Crown,
the Crown of England*



The Imperial State Crown

St. Edward the Confessor's Crown, or the Crown of England, which is shown above, is a copy of the original Crown of England, which was destroyed by Cromwell's followers during the Commonwealth. The records are that it is one of the oldest Crowns in the history of England—Edward the Confessor was crowned with it when he ascended the throne in 1042. It is the Crown which is seen in the coat of arms of England and which is used in many of the official seals of the country. With it the King is officially crowned; but it is not again used, as the Imperial State Crown is worn at all State functions after the coronation ceremonies and, in fact, is worn by the King during the latter part of the Coronation Services.

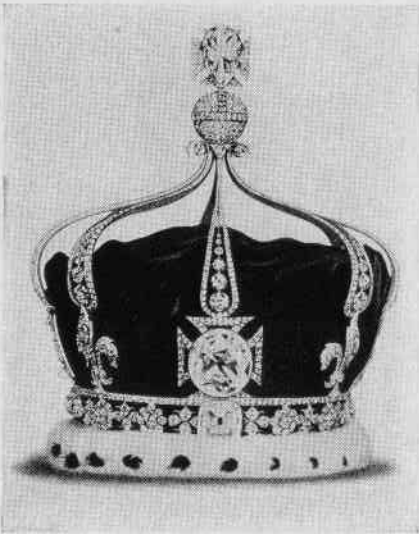
The Imperial State Crown was made for Queen Victoria's coronation in 1839. Alterations and additions to it were made by Edward VII and George V. It contains many famous old gems: the large irregular cabochon in the front of the crown is the famous Black Prince's "ruby"—actually a fine red spinel which for many years was thought to be a ruby. This was given to the Black Prince, Edward, in 1367 by Dom Pedro, a King of Spain, in appreciation of military assistance. Immediately below this is the second largest of the diamonds (Stars of South Africa) cut from the great Cullinan; the four pearls which are set near the top of the Crown at the points where the two arches intersect are supposed to have been earrings belonging to Queen Elizabeth. The stone at the center of

*G.I.A. Research Service.

the cross at the top is the Sapphire of Edward the Confessor, and the Stuart Sapphire—once worn in the Crown of Charles II (1630-1685)—occupies a paved cross on the back of the Crown directly opposite the one containing the Black Prince's "ruby." Altogether this Crown contains 1 spinel, 4 rubies, 11 emeralds, 13 sapphires, 277 pearls and 2,783 diamonds.

The Queen's State Crown is the personal property of Queen Mary, widow of the late George V, though three of the great diamonds in it belong to the State. It is possible that it may not be used at the forthcoming coronation. A new Queen's Crown may have to be constructed, or one of the other Queen's Crowns in the Jewel House might possibly be used. However, because of the three great diamonds which it contains, this crown is of considerable interest. In the Cross at the top is the second larger of the two great pendeloque-shaped stones which were cut from the Cullinan. In the cross at the front of the Crown is the recut Kohinoor; immediately below this is the smaller of the two large step-cut stones fashioned from the Cullinan. This Crown is entirely set with diamonds and contains no colored stones.

The King's Royal Scepter was made for Charles II and is about three feet long. Edward VII had the largest Star of Africa, a 516-carat gem, and the world's largest cut diamond, inserted in it; but this seems to be about the only change made in the Scepter since its manufacture. By means of an ingenious device incorporated in the mounting, this gem can be removed at will in order to be worn as a pendant. In addition to the Star of South Africa, the Scepter contains a great number of colored stones and diamonds, and much enamel work.



The Queen's State Crown



The King's Royal Scepter

GEMOLOGICAL GLOSSARY

(Continued from last issue)

(With phonetic pronunciation system)

Terms in quotation marks are considered incorrect

- Igneous rock** (ig'nee-us). A rock formed by the solidification of a molten magma, either at the surface, as volcanic lava or within the earth as plutonic and intrusive igneous rock.
- Igmerald.** Synthetic emerald. Although produced in gem sizes is thus far more valuable as a scientific curiosity than as a gem substitute.
- Ilmenite** (il'men-ite). A mineral in the hexagonal system. Hardness 5-6, opaque, black, metallic. A common inclusion in diamond.
- Imitations** (im'i-tae"shun). In its broadest sense, any material other than genuine, natural gems. In an exact sense, is applied only to glass, or amorphous compositions, such as bakelite, galalith, etc., as distinguished from synthetics and assembled stone.
- "Imitation Doublets."** A term applied in American trade to paste or glass imitations of gem-stones.
- Imperfection** (im'per-fek"shun). A trade term used to refer to inclusions or faulty structure of any kind which is visible to the eye whether observed with or without the aid of a magnifier.
- Imperial Jade** (im-pee'ri-al). In China, a term properly applied to the finest color of green jadeite. The term has been adopted in the American trade.
- "Imperial Yu-Stone."** Green aventurine quartz.
- Impregnated** (im-preg'nate-ed). Having a substance intimately dispersed or disseminated within.
- Impressed** (im-prest'). **Indented:** marked by pressure.
- Inca Stone** (in'ka). Pyrite.
- Inclusion** (in-kloo'shun). The general name inclusion, is given to any foreign body enclosed with a substance, whatever its origin. They may be gaseous, liquid, or solid; visible to the naked eye or requiring the use of a magnifier.
- Incrustation** (in'krus-tae"shun). A crust or coating.
- Indian Agate** (in'di-an). Moss Agate.
- Indian Cut.** A clumsy form of the single brilliant cut, adopted by East Indian cutters for the purpose of getting as much weight as possible after cutting.
- "Indian Jade."** Aventurine Quartz.
- "Indian Topaz."** Citrine quartz.
- Indicolite** (in-dik'oe-lite). Blue tourmaline. Very light to dark violet-blue to blue. Frequently almost black, sometimes greenish-blue. Incorrectly called "Brazilian sapphire."
- Indigolite.** See Indicolite.
- "Indigo Sapphires"** (in'di-go). Very dark blue sapphires.
- Indra** (in'dra). A casein resin used as mould material for many common objects.
- Inelastic.** Not elastic; not returning to its original form after bending.
- In Situ** (in-seye'tue). A term used to describe the location of minerals

- when found in the place where they were originally formed.
- Intaglio** (in-tal'yoe or en-tal'yoe). A carved gem in which the design has been engraved into the stone. Sometimes the figure is engraved into the stone and sometimes the background is engraved leaving a raised figure. Such raised figures differ from cameos by the fact that the edges of the cameos are lower than the figures and the figures in intaglios are below the edge. Intaglios may be used as seals—cameos cannot.
- Interlaced**. **Interwoven**. Confusedly intertwined, as fibres or slender crystals.
- Intumescence** (in'tue-mes'ens). The property of bubbling and swelling as it fuses.
- Invelite**. A plastic product similar to bakelite.
- Iolanthite**. Trade-name for a jasper-like mineral from Crooked River, Ore.
- Iolite**. A gem-stone in the orthorhombic system. Hardness 7 to 7½, refraction 1.55, transparent, light to dark blue. Incorrectly called "Water Sapphire."
- Iridescence** (ir'i-des'ens). The exhibition of prismatic colors in the interior or upon the surface of a mineral caused by interference of light from the layers.
- Iris** (eye'ris). Rainbow Quartz. Rock crystal containing cracks of air which produce iridescence.
- "**Irish Diamond**" (eye'rish). Rock crystal from Ireland.
- "**Iron Glance**." Hematite.
- Iron Pyrites**. Popular name for pyrite.
- Isochromatic** (eye'soe-kroe-mat'ik). Lines or sections possessing the same color.
- Isometric** (eye'soe-met'rik). Another name for the cubic system of crystallography.
- Isomorphism** (eye'soe-more'fiz'm). The property of crystallizing together in variable proportions possessed by some substances of like molecular structure.
- Isomorphous** (eye'soe-more'fus). Exhibiting isomorphism.
- Isotropic** (eye'soe-trop'ik). Singly refractive. Affecting light similarly in all directions as it passes through the mineral. See also **Anisotropic**.
- "**Italian Chrysolite**" (i-tal'yan). Vesuvianite.
- "**Italian Lapis**." Same as Swiss Lapis.
- Ivory** (eye'voe-ri). The hard creamy-white opaque, fine-grained substance, consisting of a peculiar form of dentine, which comprises the tusks of elephants; also the dentine of the tusks of other large mammals, or, in a broader sense, that of any tooth.
- Ivory, Artificial**. Any substitute for ivory, Bakelite, Cederon, celluloid, fibroc, invelite, micarta, redmanol, etc.
- Jacinth** (jae'sinth or jas'inth). A variety of zircon. The term is by some writers applied only to the yellow or brown variety. Others use it interchangeably with Hyacinth to mean yellow-orange or red zircon. It is sometimes loosely used to mean any zircon, and improperly to mean a Hessonite Garnet.
- Jade** (jade). A gemological group of two species—jadeite and nephrite—closely related in appearance, properties, and uses. See jadeite; See nephrite.

(To be continued)

Construction of a Polarizing Microscope

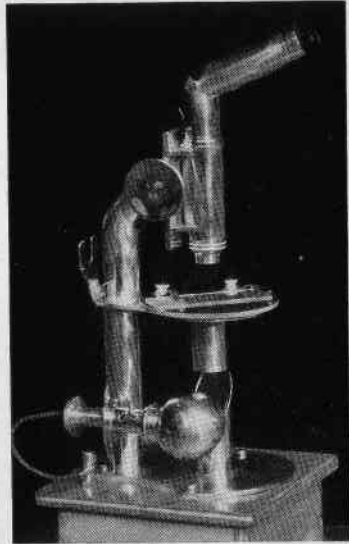
by

R. C. HOOVER

Registered Jeweler and Junior Gemologist, Akron, Ohio

(Continued from last issue)

To form the tube, a piece of the 1-inch brass tubing is sawed diagonally at an angle of 57 degrees. This angle can be laid out with a protractor on a piece of paper and placed on the bench under the tube which is held parallel with one line and the saw kept parallel with the other. The sawed edges should be trued up with a file to assure a smooth fit. Now reverse the sawed angles and solder or braze together again and you have a knee-shaped tube. Now saw off the top half of the knee at an angle of 33 degrees with the tube. This 33 degree angle is about the polarizing angle of ordinary glass. This saw cut is to remove the top half of the knee so that when a mirror is placed over the opening and the tube sighted through, the tube will appear to be perfectly straight. Measured from the center of the brazed joint, now cut the tube off, leaving one end 3 inches long, the other 4 inches. Make and braze on 3 brass clips to hold the mirror over the opening in the knee and in the 4-inch end braze or solder a threaded brass collar to take the objective lens. This collar is a machine shop job, as the objectives have special threads. Any machine shop can make the collar to fit the objective used, and a tight fit inside the brass tubing and two of



*Microscope Built by the Author,
Showing the Polarizing Devices
in Place.*

these collars should be obtained, one to be used in the straight tube.

The mirror is made from good $\frac{1}{4}$ -inch plate glass free from scratches. First lay out an ellipse on paper to fit the hole in the knee of the draw tube. Cement this paper on a piece of plate glass and grind the edges down to the size of the paper, at the same time grinding a bevel on the back. The second mirror fits in the notch in the tube below the stage,

which must also be cut at 57 degrees and suitable supports placed inside the tube to hold the mirror at very close to this angle. This mirror is similar to the one for the top, but is more difficult to describe. The shape is elliptical, but the edges are shaped as if the glass were a diagonal section through a cylinder. An apt description would be that it resembles a diagonal slice of salami. After the two mirrors are properly fitted both are given a coat of black paint or enamel on the back and edges, but *not* on the face of the glass.

The tube below the stage which contains the polarizer mirror is 4½ inches long, with the top of the notch cut 2 inches from the top of the tube. The top of this tube should extend ¼ inch through the plate which supports the revolving stage in order to form a bearing for the stage, which is 4 inches in diameter. A simple lens such as a flashlight bulls-eye is fastened inside this tube above the notch for the purpose of concentrating the light in the center of the opening in the stage and the correct position of this lens can best be determined by trial and this also applies to the correct position for the head-light bulb, as it must be in such position that it appears centered on the polarizing mirror when looking down through the draw-tube support. As illustrated, two brackets are used so that the light can be adjusted above the stage to illuminate opaque objects when used as a regular microscope with the straight tube which is a piece of the 1-inch brass tubing 6½ inches long and fitted with the threaded collar for the objective. The eye-

piece will fit sufficiently close in this tubing.

When used as a regular microscope for transparent stones with below-stage illumination, another "salami"-shaped reflector should be cut from ¼-inch regular silvered mirror which can be easily interchanged with the black polarizing mirror.

Now as to the arrangement for focusing. It is suggested that if the rack and pinion is used the builder study the method of attaching same used on factory-built microscopes and use the ideas he can gain from these, together with his own inventiveness to work out the best plan. An alternative is to split a piece of the 1-inch tubing and spread it so that it makes a friction fit over the draw-tube and use this method of focusing, as with the low-power lenses used the focusing is not critical. It is very important that the draw-tube and the stage and the tube below the stage all be accurately centered in relation to each other as otherwise when the stage is rotated the stone being viewed will not stay centered.

A few minor details of the instrument illustrated are mentioned here. The nut which comes on the threaded end of the dash light was soldered into a brass tube fitted with a knurled wheel on the end and used for tightening the light on the brackets. The shield over the light was dapped out of sheet brass and brazed to a ring to fit friction tight on the socket to permit adjustment. One side of the transformer was grounded to the instrument and the other attached to a radio binding post which permits attaching the wire which comes built into the dash light.

(To be concluded in next issue)

BOOK REVIEWS

Praktikum der Edelsteinkunde (Practical Gemology), by Georg O. Wild. Franckh'sche Verlagshandlung, Stuttgart, Germany, 1936.

This is a comparatively small text (137 pages) written in German. Although Mr. Wild has done much advanced research work on precious stones, the contents are of a comparatively elementary nature; reports of his more advanced work are, in fact, given more attention in Schlossmacher's revision of Bauer's *Edelsteinkunde*. However, this is not necessarily a bad feature of the book, for the author has purposely confined himself to a more general discussion of his subject, as the title would indicate.

Of particular interest are the descriptions of gem sources and the numerous sketch maps which illustrate them. Mr. Wild is a member of a firm of cutters who buy rough from all parts of the world; therefore, his reports of countries from which the material emanates are from personal experience and not copied, as are those of so many authors, from the work of other authorities.

The text is well organized, and the order in which subjects are presented is commendable; this is a problem which vexes a gemological author even more than the writer of a text on mineralogy or geology. Four excellent color plates are included in the book.

Mr. Wild's firm, located in Idar-Oberstein, fashions stones largely from the varieties of the quartz family, and the text gives much more space to quartz than to any other gem, even diamond. Unfortunately, no index is included; this is a very real need to the English reader, especially.

De Edelsteen (Precious Stones), by Dr. A. Willemse. C. van Hoof, Ekeren, Holland, 1936.

If this book were written in English, or indeed in German or French, it could be considered an extremely valuable addition to our gemological literature. Unfortunately, very few students in this country have any knowledge of Dutch. *De Edelsteen* presents its subject upon the basis of identification of unknown stones. All colorless stones are discussed under one heading, all red stones under another heading, etc. Practical and simple tests are suggested for distinguishing the gems of each color from one another. This, of course, would cause a beginning student much trouble, for the gems of a given species are not described together, but scattered among the different colors in which the species may occur.

Of further interest is the fact that Dr. Willemse has adopted and used exclusively the standard gemological nomenclature of the B.I.B.O.A.*; so far as we know, he is the first author of a gemological text to do so. Another unusual feature of the book are the numerous freehand sketches, which give the reader somewhat the impression that he is receiving a personal lecture from the author.

*See *Gems & Gemology*, July-August, 1935, pp. 293-294.

SELECTED BIBLIOGRAPHY

(Continued from last issue)

- Epiphanius
De duodecim Gemmis in veste Aaronia. (Gr. Lat. cum corollarie.) Tig. (Turin). 1565.
- Eppler, Dr. A.
Die Schmuck und Edelsteine. Felix Kraus-Stuttgart. 1912.
- Eppler, W. Fr.
Edelsteine und Schmucksteine. Wilhelm Diebener. Leipzig. 1934.
A revision, with many additions, of the above. Contains much excellent technical data.
- Evans, Joan and Serjiantson, M.S.
Magical jewels of the Middle Ages and the Renaissance, particularly in England. Oxford Clarendon Press. 1922.
- Evans, Joan and Serjiantson, M.S.
English Mediaeval lapidaries. London Pub., for Early English Text Society by H. Milford. Oxford University Press. 1933.
Includes material on: A. The Old English lapidary; B. The London lapidary of King Philip; C. The North Midland lapidary of King Philip; D. The Ashmole lapidary; E. E. Richardounes' Verses; F. The Peterborough lapidary. The Sloane lapidary. Notes: Lists of Stones. Glossary.
- Farrington, Oliver Cummings
Gems and Gem minerals. Chicago. Mumford. 1903.
- Ferguson, A. M.
All about gems and pearls in Ceylon and S. India. Colombo. 1888.
- Ferguson, J. C.
Diamonds and other gems. Los Angeles n. d. c. 1927.
- Fernie, Wm. T.
Precious stones for curative wear and other remedial uses, likewise the nobler metals. Bristol. J. Wright & Co. 1907.
- Fersman, A. E.
Precious and coloured stones of Russia (in Russian). 1922.
Russia's Treasure of diamonds and precious stones. 4 vols. Moscow. Peoples Commissariat of finance. 1925-6.
A magnificent work written and edited from a purely scientific and historical point of view by Prof. A. E. Fersman and a group of internationally known experts in precious stones and jewelry. Superbly illustrated.
Gems and precious stones in the Soviet Republic (Die Schmuck und Edelsteine der Dowjetrepubliken). Zeit, fur Praktische Geologie. v. 37, No. 12. Dec. 1929. pp. 202-216.
- Feuchtwanger, Lewis
Treatise on gems in reference to their practical and scientific value. New York. 1838. Popular treatise on gems in reference to their scientific value; a guide for the teacher, etc. New York. 1859.
- Ficorini, F.
Gemmae antiquae adnot. N. Galeotti. Romae (Rome). 1757.
- Pinot, L.
Les Lapidaires Indiens. Paris, 1896. Contains eight different Sanskrit books of the art of the Indian lapidary, two of which are translated. The gems are described with reference as to origin, their value as charms, and also as to their occurrence, colour, class, and value.

(To be continued)

Notes on Diamond Grading*

During the past several months a considerable amount of research on methods and instruments for diamond grading has been conducted in the laboratory of the Gemological Institute. As a result of this research at least one new diamond-grading instrument will be announced to the trade during the coming year. Also as a direct result of the experiments a number of methods of procedure which greatly facilitate diamond grading have been discovered, and these are briefly outlined here for the benefit of jewelers and readers of *Gems & Gemology*.

Observation for Imperfections

In observing for imperfections it is common practice to observe the stone with diffused transmitted light, i.e., light immediately behind the stone and coming through the gem to the observer. While this method is satisfactory for observation of such dark-colored inclusions as patches of black carbon, etc., it is not at all satisfactory for viewing transparent inclusions such as included crystals (which are frequently referred to as "bubbles"). For the observation of the latter, it is better to throw a fairly strong light through the side of the stone while observation is made from above; that is, with the light entering the stone coming at right angles to the direction along which observation is made.

For either type of observation (by "right-angle" light or by transmitted light) the character of the light source plays an important part. When a transmitted light is desired,

it is essential first of all that it be strong enough to permit close observation; but it must be so diffused that it does not confuse observation by giving bright reflections from inside the stone. While a good north light is ideal for this purpose, so far as transmitted illumination goes, the necessity of holding the stone high and tilting the head back to observe up toward the sky makes a very awkward position and one which is unsatisfactory if a number of stones must be graded; the common practice of reflecting skylight from a diamond paper held beneath the stone furnishes a more comfortable working position. It is very much better to arrange, if possible, an artificial source of illumination which can be placed at about table level.

For the "right-angle" illumination no type of natural light other than early morning or late afternoon sunlight is really practical. However, an ordinary gooseneck desk lamp with a 60-watt bulb has proven partially satisfactory. The stone to be observed is held just below and just outside the reflector, in such a position that the direct rays from the lamp strike the stone. Observation is then made from a position above and to one side of the reflector, thus shielding the observer's eye from any direct light from the lamp. When a diamond is observed in light of this character, colorless inclusions, instead of being unobservable or at best appearing as faint dark spots as they do in transmitted light, show up as very bright points in the stone and therefore they are much more

*A.G.S. Research Service.

readily located. The laboratory experiments indicate that the ideal system for grading imperfections is to use both types of light in grading every stone, and a grading instrument incorporating them is being developed.

Judgment of Color

Preliminary research shows that the greatest single handicap in accurate color grading is the difficulty of securing a light absolutely free from colored reflections from adjacent objects. In order to overcome this difficulty, the entire laboratory of the Gemological Institute was painted in neutral tones of black and gray, but it was found that even this expedient did not suffice, for the reflections of yellowish-colored buildings over 100 feet away threw very confusing color reflections into the stones. It was found that a cubical box made of translucent, dead-white paper, open on one side for observation, furnished a much more satisfactory locale for judging colors.

The use of a standard artificial light for illumination in place of daylight—which was found to vary greatly at different hours of the day and at different seasons of the year—added another factor of control. Contrary to opinions which have often been voiced in the trade, the use of the artificial light did not cause any particular deviation in the color grading from that which was made under natural light.

Premiers

Apparently one color grade of diamond which is often overlooked by the American trade is the Premier. This stone shows a slightly yellow light or in daylight transmitted

to strong yellow body color when observed in transmitted artificial through glass. When observed in unobstructed, reflected daylight its yellowish cast disappears and sometimes, in fact, is replaced by a definitely bluish or whitish hue. As a Premier is neither as valuable as the bluish or whitish cast in daylight would indicate, nor as low in value as the yellowish body color would otherwise decree, it is necessary that it be graded entirely upon its own merits, which, of course, is impossible if a Premier is not recognized as such.

A very simple method of detecting a Premier was found to be by observing first in unfiltered daylight such as comes through an unscreened open window (not recommended in winter time) following with the closing of the window or placing a sheet of window glass between the stone and the light source. With several of the Premiers used in making the experiments, a very pronounced change of color was noticed as the stone was alternated between these two light conditions. However, an even more satisfactory method of recognizing a Premier was found to be to use the simple argon bulb which has previously been described in this journal.* By using an illuminating box which can be lighted alternating by a single strong artificial light and a bank of about four argon bulbs, this difference in color can be shown even more strongly. Such a feature will be incorporated in grading equipment now being prepared.

**Sources of Ultra-Violet Light*, Richard L. Barrett, Spring, 1936; also *The Jeweler's Fluorescent Display*, Clayton G. Allbery, Spring, 1936.

A GEMOLOGICAL ENCYCLOPEDIA

(Continued from last issue)

by

HENRY E. BRIGGS, Ph.D.

CUTTING OF GEMS

In this chapter we will consider the various cuts which are used in preparing gem stones to show their greatest beauty. Also a brief synopsis of the processes used. We shall not deal with this subject from the standpoint of a lapidary, for our limited space will not permit discussing this voluminous subject.

In the very early ages before man had advanced to a stage where he was able to work hard materials, shiny and beautifully-colored stones were attached to bits of hide and worn as gems of adornment. The constant abrasion of wear caused the softer ones to become smooth and consequently more beautiful. It was then that it dawned upon man that gems could be beautified perhaps by a mere continued rubbing with earth or sand. Thus was the start of this aged art, which is so mingled with mystery and romance.

Man at first was, of course, only able to crudely smooth the stones, and even then perhaps only the softer ones. Later they were more perfectly done and the element of symmetry was taken in and the stones were definitely shaped. Cabochons were without doubt the first form of gem cutting. They are still used today, and in several styles. The ordinary cabochon is merely a stone of almost any shape with a flat bottom and an oval top. No set curvature is used and this matter is left to the good judgment of the lapidary. The double cabochon is merely the same thing as the ordinary cabochon except that the underside, too, is a curved or convex surface. Usually the lower surface is of a longer radius of curvature than the upper. The high cabochon is one which is unusually high and usually the lower surfaces of these are at least slightly convex. The hollow cabochon is merely a single or common cabochon with the underside cut concave. This type of cut is best for stones showing opalescence, chatoyancy or asterism. Or for stones which are opaque and where the color is depended on for the charm. Opals are cut en cabochon, for in this style of cutting they show their color play to best advantage.

Engraving upon gem stones was practiced at a very early date. Many specimens preserved in collections today are known to date back thousands of years. Today the art of gem engraving is very highly developed. Cameos and intaglios are cut so accurately that the faces can be easily recognized. The cutting is done in America with a small lathe fitted with a suitable cutter. But in some foreign countries the cutting is still done with merely a hand tool. The symmetry of the figure is entirely determined by the eye. Consequently it requires great skill to produce fine work in this line.

Cameos are engraved stones where the figures are raised in relief and where the backgrounds are either flat or very slightly oval. Intaglios are engraved stones where the figures are engraved or sunk into the stone, the surface being flat or nearly so. Cuvettes are similar to cameos except that the background is slightly concave in the cuvette instead of being flat or slightly oval as in the cameo.

Boring in gems, too, is a very old art, dating before Christ. Nevertheless, it is an art which requires a great deal of skill. The operation is done with a drill of metal charged with abrasive or with a metal drill set with a hard stone such as topaz, corundum or diamond. Usually the latter. The stones are cemented to a frame or holder and the drilling is usually done by hand, although the author is at this time using a machine for this purpose in his lapidary shop.

Faceted gems will perhaps be considered of more importance, and we will endeavor to deal with them a little more lengthily. Faceting is usually stated to have been discovered about the middle of the latter part of the fifteenth century. However, it is a proven fact that gems were faceted long before that date. The table and rose cuts are among the oldest known. The table being used extensively for diamonds and later the rose cut also. The table cut at first consisted of an octahedron with two opposite points cut down, making a table and a culet. The rose cut consists of a flat base with an oval top which is cut into triangular facets varying in number from twelve to thirty-two, or even more in the cases of very large stones. The rose cut is now practically a thing of the past. Being used today only on a few small stones.

The brilliant cut, so extensively used today, was introduced during the seventeenth century. This cut consists of thirty-three facets above the girdle (including the table) and twenty-five facets below the girdle (including the culet). The angle of the facets in any gem should depend upon the refraction and optical nature of the gem in question. However, it is a fact that most of the foreign cut gems are cut without much respect to their optical characteristics. The bulk of the American cut gems will be found much superior to the foreign in this respect. The standard brilliant cut consists of eight bezel facets, eight top corner facets, one table and sixteen skill facets above the girdle. Below the girdle it has eight pavilion facets, one culet and sixteen skew facets. It is impossible here to go into the matter of the dimension of brilliants as this will necessarily vary with the various gems. However, we will note a few important points with regard to the angles of the various facets with relation to each other. In gems where the refractive index is intermediate or low, the gem should be cut with a high crown and a shallow pavilion or comparatively shallow. This, of course, will have to be governed also by the depth of color, etc. Should the gem possess weak dispersion, then the angles between the different set of crown facets should be as great as is practically possible. The lower the refractive index and dispersion of a gem, the wider the table should be.

(To be continued)