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On the Cover

Portrait sculptures of welded platinum, each capped with a 22-carat star sapphire and used as cufflinks. Actual height approximately 5/8 inch. Made by Leslie Branson, C.G.

GEMS & GEMOLOGY is the quarterly journal of the Gemological Institute of America, an educational institution originated by jewelers for jewelers. 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 authors and not of the publishers. Subscription price $3.50 each four issues. Copyright 1959 by Gemological Institute of America, 11940 San Vicente Boulevard, Los Angeles 49, California, U.S.A.

Idar-Oberstein Today

by

CHARLES L. WELLS, JR., C.G.

A short ride on the "Paris Express" from Frankfurt takes one through the picturesque vineyards and quaint villages of the Rhineland-Pfalz area of Germany and into the Nahe River valley and the twin towns of Idar and Oberstein. Since the fifteenth century, these small towns have made a constant contribution to the jewelry industry in the form of beautifully carved agate figures and *objets d'art,* exquisitely executed cameos in stone and shell, and beautifully cut gemstones. Luckily, the area did not suffer the worst ravages of the war, even though it did suffer in an economic sense. Today, after a remarkable short period of recuperation, it is again one of the most important gem centers of the world.

Due to intense NATO troop concentration nearby, we felt very fortunate to secure lodging in the small hotel "Pfalzerhof," near the railroad station. It was interesting to learn that this twenty-room establishment has housed gem dealers from nearly every country in the world!

A twenty-minute bus ride took us from the "Pfalzerhof," in Oberstein, to the village of Idar, where the "Gewerbehalle," or Industry Hall, is located. On the second floor of this old brick building we were pleasantly greeted by a gentleman who introduced himself as Professor Schlossmacher, the Director of the "Institut fur Edelsteinforschugn" —the Gemological Institute. After an informal discussion in his small, book-filled office, he took us into his laboratory, where two students were completing their examinations. Cases filled with such instruments as balances, spectroscopes, microscopes and refractometers lined two walls. He explained that one of the most frequently used instruments was a horizontal microscope

The only modern equipment in the shop is this electrically driven slabbing saw.

that occupied a small table on one side of the laboratory. It is of Professor Schlossmacher's own design, incorporating a Leitz monocular tube on a specially constructed and fully adjustable base. The immersion cell is rectangular, with optically flat sides and a horizontal adjustment. The stoneholder is on top and it is also fully adjustable. Light sources may be varied for dark- or light-field illumination, and a spectroscope can be fitted easily to the eyepiece of the instrument. In discussing the other instruments, the Professor revealed that there was only one that was a "dust-catcher" — the pearl endoscope. A modern X-ray apparatus not unlike that of the Gem Trade Laboratory in New York has made the old French instrument obsolete. A small sign, prominently displayed, reveals that the Institute has received aid from the Marshall Plan.

Returning to his office, we noticed the rather complete library of books and periodicals. The well-worn copies of GEMS & GEMOLOGY were indeed an unspoken compliment to the GIA's publication.

The Gewerbehalle also houses a comprehensive display of rough and cut gemstones, but unfortunately it was temporarily closed. Upon Professor Schlossmacher's advice, we accepted an

Agate cutter lying on his chest while shaping a quartz crystal-lined stone for an ashtray. The enormous wheel is made of sandstone and is turned solely by water power.

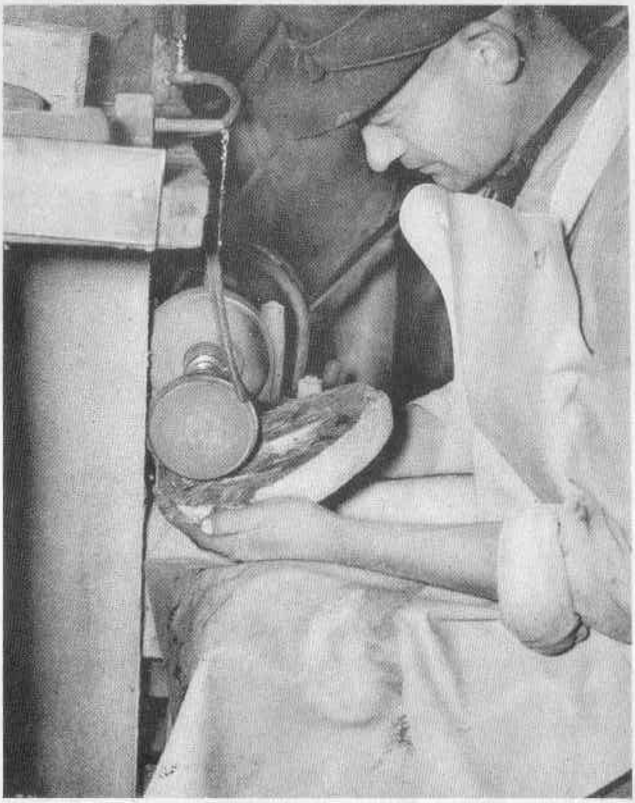
invitation to visit the lapidary of the firm, Gebruder Leyser, whose collection of fine gem specimens is actually more complete than the Gewerbehalle display. At the Leyser establishment we were graciously welcomed by Herr Leyser and his son, who showed us a magnificent collection of colored gems that included the most magnificent aquamarine we have ever seen. It was of the finest quality, and its 29 carats were priced at $30 per carat! Their collection also included several red spinels of exceptional quality. Herr Leyser lamented the fact that, despite their beauty, there is practically no demand for spinel even in Europe, where colored stones are in greater demand than diamonds! After inspecting several other unusual and beautiful pieces, including aquamarine-bead necklaces and polished amethyst-geode ashtrays, we were guided through a modern and efficient lapidary shop. Here operations are efficiently organized in much the same way as the better diamond-cutting shops of New York. Each man is a specialist in his own job — the sawyers, blockers, polishers, and even the "dop lady"!

Another short bus ride took us from the Leyser establishment to the southernmost part of the village of Idar, where the only water-powered lapidary

Polishing an agate ashtray on a large felt-covered wooden drum. Turned by water power.

is still in operation after 300 years. Owned by the Heinz brothers, descendants of the original owners, it is under government protection as a spot of historical interest. Here agate and crystal ornaments and ash trays are patiently formed by methods that have almost altogether resisted the changes of progress. The entire shop is powered by water, with the sole exception of an electrically operated slabbing saw! Today, the principal products of this shop include agate ash trays, cigarette boxes, faceted citrine and amethyst stones for the restoration of church relics damaged in the war, and duplication of broken agate and crystal objects.

Well over 30% of the population is engaged in the gem and jewelry business. The telephone book lists no less than 200 cutters of colored stones, 35 gem-engravers and cameo-cutters, 30 agate-cutters, 75 diamond-cutters, 6 diamond-sawyers, 15 producers of instrument jewels and 7 producers of industrial diamond tools. The names of Leyser, Klein, Wild, Becker, Heinz and others, whose families have been gem-cutters in Idar for hundreds of years, predominate. In addition, there are 90 firms importing rough and exporting finished gems, and over 100 jewelry manufacturers! This does not include the scores of home workshops where



Polishing the inside of an agate ashtray with a water-powered, hard-felt buff. Green rouge is the polishing agent.

the local farmers spend their winter months, or the employees of the lapidaries. It was estimated that at least 20% of the cutting establishments maintain buyers of rough in Brazil and other gem-producing areas of the world!

Unfortunately, the problem of trained employees is great. Herr Leyser and Herr Heinz mourned the fact that the young men of the area have little interest in the craft, and Professor Schlossmacher lamented the fact that there are less than 150 jewelers in Germany who have passed the examination for their equivalent of Registered Jeweler. However, we feel that these problems can hardly destroy an industry that has prevailed for over 600 years.

Highlights at the GEM TRADE LAB in Los Angeles

by

Lester B. Benson, Jr.

This past month we had the opportunity to confirm the identification of two beautiful alexandrites. One was a 45-carat slightly oval stone with a fair color change. It is among the larger alexandrites known. (One, a 50-carat stone, is owned by Avvocato & Tuch, Inc., New York City.) The second one weighed approximately 12 carats and displayed an exceptionally fine color change.

* * *

A rather large antique pin and matching ring contained a large number of small, colorless rose-cut stones that had been purchased as diamonds but were later identified by various jewelers as diamonds, colorless sapphires, rock crystal, etc. The stones were too well protected by the prongs of the setting to check the refractive index; however, strong doubling of inclusions and of blemishes on the base of the stones typical of zircon was visible under 30x. In addition, two of the large stones were very light brown and displayed an absorption spectrum that was weak, but nevertheless typical of zircon.

* * *

A West Coast dealer submitted several dozen assorted pieces of jadeite, some of which were of very fine color, to have them tested for dye. All of the stones proved to be of natural color. This is the first large quantity of imported naturally colored jadeite we have tested for some time. The majority of stones tested recently have been dyed.

* * *

One of the finest emeralds we have seen in years came in for checking to determine natural or synthetic origin.

Metallic crystals on the surface of synthetic emeralds.

GIA Photo

Inclusions of metallic crystals in synthetic emeralds.

GIA Photo

The 12.65-carat stone was almost flawless and of magnificent color. Tests proved natural origin.

* * *

The caution required in testing emeralds is borne out by several stones tested recently. Contrary to some impressions, a single test will rarely distinguish between synthetic or natural emerald. Five large, natural stones of medium dark green all displayed a distinct red fluorescence. Only when placed next to a synthetic is the difference in color and intensity obvious. Contrary to some recent advertisements featuring the use of the emerald filter as a positive method of distinguishing between synthetic and naturals, the appearance of these materials through the filter can overlap. Included crystals, two-phase inclusions and metallic crystals may also be encountered in both materials. White metallic crystals were evident in several clusters of synthetic emerald crystals examined recently. Except for color these crystals are not unlike the pyrite crystals found in many Colombian stones. They were seen both within the crystals and against the surface of some of the crystal faces. Therefore, a combination of R.I., birefringence, fluorescence and, if possible, S.G. should be determined for accurate testing.

* * *

An interesting yellow 1.69-carat step-cut stone thought by its owner to be the rarely fashioned mineral chondrodite proved to be willemite, also

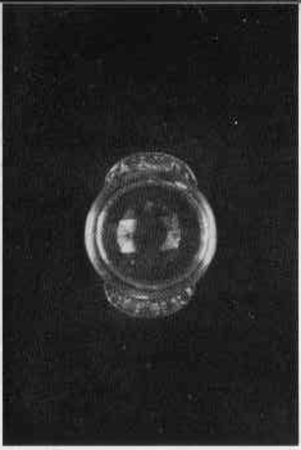


Figure 1
The mounting without rose-cut diamond. Completely closed foilbacked base with facets exactly like top portion of the rose-cut diamond.

Figure 2
Rose-cut diamond set in mounting but *not* oriented properly. When oriented properly, the stone displays exceptional brilliancy and dispersion.

very unusual as a fashioned gemstone.

* * *

GIA graduate Dave Dubinsky, Los Angeles, submitted the photograph and description of an interesting rose-cut diamond. The stone is approximately 1⅓ mm. thick and 13½ mm. in diameter. It was submitted for an appraisal but the exceptional brilliancy and dispersion, plus a closed back in the setting, aroused suspicion. With the approval of the customer, the stone was removed. The base of the setting was concave and held a metal foil insert that was exactly the same shape as the top of the rose cut but inverted in the setting (See Figure 1). It had probably been formed on the diamond originally. Replacing the foil and the diamond required accurate orientation of the two in order to achieve a maximum effect (See Figure 2).

* * *

A recent newspaper article stated that yellow diamonds were now being treated by the Brookhaven National Laboratory to remove the color from the stones. An inquiry to the Laboratory resulted in the following reply:

Dear Sir:

The newspaper article enclosed with your letter of March 20th was in error. In an effort to correct the situation, we have issued the attached notice which should serve to answer your questions.

(attached notice)

NEUTRON IRRADIATION SERVICES

The Brookhaven Graphite Research Reactor is owned by the United States Atomic Energy Commission and is used primarily for basic research. Where there is no interference with the research programs, this reactor is also used for limited radioisotope production and irradiation services. Under this latter service, a wide variety of materials have been irradiated for industrial and scientific testing. Among these many materials there have been a few diamonds.

Brookhaven will perform an irradiation

service upon receipt of a purchase order on Form AEC-391, specifying the neutron flux level and length of irradiation desired. Since the final results are dependent upon the initial condition of the materials, the irradiation conditions (time, dose and temperature) must be specified by the customer. In accordance with the terms and conditions on the required purchase order form, neither the Government, the Commission, nor persons acting on behalf of the Commission makes any warranty or other representation, express or implied, that material (s) accepted for service irradiation will not be destroyed, damaged, lost or otherwise altered in physical or chemical properties in the process of irradiation.

Since we are unable to give advice as to the irradiation requirements, our customers are generally of a professional level and have an understanding of the nuclear processes involved. In the case of diamond irradiations, we have been informed by Gem Irradiations Laboratories, Inc. and Mr. Mathew Garte, both in New York City, that they are interested in acting as consultants and in handling gem irradiations. There may be others offering similar services as well as other nuclear reactors performing similar irradiations.

Diamonds subjected to neutron irradiation usually have a green color added throughout the stone. The longer the irradiation, the darker the stone, and prolonged irradiation will make the stone appear black. We do not know of any circumstances under which coloring is removed by irradiation. Any yellow or brown color present before irradiation is added to the green altering the final color accordingly. It is a matter of taste as to whether the final color is more desirable than the original color.

On February 10, 1956, the Federal Trade Commission published "Trade Practice Rules for the Diamond Industry," Rule 5 (b) states "It is an unfair trade practice to advertise, offer for sale, or sell any diamond which has been artificially colored or tinted by coating, irradiating, or heating, or by use of nuclear bombardment, or by any other means, without disclosure of such fact to purchasers . . . , or without disclosure that such artificial coloring or tinting is not permanent if such is the fact."

All material subjected to neutron irradiation becomes radioactive to some extent. Such radioactive materials may not be transferred to or possessed by anyone in the United States unless that person has a specific license from the U. S. Atomic Energy Commission. In the case of diamonds, the induced radioactivity is generally short-lived and gone after a week or so. At that time, the stone may be returned without a license. For this reason, diamonds to be irradiated must be removed from their mountings. Most other gemstones remain radioactive and may not be returned without license.

To summarize, the Laboratory merely performs an irradiation service; the details of the irradiation must be specified. We cannot, in good conscience, accept for irradiation gemstones from the general public, as the specifications of the irradiation parameters requires wide experience. Without this experience the results of the irradiations are unpredictable.

* * *

Another reminder concerning master diamonds. Much time and expense of preparing and sending stones for grading can be saved if the stones are carefully checked prior to sending them in to the Lab for grading. Stones should not consist of mixed hues in gray, brown, orange, etc., but should represent a range from colorless through slight nuances of yellow only. Proportions and size should be as similar as possible, and fluorescent stones should not be included.

(continued on page 286)

Highlights
at the
GEM TRADE LAB
in New York

by

G. Robert Crowningshield

New colors in treated diamonds are continuing to appear in the trade. We examined a paper of red diamonds ranging from about 20 points to several carats in size. They were about the color of pyrope garnet in reflected light. In transmitted light they appeared an intense red. Spectroscopic analysis showed the 5920 Å band, characteristic of yellow treated diamonds. There are also several new hues in the blue-green available. One stone was of a medium tone and intense blue in transmitted light, whereas another was a blue-green of deep intensity. In the spectroscope, both of these stones showed a strong 4800 Å line and a weaker one at 4900 Å, fading out at about 5100 Å.

* * *

An orange-brown diamond, which showed no evidence of treatment in the spectroscope, displayed intense red fluorescence under short-wave ultraviolet, but there was no fluorescence under long-wave ultraviolet. No phosphorescence was observed under either wavelength.

* * *

The number of yellow diamonds being tested by the Laboratory for treatment is increasing constantly. Over 50 stones of about one carat or larger have been submitted in the last few months and about two-thirds of these were treated.

* * *

Several diamond crystals were brought to us to observe for possible treatment. These stones had the normal 4180 Å band in the spectroscope, which is seen in a great deal of rough. However, they showed a halo effect just under the surface, resembling the scorching from a cigarette burn on a piece of cloth. We have not examined enough rough to know whether this is indicative of a particular locality, or to what it is related.

* * *

We have seen brown and yellow diamonds and some colorless stones that contained clouds of tiny needlelike inclusions. A casual remark about it to an importer brought the response that these stones were believed to have come from the Belgian Congo.

* * *

An antique pendant with nine "mirror-cut" diamonds came to the Lab for verification of identity. Seeing so many diamonds cut in this manner was unusual. It was formerly a way of using flat diamonds but they lacked aesthetic appeal, at least from the modern requirement for brilliancy.

* * *

Undoubtedly, a few strontium titanates have been sold as diamond. One rather poor example of cutting of this synthetic material came to our attention set in the form of a solitaire. The true nature of the material was quite obvious to the trained eye because of the exceedingly poor polish, and the dispersion was much higher than that expected from diamond.

* * *

In the past three months, the imitations of jade sent in for identification have included many types of materials; for example, aventurine quartz, calcite, dyed serpentine, smithsonite, glass, emerald, and, of course, dyed jadeite. In many instances these pieces were carved and mounted, making testing rather difficult.

* * *

A collection of bright-orange Mexican fire opals was the largest we have ever seen. It consisted of a rope, a bracelet and drop earrings, all embellished with ducut diamonds (Note: a ducut is a one-facet stone made by grinding off and polishing one point of a very small and highly lustrous octahedron.) Since it was not of modern design, the collection will undoubtedly be broken up. Another collection of opal was a necklace of beads with blue and purple play of color. The beads had the appearance of fine labradorite and the owner was doubtful of their identity.

* * *

Turquois and its substitutes continue to cause more grief to both buyer and seller than any other gem in the trade. Practically all of the turquois coming to the Lab for identification shows evidence of some kind of treatment. For example, we very frequently receive pieces of material that show the normal absorption bands for turquois in the spectroscope but that has too high a luster and is waxy when peeled around the drill hole in a bead. A turquois imitation recently examined consisted of a breccia-type mass, that was colored to resemble turquois. Another substitute had a granular structure that did not permit the dye to penetrate more than a short distance below the surface. It has been necessary to resort to chemical analyses, X-ray diffraction and thin-section examination in order to furnish an identification of some of these substitutes.

* * *

It has been called to our attention that one- to 20-carat synthetic sapphires are being advertised as true synthetic diamonds. We wish to reiterate that synthetic diamonds are not being made in gem quality. A request by the *Jewelers' Vigilance Committee* to an advertiser in the *New York Times* was acted upon by the advertiser, but their true nature was never revealed. The next Sunday's issue described the stones as diamond imitations rather than synthetic sapphires.

* * *

An unusual brown tourmaline showed subdued fluorescence under short-wave ultraviolet light. This is not a characteristic usually associated with brown tourmaline.

* * *

A "blue sapphire" purchased in Mexico for $800 as a natural stone and a phenomenal bargain proved to be an attractive piece of glass. It is amazing how many seemingly intelligent, successful businessmen and other travelers buy "bargains" from peddlers in foreign countries. If they are convinced that prices are lower outside of the U. S., one would at least expect from them sufficient caution to make their purchases from reputable merchants.

* * *

Frequently, a piece of jewelry containing several stones that appear to be of the same kind is submitted with instructions for testing only one of the stones (apparently because of the expense involved in testing each one). However, an example of why it is often important to test more than one stone in a multistone piece of jewelry was impressed upon us recently by a ring containing more than a dozen stones. Although the stones were the same color, they proved to be an assortment of about one-half glass and one-half natural emeralds. Such matching could only have been accomplished by very careful selection.

* * *

Perhaps the most unique use of demantoid garnets we have seen was in a cigarette case with about 16 matched baguette-cut stones.

* * *

What was believed to be a treasure or jewel chest that belonged to Louis XIV was brought in for examination of the stones decorating the chest. They all proved to be glass, set in the silver foil that covered the box with a pictorial story of the highlights in the life of Louis XIV.

* * *

Among our pearl identifications, a pair of pear-shaped drop earrings proved to be one cultured and one natural — truly a remarkable match to the eye.

* * *

We are indebted to the **Commercial Gem Company**, New York City, for a yellow cat's-eye triplet composed of two layers of yellow synthetic sapphire and a center section of a fibrous mineral.

(continued on page 286)

Formations of Minerals
Physical Properties

by

RICHARD JAHNS, PH.D.
Professor of Geology
California Institute of Technology

This is a continuation of the article by Professor Richard Jahns on the structure of matter, the nature of crystals, formations of minerals and their physical properties that began in the Spring 1958 issue of GEMS & GEMOLOGY.

Zoning and Inclusions

The growth of natural crystals rarely is a uniform process, and variations in the conditions of growth are reflected by variations in properties within individual crystals of many minerals. *Zonal structure,* or *zoning,* within a crystal generally appears as a series of concentric layers, complete or incomplete, that differ from one another in chemical composition. Such zones can be readily distinguished under the polarizing microscope, and also can be recognized because they differ from adjoining zones in color, transparency, in the number and arrangement of included materials, and in the rate of decomposition where exposed to weathering at or near the earth's surface.

Zonal structure is especially widespread in the feldspars, micas, pyroxenes and other common rock-forming minerals. It is very useful to the mineralogist, since most zoning is due to changes in composition of the fluid from which the crystal grew; thus it can give a clue to the conditions existing when the crystal was formed. It also is useful to the gemologist, since it provides a means for determining the crystallographic orientation of many stones. Further, it is a real aid in the identification of minerals such as corundum, garnet and tourmaline, and even can be used in certain instances to distinguish natural from synthetic material.

Another type of zoning involves the over-growth, or mantling, of one mineral by another. The two minerals commonly have similar crystal structure, chemical composition, or both these features. A third type, best observed in transparent minerals, results from pauses during growth of the crystals. If, during one or more of these pauses, small amounts of another material are deposited on the surface of a given crystal before it resumes its growth, a so-called phantom crystal, comprising internal faces that are marked by thin layers of impurities, is the ultimate result. Quartz, feldspars and garnet commonly form crystals of this type.

Nearly all minerals contain *inclusions*. Some inclusions are small crystals or crystal aggregates of other minerals, but inclusions of gases and liquids also are widespread. Some of the inclusions represent material that was entrapped during growth of the crystal; others were formed by exsolution (i.e., by precipitation from solid solution in the host crystal); and still others represent material that was introduced from outside the crystal. Many of them are visible under the hand lens, or even with the unaided eye.

Numerous different minerals form inclusions in larger crystals of other minerals, and there are wide variations in the size and shape of these inclusions. Some are scattered irregularly throughout the host crystal, and others are concentrated in certain parts of the crystal or in rudely concentric layers. The individual inclusions in some occurrences are oriented consistently within the host crystal, as in minerals that show asterism, whereas others show no recognizable orientation.

Twinning

Where two or more crystals of a given mineral have grown together according to a definite geometric pattern, they are said to be in *regular intergrowth;* if they share the same lattice directions but are nonetheless recognizable as distinct individuals, they are said to show *parallel growth*. Certain parts of some crystals are in reverse positions with respect to each other (or alternately with respect to one another, where more than two parts are involved), and such crystals are said to be *twinned*. Thus, two adjacent parts of a crystal twin might have an arrangement such as would result if one part were rotated 180° around some axis while the other part remained steadfast. In general, a twinned crystal grows as such from the beginning, and hence this mechanical motion does not actually take place; however, the relation of the two parts is the same as if it did, so that it represents a convenient means for describing the geometry of the twinned crystal.

The *twinning axis* is the axis around which the revolution could have taken place, and the *composition surface* (or *composition plane*, if this surface is planar) is the surface along which the two components of the twin are united. It must be borne in mind that both crystal axes and twin axes are *directions* rather than fixed lines. A plane to which the two individuals of twinned crystal are symmetrical, and across which they are mirror images, is defined as a *twinning plane*. In most instances such a crystal also grew as a twin from the beginning, and its derivation by reflection across a plane is solely a convenient means for representing its geometric form. Similarly some twinned crystals can be considered as products of both rotation and reflection, acting simultaneously.

Some twinned crystals consist of two interpenetrated parts (e.g., orthoclase, zircon), others comprise several individuals (chrysoberyl, fluorite), and still others consist of numerous repeated tablets, or *lamellae* (albite, corundum, spodumene). Much twinning cannot be distinguished megascopically, but nearly all types are clearly recognizable under the polarizing microscope.

Cleavage

The ability of a crystal to break or split along definite atomic (or ionic) layers is termed *cleavage*. Thus graphite and muscovite can be split very easily along a single direction of cleavage into thin, parallel-faced plates, and halite can be separated into blocks whose faces meet at right angles. This ability is present to different degrees in different minerals, and in a large number of them it cannot be recognized by even the most careful examination. For all practical purposes, such minerals are said to possess no cleavage. On the other hand, many minerals do exhibit this property, which is geometrically constant for each species and hence is very useful in mineral identification.

As with crystal faces, cleavage is a directional feature that is a function of the internal structure of the crystal. More specifically, it is a function both of the arrangement of the constituent atoms or ions and of the manner in which they are bonded or held together. Each plane of cleavage is parallel to a crystal face or to a possible crystal face, although not all crystal faces represent planes of cleavage. This is because cleavage occurs only along planes where separation can best be accomplished, or along which bonds between atoms and atom groups can be broken with relative ease. Theoretically, separation along planes of cleavage can be made on any scale, down to the limiting condition under which the planes bound a part of the crystal lattice that cannot be split further into identical portions. A noncrystalline substance necessarily can show no true cleavage.

Cleavage in a given mineral can be defined according to (a) the number of directions that are present, (b) the orientation of the cleavage plane or planes with respect to the crystal lattice, (c) the smoothness, or perfection, of each cleavage plane, and (d) the relative ease with which the mineral can be broken along each plane.

The number of different directions of cleavage in a mineral ordinarily is one, two, three, four or six. Halite has three directions of cleavage; these are parallel to the faces of a cube, and hence this mineral is said to have cubic cleavage. Diamond has four cleavage directions that are parallel to the faces of a regular octahedron. Comparison of the cleavage directions with the crystal structure of these minerals *(Figures 3 and 10 in the Spring 1958 issue and*

Figure 5 in the Summer 1958 issue) show why all directions of cleavage are equally well developed in each of them. There is no difference, from one cleavage direction to another in either of the minerals referred to, in the number or kind of bonds that must be broken to yield a unit area of new cleavage surface.

Other kinds of cleavage are defined geometrically by well-known crystallographic terms such as dodecahedral, rhombohedral, basal, prismatic and pyramidal. Where two or more different kinds of cleavage occur in the same mineral, these cleavage surfaces generally are not equally well developed.

A distinction must be made, in speaking of development of cleavage, between the *perfection* of the cleavage surfaces and the *ease* of cleavage, or *cleavability.* Perfection of cleavage refers to the flatness of the surface, and ordinarily is expressed in such terms as perfect, smooth, inferior, uneven, irregular, indistinct, interrupted and imperfect. Cleavability, in contrast, refers to the relative ease with which the cleavage surfaces are formed when the mineral is broken or split, and in ordinary work it is described as good, perfect, eminent, fair, poor, ready or difficult. Unfortunately, some overlap in terminology does exist, and it has caused confusion between the two different aspects of the property.

The effect of crystal structure on the perfection and ease of cleavage is well illustrated by the carbon minerals diamond and graphite. The atoms in the diamond crystal *(Figure 10 in the Spring 1958 issue)* are very strongly bonded to one another and are arranged in a highly symmetrical structure. Layerlike concentrations of atoms in this structure are disposed parallel to the faces of a regular octahedron, and the cleavage of this mineral involves the breaking of bonds between adjacent layers. The cleavage is perfect because the layers are very regular in form and orientation, but it is a very difficult one because the interatomic bonding is so strong.

The graphite crystal, in contrast, comprises well-defined parallel sheets that are hexagonal networks of carbon atoms *(Figure 11 in Summer 1958 issue)*. Each layer is a gigantic molecule of closely spaced atoms, and is set at a relatively large distance from its neighboring layers. The flatness of these sheetlike molecules, and the weakness of the bonding between them, account for the ready and highly perfect basal cleavage of graphite.

The silicate minerals, with their much more complex internal structure, are not so easily shown in diagrams as are diamond and graphite, although the same general principles apply to interpretations of their cleavages. The great ease and perfection of the basal cleavage in muscovite, for example, can be understood from consideration of its major structural elements. This mineral consists of complex double sheets of linked silicon-oxygen tetrahedra. The two parts of each sheet-pair are firmly bonded with aluminum ions, and these in turn are attached to hydroxyl groups, or $(OH)^-$ ions. The double sheets themselves are bound together by potassium ions, but this binding is relatively weak; the structure can be likened to a stack of thin boards (the double sheets) that are held together by weak nails (the K^+ ions). Thus the crystal can be readily split into cleavage pieces whose smooth surfaces reflect the uniform outer surfaces of the double sheets.

The contrasting cleavages of the pyroxenes and amphiboles are shown diagramatically in *Figure 12* (this issue).

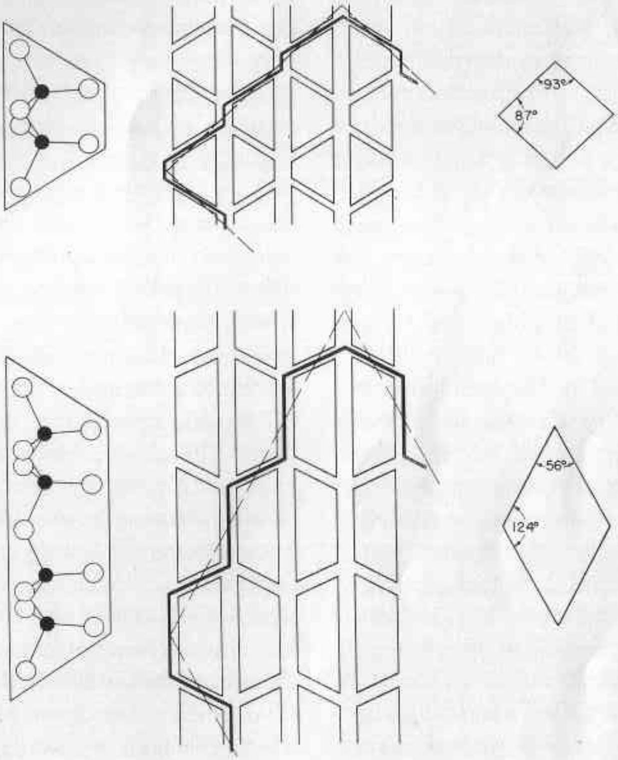


Figure 12

The cleavage of pyroxenes (above) and amphiboles (below). A single chain of SiO_4 groups, viewed end on, is shown at upper left, and a double chain at lower left. These chains are generalized as blocks, and the positioning of the blocks in the two types of structure is shown in center. The bonding within the chains is much stronger than the bonding that holds the chains together, so that cleavage occurs between chains and in directions that require breaking of the smallest number of bonds per unit area of cleavage surface. The cleavage thus shifts back and forth as shown by the heavy lines, but on such a small scale that the cleavage surfaces are smooth, even when viewed under the microscope. The general positions of cleavage surfaces are represented by the dashed lines in center views, and by solid lines at right.

After B. E. Warren

The cleavage in both these mineral groups is a function of the arrangement of the silicon-oxygen chains, since both types of crystal structure tend to break around, rather than through, the chains. In other words, it is much more difficult to break the bonds between silicon and oxygen bonds within the chains than to break the cation-oxygen bonds that hold the chains together. The cleavage therefore follows directions that involve breaking the smallest number of cation-oxygen bonds per unit area of newly formed cleavage surface.

It is not always easy to distinguish cleavage faces from crystal faces, particularly in megascopic work. Black tourmaline and hornblende, for example, commonly show similarly elongate crystal form. The hornblende has two directions of good cleavage that are parallel to the elongation of the crystal; the tourmaline has no cleavage, but its crystal faces commonly are so deeply grooved that they give a false impression of cleavage. It is well, therefore, to remember that crystal faces ordinarily appear on the outside of the crystal only (the chief exceptions are in the phantom crystals described earlier), whereas cleavage appears only on broken fragments. It also should be noted that the tendency to break along a given cleavage direction varies somewhat from specimen to specimen of the same mineral, especially if this direction is one of relatively poor cleavability.

The best evidence of cleavage is the presence of parallel planar flaws (incipient cleavage breaks) within an unbroken crystal, or parallel steps at different levels on the side of a broken crystal. Each step is separated from the next step by another cleavage plane with a different direction (calcite, feldspar), by a parting plane (corundum, muscovite), or by a fracture surface (graphite). These parallel steps give simultaneous reflections when held in proper orientation under a good source of light. In a few minerals not having cleavage, a similar effect is obtained from crystal faces that show parallel growth; nevertheless, the criterion of simultaneous reflection is the best available, and can be applied with confidence to broken surfaces of nearly all specimens examined.

If two directions of cleavage are present, the method of rotation is useful for determining the angle between them. The observer faces a source of light, and through preliminary turning of the specimen determines by the reflection technique the approximate orientations of the cleavages. He then rotates the specimen about a horizontal axis that is parallel to both cleavage directions, and estimates the angle of rotation between those positions in which reflections are obtained from the two sets of cleavage surfaces. The proper axis of rotation rarely is difficult to establish, since it lies parallel to the cracks that represent the trace of one set of cleavage breaks on the surfaces of other cleavage direction. These cracks are readily observed in most specimens, especially with the aid of a hand lens. The method of rotation is not at all difficult, even for material viewed under the polarizing microscope; if carefully used, it yields quick results that are accurate to within a few degrees.

Parting

Some minerals have parallel separation surfaces, other than those of cleavage, that are known as *parting*. These also have been termed pseudo-cleavage and secondary cleavage. Such surfaces commonly occur as the composition planes of multiple twins or along planes of weakness formed by appropriately oriented inclusions. Parting is well shown by many minerals. Corundum, for example, has four directions of parting corresponding to the base and to the three planes of the rhombohedron, magnetite has four directions of parting corresponding to the planes of the octahedron, some pyroxenes have a prominent parting parallel to the front pinacoid, and other pyroxenes have almost equally prominent parting parallel to the base. Muscovite has three directions of parting that intersect the basal cleavage plane at an angle of nearly 67°, and where all three sets are present, they commonly separate the cleavage sheets into triangular or hexagonal fragments.

Parting differs from cleavage in that the separation can take place only along specific planes, which generally are the composition planes of twinning, whereas cleavage can take place, theoretically at least, along *any* plane that is bounded by the appropriate groupings of atoms in the crystal structure.

Where parting planes are closely spaced, it may be difficult to distinguish this feature from true cleavage. Further, the parting in some minerals may be more prominent than cleavage; i.e., the crystals can be broken more easily along planes of parting than along cleavage planes. A good example is a variety of pyroxene called diallage, in which the front-pinacoidal parting is more prominent than the two directions of prismatic cleavage. The parting of much corundum also is more prominent than the cleavage of this mineral. It is well to remember, however, that parting is not necessarily developed in all specimens of a given mineral.

Fracture

When a mineral is broken in a direction that does not correspond to either cleavage or parting, the appearance of the broken surface may be of distinguishing value. Some compact and brittle substances, like quartz and glass, usually break along curved surfaces that are marked by subdued arcuate ridges, and they are said to be characterized by *conchoidal fracture*. Other types of fracture are described as even, smooth, uneven, rough, earthy, fibrous and splintery. If the fracture is extremely uneven, or jagged, it is termed *hackly*.

Fracture is of greatest diagnostic value in noncrystalline substances and in minerals without cleavage or parting. Good fracture surfaces are almost unobtainable in some minerals that have well-developed cleavage (e.g., halite, calcite, gypsum).

Hardness

Hardness is the ability of a mineral to resist scratching or rupture of the crystal structure on a small megascopic scale. Relative hardness can be determined by scratching one mineral with a sharp edge or corner of another, and the standard Mohs' scale of hardness, comprising ten common mineral species, was established in this simple manner *(Table III)*. In general, a given mineral will scratch all other minerals lower on this scale, and the ease with which one mineral scratches another serves as a rough measure of their relative hardness. In some instances, two minerals can scratch each other; this merely indicates that they are of nearly equal hardness.

Other objects of known hardness commonly are useful in making megascopic tests on minerals and rocks. These include the thumbnail (about 2½ on Mohs' scale for most persons), a copper penny (slightly greater than 3), a knife blade or steel nail (ordinarily tempered to points within the range of 5 to 5½), a glass plate (about 5½), and a steel file (about 6½).

The Mohs' scale of hardness is very useful for some work, but it is well to remember that the numbers indicate *rank* of hardness, rather than quantitative measures of this property. The difference in the hardness of corundum and diamond, for example, is greater than the difference between corundum and talc. Quantitative values for hardness have been variously obtained by scratching, grooving, boring, grinding and indenting substances under reproducible conditions, and three quantitative scales, with the hardness of topaz taken as 1000, are shown in *Table III*.

Inasmuch as hardness is in part a rough measure of bond strengths between atoms or ions in a given substance, it is not surprising that its value varies with direction in many crystals. As indicated by the ranges for several of the minerals on the Vickers and Knoop scales *(Table III)*, these variations can be moderately large. The greatest variation in a common mineral occurs in kyanite, whose typically bladelike crystals have a hardness on Mohs' scale of 4 to 5 when scratched parallel to their long dimension, but show values of 6 to 7 when scratched in a direction at right angles to this. In determining hardness by scratch methods, therefore, a mineral should be tested in several different directions. If variations are noted, the maximum value is taken as the hardness of the specimen. Other precautions to be observed in testing hardness are as follows:

1) Test only fresh, unaltered surfaces, so that a true value for the substance can be obtained.

2) Some granular minerals and mineral aggregates are torn apart, rather than scratched, when tested. Similarly, a few minerals tend to break up into tiny cleavage fragments to form a ragged groove that is not a true scratch. These situations can be recognized through care-

TABLE III

Comparison of Hardness Scales for Common Minerals

	Qualitative Scale		*Quantitative Scales (Hardness of Topaz is Taken as 1000)*	
Mineral	*Mohs' Scale*	*Jaggar Scale*	*Vickers Scale*	*Knoop Scale*
Diamond	10			6400 - 6800
Corundum	9	6580	1265 - 1650	1360 - 1760*
Topaz	8	1000	1000	1000
Quartz	7	265	669 - 765	533 - 720
Orthoclase	6	167	433	448
Apatite	5	8.1	400	288 - 394
Fluorite	4	4.9	106 - 121	111 - 131
Calcite	3	1.7	64 - 83	60 - 108
Gypsum	2	0.27	36	26 - 43
Talc	1	—	29	—

*Synthetic Corundum

ful examination under the hand lens.

3) A streak of powdered mineral left on the surface of a harder mineral can be mistaken for a scratch on the harder mineral. Such a streak is recognizable under the hand lens, however, and is easily removed by rubbing the mineral surface with the thumb.
4) Use only a moderate pressure in attempting to scratch one substance with another, and reverse the order of attempted scratching as a final check.

Tenacity

The *tenacity* of a substance is its general behavior under impact, or when it is subjected to bending, twisting, shearing, crushing or tensional stresses. Thus a brittle mineral shatters when struck by a hammer (quartz, diamond), or breaks into grains when attempts are made to cut it (calcite), whereas a *sectile* mineral, though pulverized by a hammer blow, can be cut into shavings with a knife (gypsum, chalcocite). A *malleable* mineral yields shavings that can be flattened by blows from a hammer (native silver, native copper). If the mineral is difficult to break by hammering, it is said to be *tough* (micas, pyroxenes).

If a mineral can be bent without breaking, it is said to be *flexible*. If, after being bent, it returns to its original shape, it is termed *elastic*. These properties are very helpful, for example, in distinguishing between members of the mica and chlorite groups. The micas are flexible and elastic, whereas the chlorites, though flexible, are inelastic. This difference is readily observed, even in fine-grained mineral aggregates, when cleavage flakes are bent with a well-sharpened knife blade.

(to be continued)

Charlotte, North Carolina, Diamond Class

Birmingham, Alabama, Diamond Class

New Orleans, Louisiana, Diamond Class

CHARLOTTE, N.C. DIAMOND CLASS

Members of the Charlotte, N. C. Diamond Evaluation Class, which met February 23rd through February 27th. Seated left to right:

R. A. Chipman, Sanford, N. C.; **G. J. Sylvan II,** Sylvan Bros., Columbia, S. C.; **G. D. Bruns, Jr.,** Garibaldi & Bruns, Inc., Charlotte, N. C.; **J. B. Gregory,** Goble Jewelers, Newton, N. C.; **Frank V. Taylor,** Arnold Jewelers, Charlotte, N. C.; **James F. Peck,** Charlotte, N. C. Standing left to right: **Robert L. Underwood,** Winston-Salem, N. C.; **J. B. Beam,** Charlotte, N. C.; **Frank W. Brown, Jr.,** William I. Hawthorne, Charlotte, N. C.; **Martin Barringer,** Barringer's Jewelers, Mullins, S. C.; **John O. Barton,** Garibaldi & Bruns, Inc., Charlotte, N. C.; **G. D. Bruns, Sr.,** Garibaldi & Bruns, Inc., Charlotte, N. C.; **Robert V. Ramsey, Jr.,** Belmont, N. C.; **John L. Mathews,** Rocky Mount, N. C.; **Emil H. Emanuel,** Emanuel Bros., Lancaster, S. C.; **A. R. Via, Jr.,** A. R. Via & Brother, Jewelers, South Boston, Va.; **Abe M. Harris,** Walterboro, S. C.; **G. Robert Crowningshield,** Director of the Eastern Headquarters of the GIA; **Louis Dobersten,** Hales Jewelers, Greenville, S. C.

BIRMINGHAM, ALABAMA, DIAMOND CLASS

Members of the Birmingham, Alabama, Diamond Evaluation Class, which met March 2nd through March 6th. Left to right: **George P. Vickers,** Edwards Jewelry, Selma, Ala.; **Fred O. Couch,** Couch's Gifts and Jewelry, Anniston, Ala.; **G. Robert Crowningshield,** Director of the Eastern Headquarters of the GIA; **Guerry Devson,** Jobe-Rose Jewelry, Birmingham; **Frank Bromberg, Jr.,** Bromberg & Co., Birmingham; **Elmer L. Kubiak,** Rauschert & Kubiak, Elgin, Illinois; **Gene Bromberg,** Bromberg & Co., Birmingham; **James H. Ruth,** Ruth & Sons, Montgomery, Ala.; **R. E. James,** Fairfield, Ala.; **Irving M. Kres,** Kres Jewelers, Bainbridge, Ga.; **Cecil E. Moore,** Gay Jewelers, Douglas, Ga.

NEW ORLEANS, DIAMOND CLASS

Members of the New Orleans, La., Diamond Evaluation Class, which met March 9th through March 13th. Seated left to right: **Frank E. Wilson,** Wilson Bros., Jewelry, Norco, La.; **Mrs. Irving Oberlin,** Natchez Jewelers, Natchez, Miss.; **Miss Frances Oberlin,** Natchez Jewelers, Natchez, Miss.; **Stanley M. Roques,** Roques Watch Specialists, New Orleans, La.; **Stanley B. Kahn,** Kahn's Jewelers, Pine Bluff, Ark. Standing left to right: **Werner J. Huber,** Huber Jewelers, Gulfport, Miss.; **Paul H. Kaniss,** Kaniss Jewelry Co., St. Petersburg, Fla.; **Leopold Castille,** Castille's Jewelry, Opelousas, La.; **Harry Vandegriff,** Vandegriff Jewelers, Ft. Walton Beach, Fla.; **G. Robert Crowningshield,** Director of the Eastern Headquarters of the GIA; **Fred Nacol,** Fred Nacol Jewelers, Baton Rouge, La.; **Paul A. Ross,** Macy's Diamonds, Pensacola, Fla.; **Wilbur L. Simon,** Simon's Jewelers, Church Point, La.; **Albert Klein, Jr.,** Klein Jewelers, Pensacola, Fla.

Dallas, Texas, Diamond Class

Houston, Texas, Diamond Class

Memphis, Tennessee, Diamond Class

DALLAS DIAMOND CLASS

Members of the Dallas, Texas, Diamond Evaluation Class, which met March 23rd through March 27th. Seated left to right: **Sam L. Majors, Jr.,** Sam L. Majors Jewelers, Colorado City, Tex.; **Mrs. Dorris Cleere,** Cloverleaf Rock Shop, Irving, Tex.; **Mrs. W. C. Helmbrecht,** Dallas; **W. T. Williams,** Williams Jewelry, Snyder, Tex.; **Charles D. Braddy,** Braddy Jewelers, Irving, Tex.; **Dennis Newton,** Newton Jewelers, Graham, Tex.; **Sherman Morrison,** Morrison Jewelers, Marshall, Tex.; **Rolland B. Fuller,** Fuller's Jewelry, Carollton, Tex. Standing left to right: **Harry Laves,** Rialto Jewelry Co., Alice, Tex.; **John C. Wimberly,** Busch & Sons, Jewelers, Abilene, Tex.; **Robert W. Mitchell,** Mitchell's Jewelers, Henderson, Tex.; **Garvin B. Tuley,** Brad's Jewelers, Dallas; **W. M. Edwards,** Edward's Time Shop, Electra, Tex.; **Milton Nicholas,** Baker Jewelers, Marfa, Tex.; **P. M. Blue,** Boulevard Jewelers, Ft. Worth; **G. Robert Crowningshield,** Director of the Eastern Headquarters of the GIA; **George F. Klepien,** Dallas; **Charles Sheppard, Jr.,** Sheppard's Jewelers, Russelville, Ark.

HOUSTON DIAMOND CLASS

Members of the Houston, Texas, Diamond Evaluation Class, which met March 16th through March 20th. Seated left to right: **Roy H. Duffield,** Robert E. Corrigan, Jeweler, Houston; **Jimmie Felcman,** Felcman's Jewelry, Rosenberg, Tex.; **Thomas E. Perdue,** Perdue's Jewelry, Crockett, Tex.; **W. L. House,** House Jewelry Co., Taylor, Tex.; **J. Clay Walker,** Jeweler, Houston; **C. E. Mounce,** C. E. Mounce, Manufacturing Jeweler, Shreveport, La. Standing left to right: **J. Lewis Lopez,** Lopez Jewelers, Galveston, Tex.; **G. Robert Crowningshield,** Director of the Eastern Headquarters of the GIA; **Ben Noble, Jr.,** Jeweler, Houston; **Irwin M. Goot,** Paull's Jewelry, Houston; **H. R. Sandler,** Star Jewelry Manufacturing, Houston; **Seymour Richbook,** King's Jewelers, Texas City, Tex.; **A. J. DiBella,** Lopez Jewelers, Galveston, Tex.; **Edwin E. Clarke,** Clarke's Jewelers, Shreveport, La.; **William Koen, Jr.,** Joe Koen & Son, Jewelers, Austin, Tex.; **Marcell Maresh, Jr.,** University of Houston.

MEMPHIS DIAMOND CLASS

Members of the Memphis, Tenn., Diamond Evaluation Class, which met March 30th through April 3rd. Seated left to right: **William L. Pankey,** Pankey Jewelers, Memphis; **Russell Perel,** Perel & Lowenstein, Memphis; **Herb Lipman,** Perel & Lowenstein, Memphis; **George A. Gattas,** Fred P. Gattas, Inc., Memphis; **Mrs. C. W. Helm,** Helm's Jewelry, Columbia, Tenn.; **Clyde Page,** Clyde Page Jewelers, Trenton, Tenn.; **Palmer Farnsworth, Jr.,** Farnsworth's Jewelers, Greenville, Miss.; **Harvey A. Carpenter,** Pettit's Jewelry, Batesville, Miss.; **R. H. Halbert,** H. T. Purvis & Son, Inc., Jonesboro, Ark. Standing left to right: **Charles M. Wynn,** Delta Jewelers, Greenwood, Miss.; **K. R. Van Horn,** University Jewelers, Memphis; **J. M. Andrews,** Andrews Jewelers, Union City, Tenn.; **R. D. Williams,** R. D. Williams Jeweler, Fayetteville, Tenn.; **Al Denman,** Floyd A. Denman, Jeweler, Stuttgart, Ark.; **J. P. McGee,** McGee Jewelry, New Albany, Miss.; **Charlie O. Johnson,** Rich's Incorporated, Knoxville, Tenn.; **James E. Cole,** L. P. Jackson, Jackson, Tenn.; **Maurice Suggs,** Suggs Jeweler, Newport, Tenn.; **G. Robert Crowningshield,** Director of the Eastern Headquarters of the GIA; **H. D. Bean,** H. D. Bean, Jeweler, Carmi, Illinois.

Gemological Digests

British Guiana

It has been reported that 14,344.75 metric carats of diamonds were mined in British Guiana during the first six months of 1958 — an increase of 290.28 metric carats over the same period in 1957.

New Delhi

The Nizam of Hyderabad is reportedly retiring from public life in order to have more leisure time with his family and treasures. Besides his fabulous jewels, valued roughly at two-billion rupees (about 420 million dollars), his treasure vault is filled with cash, gold and silver bullion. One of his treasures, the 183-carat Jacob diamond, is 70 carats heavier than the famed Kohinoor Diamond in the British Crown.

Rhodesia

It seems that plans are being made to institute marketing controls similar to those South Africa uses on diamonds on the Rhodesian emeralds.

Nepal

A visitor to Nepal reports that the Queen of that country is wearing the rare 126-carat Jonker diamond. It is said that she purchased the Jonker from ex-king Farouk.

Rhodesia

Another emerald deposit has been found in the Insiza River District near Filabusi, which is in the same area as the Belingwe deposit. Mr. J. H. Oosthuizen, prospector, who found the deposit, stated that the area is exposed for 100 yards and that the formation is 1800 by 3000 feet, with a pocket appearing every few feet. The extent of the pockets on the sides is not known. The contact minerals are said to be serpentine, mica-schist, granite and tourmaline. The emeralds found are of slightly lower quality than those of the Belingwe claim. In the near future, a power plant and machinery are to be installed on the Belingwe claim to open a full-scale emerald mine. A blockhouse, in which the emeralds will be sorted and stored, will also be built.

Book Review

FACET CUTTERS HANDBOOK, by Edward J. Soukup, G.G., F.G.A. Published by Gems & Minerals, Mentone, California. 52 pages, illustrated (paper bound). Price $2.

This handbook is written essentially

for the person who is interested in learning to facet gemstones without the assistance of an instructor. The first section of the book presents step-by-step instructions for faceting the standard round brilliant, a comparatively simple cut which usually is the first cut for the novice. Other and more difficult cuts, with detailed instructions for their fashioning, are listed; however, the author wisely suggests that a beginner should cut at least five round brilliants before attempting the more difficult cuts. Potential questions to be expected from the tyro are answered in an easily understandable manner, including a discussion of laps, v-blocks, polishing agents, dops and dopping procedures. On page 10, under the heading of *On Things To Remember,* the author lists the "do's and don't's" of faceting. A chapter on dopping, which is well illustrated with comprehensive diagrams, is well done. It is unfortunate, however, that in the table on page 51 the columns listing the angles for the star and upper girdle facets have been transposed in the printing. However, the text in other sections of the book has been so clearly written when referring to this particular subject that the reader should be able to recognize this error and transpose the angles. An interesting section on the polishing of corundum and the abrasives used has been contributed by Charles J. Parsons, C.G., F.G.A., and completes the Handbook. The *Facet Cutters Handbook* should prove valuable for the person who is contemplating faceting as a hobby.

Honor Roll

Following are students who have recently been awarded diplomas in the THEORY AND PRACTICE OF GEMOLOGY:

Miss Monta McFadin, Clayton, New Mexico; **William A. Grupe**, Wm. Grupe Co., Los Angeles, California; **Brandt V. Houtsma**, Dupen's Jewelry, Chico, California; **Joseph E. Jessop**, J. Jessop & Sons, San Diego, California.

Following are students who have recently been awarded diplomas in the the THEORY OF GEMOLOGY:

B. S. Mahajan, Bala Appaji & Son, Bombay, India; **Lawrence B. Holden**, Holden Jewelers, Matawan, New Jersey; **William Shapiro**, New York City; **Charles O. Johnson**, Knoxville, Tenn.; **Edward Rubin**, Bayside Queens, N. Y.; **William S. Preston, Jr.**, F. J. Preston & Son, Inc., Burlington, Vermont; **Paul R. Rousseau**, La France Jewelers, New Bedford, Mass.; **Walter J. McTeigue, Jr.**, McTeigue & Co., Inc., New York City; **John Nelson Frith**, Bauman's, Dothan, Ala.; **Louis L. Nabholz**, Robins Co., Attleboro, Mass.; **Mrs. Velma Mae Caldwell**, Traverse City, Mich.; **Richard L. Caldwell**, Traverse City, Mich.; **René Plourde**, Plourde Jewelry, Montreal, Quebec, Canada.

N. Y. LAB NOTES

(continued from page 270)

From gemologist **John M. Wise,** Baltimore importer, we received rough specimens of the synthetic spinel made as a substitute for lapis-lazuli.

An unusual piece of fluorite from Brazil, a gift of **Joseph Dattoli,** showed an alexandritelike effect consisting of brownish-purple and purple. He also gave the Laboratory a blue apatite crystal.

We are indebted to the **National Lead Company,** for two orange-brown synthetic rutile cabochons and one blue cabochon for use in our classes.

Dr. Donald Spaulding, GIA student, Omaha, Nebraska, sent specimens of peridot and star quartz for our study collection.

Student **Ben Noble, Jr.,** shared rough Mexican opal with the recent diamond class held in Houston, Texas, and contributed some valuable specimens to the GIA study collection.

Several donations to the Institute were received this past month, all of which can be used to advantage in our classes, in research activities and in our gemstone displays.

L. A. LAB NOTES

(continued from page 267)

Several hundreds of carats of rubies, sapphires, and emeralds excellent for class and study purposes made up an exceptionally generous gift from **Raphael Esmerian,** New York City colored-stone importer. Many of the sapphires will be useful for display purposes, as well as for test sets.

An attractive, dyed mother-of-pearl formation was received from **Walter Meister,** Zurich, Switzerland.

A citrine heart and an attractive green tourmaline was received from **Arthur Azevedo,** San Francisco.

From **Maurice Savauge,** Canada, we received a beautiful yellow, twinned diamond crystal that now graces our display case.

A rare cat's-eye tourmaline is now an added attraction in our tourmaline display. It was donated by **Martin Stone,** F. & F. Felger, Inc., Newark New Jersey.

John Krzton, GIA student and avid collector from Chicago, recently donated the following cabochons: rutilated quartz, nephrite, chrysocolla, smithsonite, chrysoprase, green scapolite, rhodochrosite, opal, malachite, spider-web variscite, labradorite, and satin spar with opal attached. A faceted synthetic spinel and green quartz, a brown-dyed cultured pearl and an imitation pearl were among the donations.

From **Joseph Eschenbacher,** Minneapolis, Minn., we received a huge portion of an ivory tusk for our ivory collection.

William McConahay, GIA graduate, Salt Lake City, Utah, donated three intaglios when he visited the GIA in February. They were from his private collection and, based on the type of carving and polishing exhibited on the cuvette figure, are believed to be at least 100 to 150 years old.

From **George Marcher,** C.G., San Francisco, we received three of his special Marcher cuts, one each of quartz, synthetic spinel and synthetic corundum, all having the same diameter (14 mm.) and cut to reveal maximum brilliancy and scintillation.

Five small, burned diamonds were sent in by **Karl Schwemmer,** Reading, Penna.

From **Francisco Muller Bastos,** Belo Horizonte, Minas Gerais, Brazil, we received 20 faceted tourmalines that run the gamut of colors for this gemstone. They are presently holding a very prominent place in our display cases.

ABOUT THE AUTHOR

Charles L. Wells, Jr., jeweler-gemologist, Jacksonville, Florida, was born in 1929 in Atlanta, Georgia. ("Purely by accident," the author says, "since my father just happened to be busily engaged at this time in Atlanta in opening a store for the firm of which he was general manager.") Mr. Wells grew up in Jacksonville and, at the tender age of twelve, he was introduced to the jewelry business; he weighed the mellee that his father graded and sorted. His education was received at Jacksonville Junior College and at Emory University. Formal entry into the jewelry trade came in 1944, when he was assigned the duties of window trimming, which was accomplished in the mornings before classes, and selling in the afternoons after school and during vacations. The title of Registered Jeweler was awarded him in 1956, and that of Certified Gemologist in 1958. Mr. Wells is a member of the Gemmological Association of Great Britain, and his firm is a sustaining member of the GIA. His recent trip abroad included a visit to Switzerland and to Berlin, his wife's family home (where he met and married her while serving in the Army with the Berlin Command during 1951 - 1952). His very enlightening article, *Idar-Oberstein Today,* appears on page 287 of this issue of GEMS & GEMOLOGY.