

Gems and Gemology

SUMMER 1959



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On the Cover

This jewelry ensemble, created by Marianne Ostier, is composed of a woven band of fine gold, tipped all around with small brilliants. The matching bracelet may be unjeweled or it may be set with brilliants in its interwoven circles. The necklace is featured on the jacket of the new book by Marianne Ostier. (See review on page 306.)

*Photo Courtesy N. W. Ayer & Son, Inc.
New York City*

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Highlights at the GEM TRADE LAB in New York



by

G. Robert Crowningshield

Since the trade has become more generally aware that many colors of diamond may be produced by atomic bombardment, we have been asked to examine diamonds the colors of which have not yet been reported. Among these colors are blue to steel blue and definite pinks. However, greenish-blue stones and brownish-pink stones have been produced. In anticipation of the day when artificially colored blue diamonds will be marketed, Lester Benson designed and constructed circuit testers for both of the GIA Laboratories in order to test for the electrical conductivity known to be present in all known natural-blue stones. In the past several months, we have had occasion to test and report on a number of blue stones, all of which showed electrical conductivity on the circuit tester. It is interesting that in some cases (notably a large, bright-blue, marquise-cut stone), the circuit tester reading was as high as

when a penny was substituted for the diamond. Other natural stones that we have found to be conductive are the iron minerals hematite (and, unfortunately, hemetine); pyrite; marcasite; impure crystals of rutile, but not gemmy crystals; about half of the jadeite specimens tested, but not really gem-quality stones; most gray to blue chalcedony; moss agate; all black chalcedony tested, including a five-pound piece of undyed gray; a large block of nephrite, but no gem-quality stones; verdite mica; a large block of lepidolite; impure cassiterite, but not colorless stones; and houlandite. I am sure that if we had time to test more minerals we would find specimens of others that would be conductive. Among synthetic stones the most striking was blue synthetic rutile that was as conductive as any natural-blue diamonds we have tested. Also, specimens of carborundum are strongly conductive.

This summer has marked the first really widespread use of white coral for summer jewelry. Some of it has small areas of light pinkish orange and most takes an excellent polish. An imitation that is being sold as genuine white coral is fashioned from pink conch shell and is sold for about one-fifth the price of the genuine. An article in "Women's Wear Daily," with a Berkeley California date line, mentions the impending distribution of black coral from the island of Maui, Hawaii. The article makes the following statement: "Black coral, which is very hard and abrasion resistant, has fine veinings of white that make free-form patterns when the material is cut and polished." We have not yet encountered this material in the laboratory nor have we heard of it in the trade.

* * *

A most unusual yellow-green stone was identified as glass although it had an index of 1.80 plus. It appeared brilliant red under the emerald filter and, in fact, turned red when a strong beam from a 500-watt projector was passed through it. It had the red flashes that one associates with synthetic blue spinel, and an absorption spectrum associated with dyed jadeite. The specific gravity was 5.40 and the stone fluoresced under long-wave ultraviolet. To the unaided eye the stone resembled a fine demantoid garnet. The owner (a layman) said it was originally a shapeless lump that, only recently, he had polished. Unfortunately, we were unable to conduct a complete analysis of all its properties such as X-ray transmission, ultraviolet transmission, etc. The fact that the stone was red under the "emer-

ald" filter is further reason to believe that this instrument should be used with great caution.

* * *

We recently examined some highly lustrous, cream-rosé baroque pearls strung in five-inch hanks that were imported as natural pearls. A radiograph showed them to be hollow centered, and the brilliant fluorescence under X-rays in the darkroom indicated them to be of fresh-water origin. The best information we have is that they are probably fresh-water cultured pearls from Lake Biwa, Japan. Dr. Cahn, in his 1949 report on the Japanese Cultured Pearl Industry, mentions that the irritant is mantle tissue with no other nucleus. Early examples that we had seen were of very poor quality and almost unsaleable. These latest are of good, although mostly baroque, quality. Among the pearls we examined were perhaps 20 to 25 that were almost round, although the internal void was significant.

* * *

A clear-green crystal fragment of andalusite, gift of Joseph Dattoli, New York City, had defied detection until its absorption spectrum was studied. The unusual appearance, attributed by Anderson to rare earths, is unlike any other spectrum and serves to identify this rare stone positively, even when a refractive-index reading and optic figure are unobtainable.

* * *

We were able to detect a coating on a marquise diamond recently. It is assumed that the coating, which was

on the pavilion only, is a mechanical painted process rather than the vacuum-sputtering process that has been mentioned before as a means of improving the color of a yellowish diamond. We were unable to have the stone for exhaustive tests.

* * *

We examined a large blue fluorescent diamond in the spectrocope and were surprised to note two bright fluorescent lines (lines of brilliant transmission?) at approximately 4350 Å and 4420 Å. The lines of brilliant transmission in the red part of the spectrum are well known for natural and synthetic rubies and for some natural red spinels. We wonder if the size of the stone was responsible for seeing lines that may be present in many similar stones but overlooked when the stone is small.

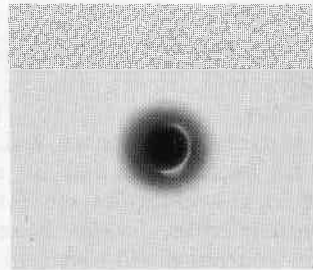
* * *

A most unusual fluorescent diamond seen in the Lab was a fine brownish yellow when first taken from the diamond paper. As one approached daylight from a window, the stone turned green and remained that color during the day. Placed overnight in the safe, it again resumed its brownish-yellow color. As one could imagine, the stone was highly fluorescent and, in addition, phosphorescent. The stone showed no spectroscope reaction and no evidence of color treatment, either, when allowed in contact with an X-ray film for 36 hours.

* * *

For some reason we have seen more clam pearls in the past two or three months than in a whole year previously.

Every one we have seen, and we have identified at least half a dozen, have been of excellent shape and frequently had a high luster but, of course, without nacre. Several of the clients have wanted to know how to "prepare them for sale." In one case, the lay client had been advised by his jeweler to come to the Lab for this information. It is perhaps well to repeat here that we do not know of anyone in the trade who deals in these concretions, although they may occasionally be purchased at seaside resorts. Lacking nacre, the trade does not accept them as true pearls. They tend to crack easily during drilling. The only non-nacreous concretions from molluscs that the trade does accept are the lovely orange-pink to pink conch pearls. We have seen only three or four of the latter in the past year.



Cultured pearl

What is believed to be the largest cultured pearl to be offered for sale in this country proved to be a slightly button-shaped South Sea cultured pearl measuring approximately 17.20 x 16.25 mm. However, not only its size (and quality) distinguished it but, as the accompanying radiograph showed, the mother-of-pearl core measured only approximately 6.00 mm.

Among the unusual sapphire examinations in the past few months was a natural blue stone that showed the expected line in the spectroscope at approximately 4500 Å; in addition, it had two other lines at about 5000 Å and 5100 Å, as well as a fine line at 6100 Å. We have not been able to discover any references in the literature to any of the lines other than the normal 4500 line.

* * *

A large blue sapphire that contained no inclusions or color banding of any sort, even under immersion, proved to be natural when the 4500 Å line was seen in the spectroscope.

* * *

The necessity of exposing yellow sapphires to the sunlight, if the supplier has not already done so, to detect whether the color is due to Xrays or is natural was again brought to our attention. A local New York wholesaler sold the stone to a retailer, who, in turn, sold it to a retail customer. In her possession it came into contact with sunlight for the first time and lost nearly all of its color in a few months. She returned it to the jeweler. Most sapphires so treated will revert to their original color after a few hours exposure to direct sunlight. However, other means of irradiating sapphires may produce colors that are more permanent. No controlled experiments have yet been made by the Laboratories on atomic-pile-treated or cyclotron-treated yellow sapphires.

* * *

The largest good-quality synthetic emerald we have seen to date weighed approximately 8½ carats and was cut

as an octagon step cut. Both the cut and the color had alerted the jeweler who brought it in, and he was not surprised to learn that it was synthetic.

* * *

A most unusual star sapphire seen in a selection recently imported showed two stars; under a single incandescent bulb one star was yellow and the other bluish. We were unable to keep it long enough to photograph, nor could we determine the reason for the "phenomenal phenomenon." A clue was provided a day or so later when we observed a black star sapphire with twelve rays; one set of six was yellowish the other set bluish. The latter was due to quite distinct and long needles, whereas the yellowish set was due to minute needles making up the characteristic "silk" seen in black star sapphires.

* * *

We would like to express our appreciation to Mr. Max Duraffourg, gem dealer of New York City, for a fine specimen of synthetic green sapphire, the nearest to emerald color we have yet seen.

In addition to the rare green andalusite fragment, we want to thank Joseph Dattoli, New York dealer, for a Brazilian emerald in mica-schist and a specimen of blue apatite.

We are indebted to graduate Andy Heinzman, of H. R. Benedict and Sons, for two finely cut orange-red synthetic rutiles. This color is not obtainable commercially, which is unfortunate, since they make handsome stones. Graduate Melvin Strump, of Superior Gem Company, New York City, made an important donation to the Institute of a parcel of Ceylon moonstones.



Highlights at the GEM TRADE LAB in Los Angeles

by

Lester B. Benson, Jr.

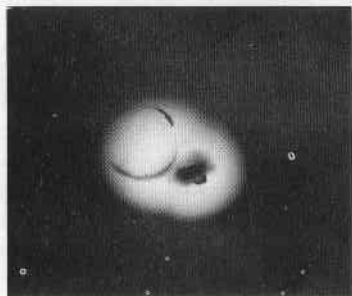
Rumors of a new German substitute said to be a synthetic turquoise led the Laboratory to ask Dr. Karl Schlossmacher in Idar-Oberstein, Germany, for confirmation. The material was reported to be identical to natural turquoise and, in fact, was even sold as natural turquoise from Afghanistan. Contrary to several articles that have supported the claims, Dr. Schlossmacher stated that the material has been proven an imitation rather than a synthetic, and that the person who produced and sold it was sentenced to a short term in prison for the fraud. Apparently, the same material has again been offered, but this time under the name of synthetic turquoise matrix, which is also incorrect. Dr. Schlossmacher gives the following description of the material and suggestions for its identification:

"... the material is composed of alum hydrate-copper phosphate. The copper gives

it the nice blue color, the same as the genuine stone. The chemical composition determined that it was an imitation. The simplest method of identification is the spot method, in which a tiny drop of reagent liquid, such as Thoulet's solution (potassium and mercuric iodides), is used. The imitation shows a brown spot, whereas the genuine shows none. Another method is the specific-gravity test; the imitation is much lower than the genuine. In a liquid specific-gravity test, the genuine sinks and the imitation floats. Under the microscope, the genuine shows two spotty minerals intergrown, whereas, the imitation has a fine-grained structure. In addition, the refractive indices of the two materials differ."

* * *

Two of the most interesting cultured pearls we have encountered were large, elongated, and almost perfectly matched (see radiograph illustrated). Presumably, they were of South Seas origin. Their unusual shape and size, in addition to the identical nature of the



Cultured pearls

two, made it seem as if their shape had been planned rather than accidental.

* * *

One woman made a trip from San Francisco to have the identity of a ruby confirmed. The stone originated as a gift from India and its presumed value was too high to risk sending it through the mail despite its weight of about one carat. It turned out to be a typical synthetic.

* * *

Another identification involved checking a number of stones believed to be glass. All turned out to be natural sapphires!

* * *

The chalcedony cameo in the accompanying photograph was sent in to determine the cause of the wormlike inclusions in the upper left part of the stone. The claim was that the "worm" was of recent origin, and that it was increasing in size. The inclusion was extremely obvious and spoiled what would otherwise have been a beautiful cameo. Assuming that it would have been unlikely for fine work of this kind to have been done on a stone with such a pronounced blemish, it was checked for effects of acid. This treatment revealed that the material was not

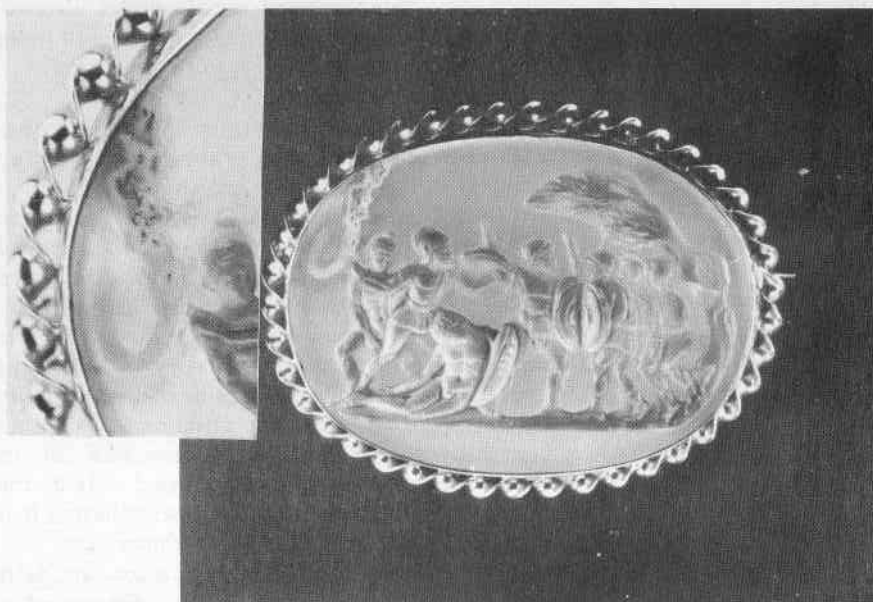
pure chalcedony, but that it contained isolated areas of impurities that were attacked by hydrochloric acid. These areas became slightly cloudy upon exposure to concentrated acid, although the reaction was light. The only conclusion that could be drawn was that the stone was an impure chalcedony. Perhaps it had been immersed in a pickling solution or another weak acid, at which time the area that now appears as the wormlike inclusions, in addition to a few other small clouded sections, began to alter to their present appearances. The slow rate at which these changes took place gave the illusion of growth.

* * *

A highly prized ruby-and-emerald-set antique pin was submitted for confirmation of the stone's identity. The pin had a closed back. Examination revealed that the emeralds were gaining much of their color from a cement on the back of the stones.

* * *

Some interesting problems were encountered in the construction of the circuit testers mentioned in the New York Lab Column. The first references to the testing of natural blue diamonds by this method were presented by Dr.



Chalcedony cameo. Inset shows wormlike inclusions.

Custers, of the Diamond Research Laboratory in South Africa, about two years ago. His, as well as subsequent articles on the subject, referred to the use of a normal 110-volt circuit for the test. Since the exposed prods required for making contact with a stone used in conjunction with high-ampere current of this type would be rather dangerous in the hands of a novice, the construction of such an instrument for routine testing could not be considered. Tests showed that very low-ampere currents were equally effective, provided suitable contact could be made with the stone. When using a low-ampere current, placing a diamond on a metal contact plate and using a clean metal point for a prod will not in itself always make a suitable contact on a diamond surface, even when considerable pres-

sure is brought to bear. Oftentimes, under these conditions, a minute amount of arcing could be observed in a dark room from various points between the polished surface of the diamond and the base plate. Constructing a tester to provide a wet surface plate and a hand probe that contained a small cotton pack that can also be dampened by simply dipping it in water solved the problem. Work done in conjunction with that performed in the New York Lab has verified that a considerable range of conductivity is presented by different crystals. In one case, a large blue crystal was encountered that failed to conduct any current through one portion. Polished stones, for example a tapered baguette, have shown a proportionate degree of conductivity for the depth of the stone tested; again,

however, the degree of conductivity versus the depth varies tremendously with different stones. One very small cyclotron-treated purple stone proved to be a conductor, but all conductive stones tested thus far were at least to some degree bluish, although in a few cases they were virtually colorless. Production of these circuit testers has not been contemplated, unless unexpected demand arises. This is because the average wholesale or retail firm would have little occasion to test such stones.

* * *

The accompanying photograph was made of a ring set with a huge cabochon of colorless quartz with bladelike inclusions that was submitted for identification.



Quartz cabochon with bladelike inclusions

An interesting phenomenon was encountered during recent work on the testing of blue diamonds. Specifically, two colorless stones that were irradiated for approximately two minutes under short-wave ultraviolet and then exposed to X radiation (approximately 65kv's, 7ma's) for approximately one minute fluoresced and subsequently

phosphoresced weakly under ultraviolet, whereas the property had been nonexistent prior to the treatment.

* * *

Some months ago the Institute was approached by a prominent lighting manufacturer for suggestions on a lamp he planned to offer jewelers. The basic lamp had been developed for an artist, who was dissatisfied with the nature of the artificial illumination available to him. In laboratory tests the quality of the light seemed so exceptionally satisfactory for work with diamonds, and other stones as well, that the staff felt its possibilities were limited only by the usual lack of fire and scintillation that is characteristic of fluorescent illumination. Experiments in the GIA laboratory led to the adaption of a unique system of baffling that resulted in high fire and scintillation characteristics remarkably resembling those produced by a combination of sunlight and general north-light illumination. Thus, the lamp provided a double-duty potential as both a general illuminant and as an effective display unit. Since this illumination is accomplished by combining specially designed and engineered fluorescent tubes, lightweight construction was possible without the heat problem that is associated with incandescent lights. In addition, an inexpensive all-plastic diamond-grading unit was designed to be used with the lamp for accurate grading purposes. This is constructed in a way that eliminates surface reflections from stones and other problems imposed by a direct overhead grading light. It is believed that this lamp will have a material

(continued on page 319)

1800

Sea-green Carats

by

JOHN SINKANKAS, C. G.

Last winter—I guess it was about then—Martin Ehrmann breezed into Washington on one of his many gem-trading trips. He called up from the Smithsonian: "Can you get away? Come up to George's office; I've got something to show you!"

From the tone of his voice I knew he had something considerably out of the ordinary, but his brief conversation gave no hint of what it might be.

The office referred to, a squarish, rather gloomy place on the top floor of the Natural History Building on Constitution Avenue, belonged to Dr. George Switzer of the Division of Mineralogy. I passed by his receptionist and entered through a door that looked faintly like the adit of a mine because of the stacks of books and files that guarded its entrance and reached into the gloom of one of those impossibly high-ceilinged rooms so dear to the hearts of government-building architects of the classical school.

Martin was in the middle of a cabbage patch of white tissue paper, talking animatedly to Dr. Switzer. Turning to me he said: "John, I've got something for you to cut."

He reached over to one of the puffs of paper and from its middle extracted an enormous mass of transparent Brazilian spodumene. It was about the size and shape of a bar of laundry soap but quite irregular upon the ends and rounded on one of the sides. It gleamed and glistened in the light of the window as he handed it over. A casual glance was enough to tell me that in its center rested a potential gem of a size never seen before in spodumene. The color was good, and although comparatively pale, as is always the case in this greenish variety, it would multiply and deepen through repeated reflections from the facets of the finished stone—if it ever got finished! Thoughts of bitter, determined struggles with a certain spodumene of

several hundred carats now resting in the Smithsonian Gem Hall chilled my enthusiasm and killed the anticipation that Martin's call had raised. Almost with a sense of relief, I handed back the stone, saying: "Sorry old man, can't handle it—much too big for my equipment."

Anyone who knows Martin Ehrmann also knows that he is not easily diverted from a goal, and this time the goal was to have me cut this particular piece of spodumene. He shot back:

"Well for heaven's sake, get some big equipment. Don't let a little thing like that stop you!"

I spluttered with indignation as I tried to tell him that one simply did not go out, snap his fingers, and with the magic of an Aladdin's lamp produce a jumbo-sized facet machine out of thin air, especially when the likes of such had never been built commercially. Martin ignored my indignation and then, knowing of my respect and admiration for Dr. Victor Ben Meen of the Royal Ontario Museum in Toronto, casually mentioned that Vic and the Museum would be awfully disappointed, inasmuch as he had promised them the cut stone.

Most reluctantly, then, I admitted that I just did happen to have a cousin in New Jersey who was a perfect genius in machine work. In fact, he operated a rather unique establishment with his father that specialized in making Rube Goldbergian packaging machinery—the kind in which the machine makes up plastic squeeze bottles, for example. It takes plastic tubing, cuts it up into pieces, slips a piece into a nose cap, puts the cap into the bottle and then screws on a lid. All going

like mad.

"Perhaps" I said, "He *might* go for such a machine if I twist his arm enough, although this sort of a deal would be pretty small potatoes for him."

"Twist it," shouted Martin. "Break it off, I don't care—I promised Vic!"

I looked again at the rough and gloomily predicted: "Besides it isn't the right shape for a big recovery; too flat, and look at all the bumps that have got to go from the ends. You'll lose a lot of weight right there even before you begin cutting."

But Martin was not to be put off. After a few minutes of his impassioned oratory, I found myself committed to do a cutting job, the biggest I had ever tackled and not in something easy like quartz, but in about the worst that one could find, and that with a machine that hadn't ever been built. Despite its delightful vagueness, we shook hands on the deal.

The crystal was not of the most ideal proportions, but who could quibble about a minor detail like that? How many years would it be before another, *better* crystal would show up? I'm afraid we would have to wait a long time. Now that the bargain was sealed, I bent to a closer examination, which showed the interior of the gem to be quite flawless, in itself an astonishing event in view of its large size. Thank goodness there were no signs of twinning evident upon any of the glistening, etched surfaces. Twinning is common in gem spodumene and shows itself by sharp discontinuities, or ledge-like protuberances, upon the exterior. In most cases, these discontinuities can be followed completely around the



Figure 2 The specially made reproduction of the Allen Facet Unit used in cutting the spodumene. The splash pan is not installed. Behind the machine is the dop transfer jig; to the right are the dops. Photo courtesy Cedric Gleason

periphery of the rough; in the case of the lovely kunzites of California they are believed to contribute to the notorious instability of this gemstone while being cut, perhaps because such places represent points of strain due to twinning. The weight of the crystal was 735 grams, or 3675 carats. I drew a few reference marks upon the mass, applied certain thumb rules for estimating the inevitable cutting losses, and announced the expected result: a gem of about 1850 carats! As it turned out, this was not far off.

The first hurdle obviously was to get the faceting machine. This proved much more difficult than any of us had anticipated in the first flush of enthusiasm. I called up my cousin, Casimir Wysocki, that evening and found him amenable to making the machine after

I described the circumstances surrounding the bargain and what would be required. He warned that it would take time because of the involvement of his firm, Progressive Machine Industries, in no less than four of the packaging machines referred to earlier, each one for a different packaging problem and calling for a great deal of cut-and-try and on-the-spot invention. He suggested that I prepare the drawings to save time.

The machine that I thought would best meet the rugged requirements of the cutting task was the Allen Facet Unit, a regular model of which had served me well for many years. Its direct simplicity, strength and accuracy convinced me it was best for the purpose. Gene Allen, its designer, graciously granted me permission to make a



Figure 3 The author holding the finished gem just after its completion. Photo courtesy Cedric Gleason

one-time scaled-up reproduction, shooting back his assent with a cheery "Go ahead, and best of luck."

I set to work immediately drawing up the plans, using a scale-up factor of 1.5 applied to all the dimensions of the regular model, rounding off to convenient decimals toward the higher and more rugged side when desirable. The completed machine appears in *Figures 2 and 3*.

A few dimensions will give some idea of its size. The table built for it, for example, measures 48" by 30"; the vertical stand rod on which the facet head slides is 16 $\frac{1}{2}$ " tall. The dop arm for holding the dops, the latter of

$\frac{3}{8}$ " shank diameter, is 9 $\frac{3}{4}$ " in overall length. A transfer jig for the dops, used when gems are switched from one dop to another, was machined from aluminum and measures 4" by 7", to assure a wide enough throat for the largest gems. The ballbearing-mounted master lap is 11 $\frac{5}{8}$ " in diameter and accepts 12" diameter laps. The latter I ordered from Gene, because especially careful machining work is necessary to make true laps in the first place, and my own of 12" diameter could prove to be completely unacceptable, if made by a shop not familiar with the peculiar needs for faceting. Two copper laps for charging with diamond grit were or-

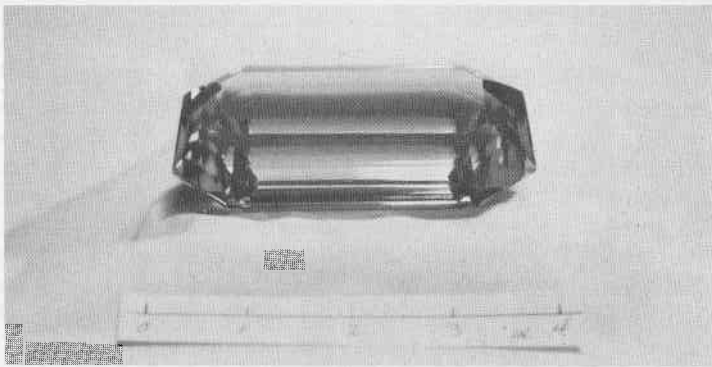
dered; one was to be charged with 100 grit, the other with 400 grit for coarse and fine grinding, respectively. I later found it necessary to charge one of the remaining free sides with 200 grit to provide an intermediate grinding step between coarse and fine. A plain steel lap was also ordered for lapping with loose grit and a lead-on-aluminum lap for grinding with imbedded grit, a technique as old as the hills in lapidary work. Two plain aluminum laps were also obtained for making into wax-cloth polishers, whereas a conventional lucite lap and a tin-on-aluminum lap completed the kit.

Power for driving the master lap was provided by a one-third horsepower motor, whose speed of 1750 RPM was reduced to 350 RPM at the master-lap spindle by suitable pulleys. This speed proved entirely satisfactory for both grinding and polishing. I won't bore readers with further mechanical details, except to say that everything worked out as planned: the machine ran accurately, quietly, and did not stall under the very considerable pressures that have to be applied when cutting so hard a material as spodumene.

Of the numerous problems faced in the cutting of any large gem, not to mention those connected with spodumene, that of reducing the irregular mass of rough to an approximation of the final gem known as the *preform*, is one of greatest concern. Obviously, in this instance, the enormous crystal could not be hand held against my 5-inch thin-blade diamond saw, which I use ordinarily for sectioning gem material. All that would happen, I was sure, would be a jammed and broken blade and possibly damage to the stone

itself. With blades at about ten dollars apiece, I could not afford to ruin one after another. Considering past experience with similar spodumene from Brazil, a material far less inclined to develop cleavages than spodumene from other sources, I decided upon the daring alternative of slicing off surplus material on my sixteen-inch slabbing saw, a machine ordinarily better suited to the cutting of far coarser and larger material. I reasoned that if the slowest rate of power feeds were used, the shocks applied to the sensitive crystal would probably be less than those likely to arise from trying to hold the stone by hand against a smaller blade. Accordingly, sawing-guide marks were carefully laid out in india ink and protected from the solvent action of the coolant in the saw by coating them with shellac. The crystal was then clamped in the saw carriage for the first cut, carefully aligned to the edge of the blade, the splash hood closed, and with fingers crossed, the motor switched on.

In a few minutes the initial "zinging" of the blade changed to a rhythmic "swishing" as the thousands of minute diamond teeth in the edge of the blade carved a narrow channel into the stone. This first cut was like awaiting the verdict of a court. Would it be freedom to go ahead, or would it be disaster—a handful of needlelike shards of shattered spodumene? I could scarcely wait until the exasperatingly slow movement of the carriage had brought the gem far enough forward to give a fair trial of cutting progress. When the saw was stopped, I examined the cut in the beam of a flashlight, looking for any trace of cleaving or splintering. There was nothing that I could



A flawless, sea-green Brazilian spodumene cut for the Royal Ontario Museum, Toronto. It weighs 1804 carats and measures $3\frac{3}{8}$ inches long and $2\frac{1}{4}$ inches wide. Photo courtesy Cedric Gleason

see. Breathing a little more easily, the hood was closed again and the machine restarted until the abrupt cessation of noise some minutes later signaled the end of the cut.

This time the examination would tell the story. The crystal was loosened from the carriage and brought up to a strong light; it appeared beautifully transparent under its oily coating. Incredible! Not one sign of internal damage—nothing but the smooth lapped surface where the tiny diamond teeth had worn away the spodumene. With an enormous sense of relief, I returned the stone to the saw for the next cut, and the next, until after the better part of a day acting as nursemaid, every bit of excess that could be removed by this technique had been shaved away from the parent mass. A few hours of work on a carefully dressed grinding wheel brought the preform to its final dimensions, only slightly larger than those of the completed gem. From this point on, it would be cemented to a dop and fitted with the long narrow facets of the emerald cut I had decided upon.

Disappointingly, grinding of the preform revealed several etch pits, origi-

nally filled with pocket clay that disguised their true depth, penetrating deeply into the crystal and requiring the removal of more material than I had anticipated. However, these, too, were taken care of and the gem finally readied for faceting. The work now progressed slowly but routinely; each facet angle was set, the gem lowered to the whirling lap and ground away to the correct depth: the upper half was finished first, then each facet polished with Linde A powder upon a heavily scored tin lap. The entire process was repeated for the pavilion, until at last the final narrow facets at the very tip were rendered transparently smooth. The gem was finished!

Cleaning off the shellac used for cementing the stone to the dop revealed the spodumene in its true beauty. It lay upon white tissue paper, scintillating with narrow ribbons of light reflected from its facets. This is always the supreme thrill in faceting, to see the emergence of brilliance where moments before lay only a dull pool of color. Sometimes the thrill is replaced by keen disappointment when unforeseen inclusions, color banding, or excessively dark coloration "kill" the

stone and hours of labor go for naught. But this one—now this was a *gem!* My only apprehension was its weight: would it, as I had rashly predicted, weigh close to 1850 carats? It was a bit of a scramble to get enough weights together to balance the gem on my small scales, but it was done and it came out to 1804 carats!

Some vital statistics on this spodumene may be of interest to readers who are curious to know how much weight was lost during cutting. Losses, of course, vary considerably with the initial shape and relative flawlessness of the rough, but the data below still give some idea of what can be expected:

Rough weight: 3675 carats

Preform weight: 2055 carats, so far a 44% loss

Finished weight: 1804 carats, a final loss of 49%

Finished dimensions: $3\frac{7}{8}$ " x $2\frac{1}{4}$ "

Style of cut: Octagonal step cut. Four facets on the crown; six rows of facets upon the pavilion.

Size of table facet: $2\frac{7}{8}$ " x 1"

The gem, so I am informed, is now on exhibit in the mineral and gem hall of the Royal Ontario Museum in Toronto, Canada.

Before I close, I wish to thank Mr. Gene Allen of Los Angeles, California, for his generous permission to use his smaller unit as the model for the one just described. After many years in business under the name of Allen Lapidary Equipment Company, I understand he has now turned over all interests to the Belmont Lapidary Company, who will continue to make the Allen line of lapidary equipment. Special thanks are also due to Mr. Casimir

Wysocki of Hackensack, New Jersey, who placed at my disposal the very considerable skills of his machinists. The quality of the gem is a reflection of their ability. The photographs that accompany the text were kindly made by Mr. Cedric Gleason of Washington, D. C.



Following are students who have recently been awarded diplomas in the Theory and Practice of Gemology:

John R. Fuhrbach, Fuhrbach Jewelers, Amarillo, Texas; **John M. Wells**, Wells Jewelry Company, Perry, Florida; **B. S. Mahajan**, Bala Appaji & Son, Bombay, India; **Glen W. Glover**, Jewelry, Payette, Idaho; **Norman R. Clark**, Norman Ingle Jewelers, Salisbury, North Carolina.

Following are students who have recently been awarded diplomas in the Theory of Gemology:

Donald E. Kaufman, St. Joseph, Missouri; **Peter Adler**, Barney Adler & Sons, Inc., Montreal, Canada; **Alvin J. Goldberger**, Pine Bluff, Arkansas; **Roger M. Levi**, Kruckemeyer & Cohn, Evansville, Indiana; **John T. Carpenter**, Carpenter's Jewelers, Camp Hill, Pennsylvania; **Virgil Pratt**, Pratt Jewelers, Alturas, California; **Joseph E. Ball**, Ernest V. Ball Jewelry, Akron, Ohio.

Book Review

by

Dorothy Dignam

Feature Writer and Researcher on
Diamonds

JEWELS AND THE WOMAN, The Romance, Magic and Art of Feminine Adornment, by Marianne Ostier. Published by Horizon Press, 220 West 42nd. Street, New York 36, 320 pages, 60 halftones, color pages on the birthstones. Price \$7.50.

Books on jewelry are pretty well typed. They tend to be chronological reports on changes of style, material, and the goldsmith's art. If you're building a jewel library, acquire these elaborate editions as you can. But right now, for everyday use, buy *Jewels and the Woman* and keep it in the store. There has never been a handbook with so much "inside stuff" on feminine adornment. Put slips of paper as markers in the chapters on earrings, the etiquette of jewelry, and advice to wives on buying jewelry for men. There are ideas here that might put an important sale into orbit for you.

First, meet the author, Marianne Ostier. You may have seen that name in print before. Mrs. Ostier has written on design for JEWELERS' CIRCULAR-KEYSTONE. She has great talent for creation in precious jewelry. She and her husband, Oliver Ostier, operate Ostier, Inc., on Fifth Avenue. Mrs. Ostier won Diamonds U.S.A.

Awards for diamond jewelry design in three successive years.



Marianne Ostier, author of
Jewels and the Woman

Born and educated in Vienna, she married court jeweler, Oliver Ostier, while still a student at the Vienna Academy of Arts and Crafts. The couple came to this country before World War II and are now American citizens. In Vienna, they designed and made most of the magnificent diamond jewelry of Queen Geraldine of Albania, a portion of which was put on sale in New York last winter for benefit of Albanians now resettling outside the iron curtain.

Jewels and the Woman was not writ-



Award-winning jewelry designed by Marianne Ostier

Photo courtesy
N. Y. Ayer & Son, Inc.





Award-winning jewelry designed by Marianne Ostier
Photo courtesy N. Y. Ayer & Son, Inc.

ten for jewelers or anyone in the trade. It is replete with woman-sense addressed to other women and is all jewelry and ornament. No fashion folde-rol! Everything that a good gem book should contain is here: gemstones, birthstones, lucky stones, famous stones. But the big plus values for you are its many little pointers not found in any other book, whether the subject is fashion, etiquette, or gemology.

Here are selections that you might almost call Ostier epigrams:

Cosmetics are no more than a base . . . jewelers are the oldest and most proven help to beauty.

Earrings can do more to bring out a woman's best features than any other jewel . . . more tricks to them than makeup.

Red hair and a fair complexion . . . pearls may be worn if the luster is pink.

Too wide a band (bracelet) will tend to make the hand look boney.

Don't wear a clearly functional watch during social hours . . . your hostess should never sense that you are measuring the time you give her.

You wouldn't caution a high-school girl about wearing her sport shoes with a formal. She'd know. But when it comes to jewelry appropriate to the occasion, most women haven't the haziest idea.

At a large social gathering, among strangers, a well-designed jewel or beautiful parure sometimes offers a pleasant opening for general conversation. This leads to mutual interest and generates friendly ease. (More original than the weather, anyway!)

A diamond clip should never be

worn on a fur or stole to be left over the back of a chair in a restaurant or hanging in the hall closet at a home party. Decide in advance what jewelry to wear and where to wear it; this means what jewel placed where in relation to the costume.

A gourmet never smokes before the coffee; a woman of taste never wears diamonds before lunch. In the evening, conversely, no leather, wood, or silver.

In itself, the lorgnette can be a beautiful jewel. In the hands of a graceful woman, it can embellish her beauty, considerably.

A woman must remember, in selecting dress and jewels, that she is the living symbol of her own or her husband's significance.

On an ocean voyage, there will be no time to change clothes between cock-tails in a private suite and the captain's dinner. (Mrs. Ostier, by the way, encourages smart women to take some of their good jewelry to Europe with them because of much entertaining over there, and gives several pages to travel, care, insurance, and customs. Read this section of the book; know all the answers.)

Whatever a man needs he probably has, but this should not deter you from pleasing him with another gift. New cufflinks, for instance, may remind him of some recent event in his life or career.

For an especially significant gift, have the jeweler's box embossed with the initials of the recipient and the date of the occasion. The box then becomes a treasured part of the jewelry gift.

*Being a book about beauty, *Jewels and the Woman* is a beautiful book in*

(continued on page 318)

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.

Color and Transparency

The *color* of a mineral, as determined by inspection of fresh surfaces in reflected light, can be a very useful means of identification, especially if it is interpreted with caution. Color is a constant and diagnostic property for some minerals, such as magnetite, pyrite and galena, but varies considerably in many others. Most of the gem minerals show such variations, not only from one occurrence to another, but even within single-zoned crystals. Further, the true color of a mineral commonly is masked by surface alteration to films of one or more other minerals; corundum, garnet and

olivine are good examples. A few minerals, particularly those with metallic luster, have tarnished surfaces that do not represent the true color as observed on fresh breaks.

Most colored minerals are said to have *body color*, because the light reflected from them owes its color to selective absorption of certain components of the white light that is incident upon them. This white light penetrates appreciable distances into a given mineral and is robbed of certain colors before it is reflected back to the observer. *Surface color*, on the other hand, is due to selective reflection of certain colors at the *surface* of the mineral. It is well shown by pyrite, native gold and many other minerals that are opaque and have metallic characteristics of reflection.

If the color of a mineral is due to one or more properties of the mineral itself, it is termed an *inherent color*.

Inherent coloring, in turn, can be a function of the kinds of atoms or ions in the crystal structure, of the manner in which they are bound together (i.e., the effect of bonding upon their electronic configurations), of various types of structural imperfections in the crystal, or of some combination of these factors. The compositional effect generally is the most important, and can be demonstrated very clearly by the correlation between color and composition in such mineral groups as the pyroxenes, amphiboles, epidotes, garnets and tourmalines. The nature of the bonding between atoms also is very significant in some occurrences, and is well illustrated by the marked differences in color and transparency of the carbon minerals diamond and graphite.

Atoms (or ions) of iron, manganese, titanium and chromium are the most common coloring agents in gem minerals. The specific color imparted by one of these (or other) elements depends upon its state of oxidation and upon the manner in which it is distributed and bound within the crystal structure. Ferrous iron, for example, imparts a greenish to brownish coloration in some minerals and little or no color in others, whereas ferric iron commonly gives pale to very deep yellowish, reddish and brownish colors; if iron is present in both states of oxidation, a deep-blue color commonly results. Where two or more kinds of coloring atoms are present, their effects generally are blended.

Many elements that are abundant in minerals have little or no influence on color, and transparent crystals that are formed only by elements of this type are colorless. Among such elements are oxygen, silicon, aluminum, beryllium, calcium, magnesium, sodium, potassium, and under certain conditions, carbon. It is scarcely surprising, therefore, that so many of the silicates, carbonates and aluminates are colorless or white.

The inherent color of many minerals is modified or even masked by coloration due to impurities, and such coloration commonly is said to be *exotic*. Some impurities have a very strong coloring influence, even though they may be present in little more than trace amounts. Iron and manganese oxides are particularly effective coloring agents of this type, and commonly occur as scattered tiny inclusions that are physically distinct from the host crystal. Impurities that are chemically combined, in the sense that they occupy various regular positions in the crystal structure, also can have strong effects upon color. Such colors, however, are not ordinarily referred to as *exotic*. Excellent examples are the green color beryl receives from a little chromium, the red color that corundum receives from a little chromium and titanium, and the pink color of muscovite and purplish color of quartz that are ascribable to minute amounts of manganese.

Color of a different type is caused in some minerals by thin films, lam-

nae, or other defects in the crystal structure, or by minute inclusions or particles that are not colored themselves. The defects can exist over a wide range of scales, but in general are large as compared with the size of individual atoms or ions. Some of them cause interference or diffraction of light to produce *play of color* (opal) or change of color (certain varieties of labradorite). Tiny oriented inclusions can cause a pearly or milky adularescence, as in the moonstone variety of orthoclase. Absorption of light by certain ions or atoms in disturbed crystal structures also can give a coloring effect, and the smoky color in some quartz and the colors in some varieties of fluorite, for example, have been attributed to ion dislocations caused by radiation from nearby radioactive minerals.

The *transparency* of a mineral is essentially an inverse measure of its ability to absorb light. Many minerals have this ability to such a degree that they are opaque even in the thinnest slices. The metallic sulfides and some native elements are good examples. Most of the gem minerals, however, are transparent, at least in thin splinters, and are transparent, milky or translucent in thicker masses. This is especially true of the light-colored minerals, but even very dark-colored ones like hornblende and some tourmaline are seen to be transparent when examined in the form of small or very thin fragments. Similarly, extremely thin films of magnetite are

transparent and purplish gray in color.

Although very small fragments of most nonopaque minerals are quite transparent, large fragments and masses rarely are clear. Colorless minerals, for example, appear milky and white, and many colored minerals give a false impression of complete opaqueness. This general effect results from the repeated diffused reflection of the transmitted light from the surfaces of numerous fractures, cleavage cracks, inclusions, cavities and other tiny flaws within the minerals. Some of the imperfections may have developed during growth of the crystals, as already described; others may have been formed by later contraction during cooling of the crystals; still others appear to have resulted from exsolution of other minerals during cooling. Innumerable cracks also are formed by still later stresses that are applied to the crystals in rocks. And finally, the milkiness in some crystals is due to the development of tiny scales, needles or grains of secondary minerals by alteration along fractures or other openings.

Streak

The *streak* of a mineral is its color in powdered form, and commonly differs somewhat from the color shown by the mineral before it was powdered. This property is more constant than gross color, and is most helpful in the identification of very dark-colored or opaque minerals, es-

pecially the sulfides and some of the oxides. Most of the transparent minerals have a white streak, and hence cannot be distinguished on the basis of this property alone. The streak of such minerals can be useful, however, for recognizing some exotic colors, which disappear or become very faint when the mineral is powdered.

The streak of a soft mineral is best obtained by drawing an edge or corner of the specimen across a plate of unglazed porcelain (streak plate). A streak of the powdered mineral will remain for inspection on the surface of the light-colored plate. Minerals that are harder than the streak plate can be powdered by percussion, and the ordinary hammer marks on a trimmed specimen generally yield the required streak data in the form of adhering mineral powders. These powders can be inspected in place, generally with the aid of the hand lens, or they can be rubbed off onto a sheet of white paper for further examination. In determining the streak, care should be taken to powder fresh fragments of the mineral, lest a false color be contributed by alteration products.

Luster

The *luster* of a mineral is the appearance of its surface in reflected light, and is independent of color. Minerals whose surfaces resemble that of a typical metal are said to have *metallic* luster, and those with only a partial resemblance of this kind are said to have *submetallic* luster. All other kinds of luster are classed as *nonmetallic*. Minerals with metallic luster are opaque or very nearly so, and include many of the

native elements and the sulfides, as well as some of the oxides. Minerals with nonmetallic luster can be further classified in terms of their surface appearance. The chief designations used are adamantine (diamondlike), vitreous (like a broken surface of glass), greasy (like oily glass), pearly, silky, icy (like melting ice), resinous (like the resin of pine trees) and earthy. The *intensity* of luster can also be classified between the brightest and dullest limits, and the terms generally used are splendid, shining, glistening, glimmering and dull.

Luster varies for different specimens of some minerals, and even for different crystal faces or cleavage surfaces of a few species. The property is highly characteristic, however, for most minerals. It is especially useful for distinguishing certain minerals from others that resemble them, and even slight differences in the lusters of such species can be recognized by a practiced eye. Some beryl, for example, can be easily mistaken for quartz, but it has a slightly oily or greasy luster that, once recognized, serves as a surprisingly reliable means of distinction. The difference between greasy luster and vitreous luster is useful in much megascopic work, but the investigator should be cautioned that many laboratory specimens of minerals with vitreous luster take on a greasy or oily appearance after repeated handling.

Specific Gravity

The *specific gravity*, or *relative density*, of a substance is the ratio of its weight to the weight of an equal volume of water at 4°C., and can be expressed by the simple formula:

(continued on page 318)



Cincinnati Diamond Class

Members of the Cincinnati, Ohio, Diamond Evaluation Class, which met July 6th through July 10th. Seated left to right: H. L. Hosack, Oxford, Ohio; William Stratman, Batavia, Ohio; R. Paul Wisener, Wapakoneta, Ohio; Miss Dorothy Sanders, Richmond, Ind.; Frank A. Garrett, Cincinnati; Donald J. Merkley, Louisville,

Ky.; Ralph E. Braun, Xenia, Ohio. Standing left to right: Charles Tebelman, Cincinnati; Thomas Welling, Reading, Ohio; Gordon Zweigert, Maysville, Ky.; Bertram Krashes, GIA instructor; Lewis E. Zimpfer, Minster, Ohio; Russell Diskete, Milford, Ohio; Harley B. Britton, Cincinnati; John C. Dillon, Middletown, Ohio.



Cleveland Diamond Class

Members of the Cleveland, Ohio, Diamond Evaluation Class, which met June 29th through July 7th. Seated left to right: John M. Yurick Akron, Ohio; John R. Kerr, Saegertown, Pa.; David L. Rossio, Cleveland; Robert P. Farrell, Cleveland; Carl M. Levy, Cleveland; Max Davis, Toledo, Ohio; Floyd Silver, Cleveland; R. E. Armstrong, Jr., Toledo, Ohio; Noel

Mascher, East Palestine, Ohio; Joseph W. Mayne, Cleveland; Roger C. Herrick, Oberlin, Ohio. Standing left to right: William G. Nelson, East Cleveland; John M. Longheier, Massillon, Ohio; Lawrence E. Ball, Akron, Ohio; Forrest D. Wolf, Wadsworth, Ohio; Harold Neiman, Akron, Ohio; Gustave Julian, Parma, Ohio; Bertram Krashes, GIA instructor.



New York Diamond Class

Members of the New York City Diamond Evaluation Class, which met April 20th, through April 24th. Standing left to right: Alex J. Stein, Bridgeport, Conn.; Irwin Davis, Bridgeport, Conn.; Philip Silverstein, New York City; Bertram Krashes, GIA instructor; Martin Siegel,

Trenton, New Jersey; Russ Scalzo, New York City; Samuel Kind, Princeton, N. J. Seated left to right: W. B. Fielding, Madison, New Jersey; Mrs. Polly Baker, Knoxville, Tenn.; Dorothy Stifler, New York City; Frank Scaramazzo, Hoboken, N. J.; Charles H. Derby, Rahway, N. J.



Pittsburgh Diamond Class

Members of the Pittsburgh Diamond Evaluation Class, which met June 22nd, through June 26th. Standing left to right: M. S. Morrow, Pittsburgh; Michael Martino, Altoona, Pa.; Larry Friedman, Clairton, Pa.; Leonard B. Morris, Coraopolis, Pa.; Louis Mente, Carnegie, Pa., Robert N. Hackett, Pittsburgh; Earl Freilino,

Leechburg, Pa.; Dale Taggart, Slippery Rock, Pa. Seated left to right: John Sturtsman, Johnstown, Pa.; Felix Palone, Jr., Crucible, Pa.; Mrs. Margaret Knapp, Johnstown, Pa.; Mrs. Lillian R. Franz, Carnegie, Pa.; Mrs. Mildred R. Bord, Frafton, West Virginia; Alfred Land, Bluefield, West Virginia.

The Diamond Evaluation Classes, which cover GIA's diamond appraisal system and important diamond merchandising features, are open to any jeweler. The purpose of these one-week classes is to teach diamond evaluation and appraisal; therefore,

the major portion of the classwork is given to supervised practice in color, imperfection, proportion and finish grading, and the final pricing. The 1959 classes were scheduled the early part of the year for major cities throughout the nation.

Book Reviews

THE WORLD OF JEWEL STONES, by Michael Weinstein with color illustrations by Mme. B. Middlerigh-Bokhorst, and her husband J. J. Middlerigh, published by Sheridan House, New York, N.Y. 419 pages and index. Price \$10.

The rate at which books on gemstones are being published seems to be increasing. A recent addition to the growing list is *The World of Jewel Stones*, by Michael Weinstein. Weinstein wrote a book on gems a number of years ago, but this is not a second edition of the same work.

On the dust cover, the publisher states, *About once in a generation there is written a definitive book on a great subject. This is the great book on gems and jewel stones for the present time.* It is hardly that. So long as Mr. Weinstein confines himself to discussions of the various gemstones, the book is interesting and fairly accurate. However, he elected to write on the formation of gemstones and physical properties, as well as gem identification. Unfortunately, these subjects were not too familiar to the author; therefore, these sections of the book are more confusing than edifying.

There are many inaccuracies, some of which were undoubtedly made in the effort to keep this book simple for the layman. They have the opposite effect. With the exception of these sections, Weinstein's discussions of the various gemstones contains enough of interest to create some demand for his book.

MINERALOGY, An Introduction to the Study of Minerals and Crystals, by Kraus, Hunt and Ramsdell, 5th edition. 661 well-illustrated pages, bibliography and index. Published by McGraw-Hill Book Company, New York. Price \$9.

A new 5th edition of the valuable Kraus, Hunt and Ramsdell *Mineralogy* has just been published. In the 39 years between its introduction in 1920 and the announcement of the 5th edition, this book has become a widely used mineralogy text because of the clarity and logic with which it is presented.

The latest edition is changed in a number of respects from the 4th, published in 1951. The principal changes were undertaken to bring the work up to date, but certain chapters were rewritten entirely to reflect interim findings in the constantly developing research in the mineralogical field.

Perhaps the most important changes include the addition of a section on crystal chemistry to Chapter 13, the reorganization and rewriting of *The Formation and Occurrence of Rocks and Minerals* (Chapter 14), and many changes and additions in the long section entitled *Descriptive Mineralogy* (Chapter 16), covering all of the important minerals. No basic changes were made in the chapter on gemstones, except those required to bring it up to date.

A new edition of this worthy text after eight years is welcomed.

Gemological Digests

Kimberley, South Africa

The diamond digger, one of the most romantic figures in the history of South Africa, is slowly but surely on the way out. The last digger's certificate was issued in 1927; therefore, all present certificate-holders are over fifty years of age. In 1927, there were more than 4,000 diggers, but today there are only about 800. It has been stated that over a period of ten years, at Nootgedacht, 150 diamond diggers found diamonds valued at approximately £750,000 or an average of £60 per month.

Famous Diamonds

It has been reported that the 102.55-carat champagne-colored Aschberg diamond, one of the world's largest and most beautiful diamonds, is to be sold in Stockholm. It is said to have been part of the Russian crown jewels and brought to Stockholm after the Revolution.

Vatican City

A diamond-and-gemstone tiara worth approximately \$65,000 has been presented to Pope John XXIII. The crown, shaped like a beehive and weighing slightly more than two pounds, is set with twenty diamonds, sixteen emeralds, sixty-eight rubies and seventy pearls. The tiara was presented to the Pope by the people of Bergano, an area in northern Italy where Pope John was born, grew up and worked as a young priest.

Diamond-and-Sapphire Nail Files!

Thousands of sharp, infinitesimal diamond and sapphire crystals form the abrasive surface of a new type feather-light nailboard. It is said to be more sanitary than the customary emery board, since it may be sterilized without affecting the rustproof finish and it is also more durable than the conventional manicuring tool.

\$13,000 Diamond-Grinding Wheels

A six-inch-wide wheel, containing hundreds of carats of tiny diamonds and costing \$13,000, has been added to the facilities of the Raytheon Corporation, producer of microwave electronic tubes. The wheel has paid for itself in a year through the savings realized from faster production, better quality finish and reduced scrap. After a year's use, the wheel shows only slight wear.

Industrial Diamond Research

It has been reported that De Beers Diamond Research Laboratory in Johannesburg, South Africa, has been doing intensive research on increasing the effectiveness of natural industrial diamond so that it is superior to any man-made diamond abrasive. As a result, the improved product, which is used for grinding wheels, is claimed to be 40% more efficient than the abrasive previously used, and will give a diamond drill a considerably longer life.

Diamond Digging in Arkansas

40,000 tourists visited the Murfreesboro, Arkansas, diamond mines, last year, to try their luck in finding these elusive stones, but only 125 small diamonds were recovered. The well-publicized find of a 15.3-carat stone, in 1956, seems to have whetted the interest of the treasure-hunting tourist. Mr. Howard A. Millar permits diamond-seeking visitors to do their own digging on his property for \$1.50 per person, per day. Mr. Arthur Slocum of Murfreesboro, has been screening the turned-over tailings for about a year and he reports that he has recovered about 600 diamonds, of which approximately one-third might be called cuttable material. Others of a cloudy nature, which have some commercial use, bring \$5 to \$7 a carat. The size and quantity of the stones prohibit extensive mining on a commercial basis.

BOOK REVIEW

(continued from page 309)

itself. The typography is so clear and the pages so open that you can "skim" or read for study, as time permits. There are more than sixty illustrations. The rich, plum-colored jacket is adorned with the picture of one of Mrs. Ostier's most successful diamond necklaces. Best of all is the great discretion in text — not a line that might be construed as a bid for private-customer business. Read this book yourself, and then think of it as a special gift to women you know who could buy far more jewelry from you than they would if only mildly interested. *Jewels and the Woman* will get them interested — could even make a sale for you.

FORMATIONS OF MINERALS

(continued from page 313)

Specific gravity of X =
(weight of X in air)

$\frac{\text{(wt. of X in air)} - \text{(wt. of X in water)}}{\text{(wt. of X in air)} - \text{(wt. of X in water)}}$

This property is a function of the kind or kinds of atoms in the substance, and of the manner in which the atoms are arranged. Thus galena, the lead sulfide, has a specific gravity of about 7.50, whereas alabandite, a manganese sulfide with the same crystal structure, has a gravity of only about 4.00. The difference here is mainly a reflection of the difference between the weight of the lead atom and that of the manganese atom. The effect of the crystal structure, the other main factor, is well illustrated by the contrast between the specific gravity of diamond (about 3.52), in which the carbon atoms are relatively closely packed, and that of graphite (slightly greater than 2.00), in which the arrangement of the carbon atoms is much more open (*Figure 10 in the Spring 1958 issue and Figure 11 in the Summer 1958 issue*).

Accurate determinations of specific gravity can be made only by means of special instruments or by appropriate use of heavy liquids. It is possible to make rough appraisals of gravity by hefting specimens of minerals or rocks in the hand, and an ability to do this easily can be developed to a surprising level of sensitivity with practice. Careful hefting provides an excellent preliminary approach to the identification of many rocks and coarse-grained minerals, especially those that are exceptionally light or heavy.

Many of the common minerals have specific gravities in the 2.5 to 3.0

range. These include quartz, the feldspars, calcite, muscovite and biotite. Others, in a somewhat higher range, include the pyroxenes, the amphiboles, corundum, diamond, epidote, olivine, garnet and zircon. Common minerals with low specific gravities include ice, gypsum, halite and kaolinite. In general, the minerals of low specific gravity are relatively soft, whereas those of very high specific gravity either are hard or contain substantial percentages of heavy-metal atoms. It should be evident that these features and the crystal structure of minerals are interrelated in a fundamental way.

L. A. LAB NOTES

(continued from page 298)

effect on jewelry-store illumination. The unit will be distributed to the trade through the GIA Instrument Department and will be available in two models: one without the system of baffles for general store illumination, and one, with baffles for the jewelry department.

"GEMOLOGIST"

A customer's acquaintance with Gemologist Wm. R. E. Hebert, Keller & George Jewelers, Charlottesville, Virginia, suggested to him an appropriate name for a colt. The colt was sired by Royal Gem II, so "Gemologist" seemed appropriate to prominent New York attorney, Walter D. Fletcher, whose horse farm is located in Virginia. When asked, Hebert thought it a fine name for a promising colt; therefore, he was greatly pleased when GEMOLOGIST won his first race at Belmont Park recently. With *that* name how *could* the horse lose!

We are grateful to gemologist John M. Wise, Baltimore importer, for a specimen of synthetic spinel that had been produced as a substitute for lapis-lazuli.

Martin Ehrmann, C. G., gemstone importer of Beverly Hills, California, recently presented the GIA with several cut-and-polished sphenes. These will be put to good use in our display cases and also will be used for demonstration in our classes.

A donation recently received from J. A. Eschenbacher, gemologist-jeweler, St. Paul, Minnesota, consisted of an assortment of stones that will be used to good advantage in our student practice-stone sets.

A recent donation to the GIA's collection was a 2.34-carat golden-brown synthetic rutile brilliant. This was the gift of H. R. Benedict & Sons, importers and cutters of New York City. The stone has the appearance of a rich golden-brown zircon, and it does not show the great amount of dispersion that is so noticeable in most synthetic rutiles of lighter tones.

