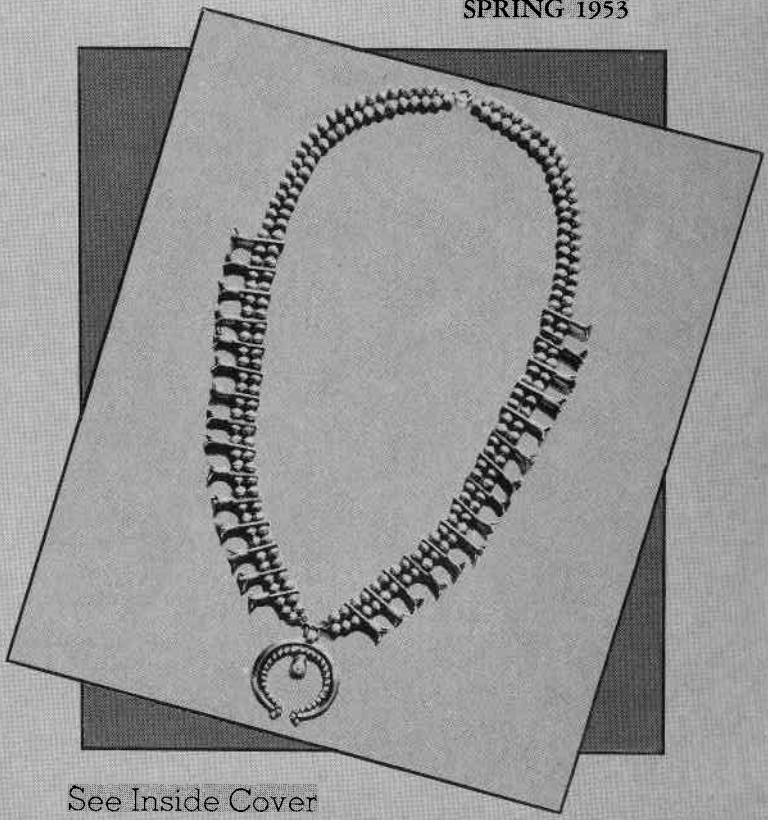
Gems and Gemology

SPRING 1953



See Inside Cover

Gems & Gemology

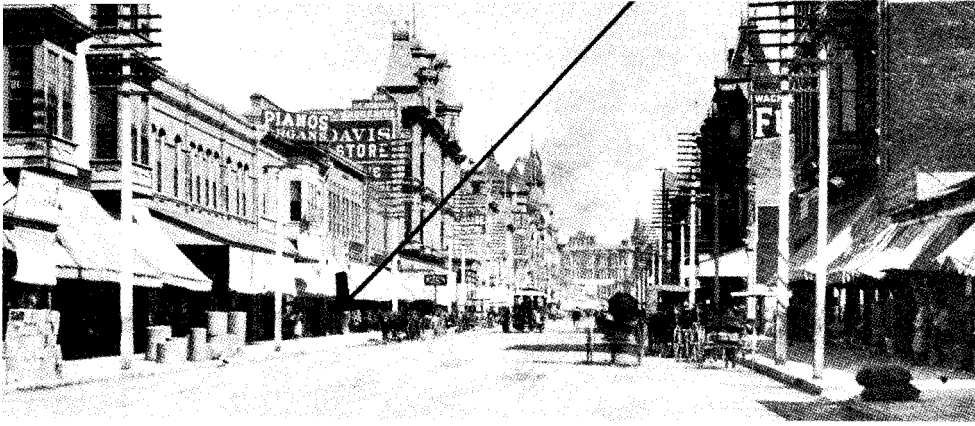
VOLUME VII SPRING 1953 NUMBER 9

IN THIS ISSUE

On the Cover

One of the typical designs used by the Indians was the squash-blossoms or pomegranate as illustrated in the silver and turquois necklace shown on the cover. Courtesy The Southwest Museum, Los Angeles.

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.



• Spring Street in Los Angeles, looking north from Fourth Street, late in the last century. Location of Pacific Gem Company — later to become Marcher Brothers — is indicated by arrow. *Courtesy Security-First National Bank, Los Angeles.*

PAGES FROM A JEWELER'S NOTEBOOK OF MEMORIES

by

GEORGE MARCHER, C.G.

AFTER finishing my High School Education in 1899 in the small town of Tomah, Wisconsin, I was taken in tow by my brother Frank—15 years my senior—and whisked off to California in October of that same year.

This brother — who has always been known in the family as " F. A."—had already been out in the world more than 20 years and had acquired supreme confidence in himself. On the other hand, I was so green I could taste the chlorophyll that marked my appearance to all looking in my direction. I had everything to learn, and I realized it too well to feel the self-assurance every salesman should have. Yet, I earnestly wanted to learn what I could and to correct my deficiencies.

On January 1, 1900, we opened a store featuring unmounted gemstones and adopted the slogan, "Genuine Stones Only." This was at 335 South Spring Street in Los Angeles, one block south of the center of town. To the best of my knowledge this was the first store in the country to specialize in unmounted stones, and to mount them to the customer's order—as well as to display a stock of similar handmade articles ready to sell.

During this decade of the century sim-

plicity of design characterized jewelry. Wire-shanked rings, with plain six- or eight-prong settings, were often chosen for holding garnets, amethysts, "topaz" and similar facet-cut gemstones – even for diamonds *(Figure 1)*. When cabochon stones were mounted,

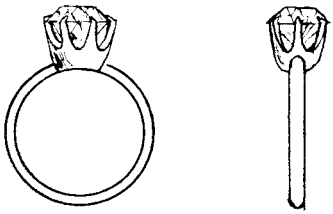


Figure 1

this same dainty wire shank was used attached to a box setting to hold the stone. Beneath the box, usually there was a finger-form bezel and frequently there was a simple twist wire put around the box for decoration *(Figure 2)*.

Figure 2

The next ring type, a better and more expensive one, which practically completed the list for rings, was the original Tiffany style. This consisted of a shank that was practically half round, flat on the inside, and tapered right up into the six- or eight-prong setting holding the stone. However, unlike what is usually known as a Tiffany mounting today, it had no frills between the prongs. No girl was properly engaged unless she was given a diamond ring of such a style – and strictly a solitaire *(Figure 3)*.

Before long we were to learn that there were Tiffany rings—*and Tiffany rings!* The wholesale houses had been selling bunches of a dozen or more by the pennyweight. Theoretically these mountings met all the qualifications for that style, but something seemed to be lacking.

Soon we acquired a new workman Arthur W. Ballard—who had come to Los Angeles from Omaha where he had been making many such rings. He had not had any artistic training, but he used his head as well as his hands, and he had developed good taste and beauty in his workmanship. A well-trained artist will tell you that a simple vase made without any decorative details, or even a handle, may be composed of gracefully curving lines and be of pleasing proportions that remain an enticing delight to the eye. And he will point out as proof the classical outlines of the architectural columns of Ancient Greece as eternal examples of simple beauty.

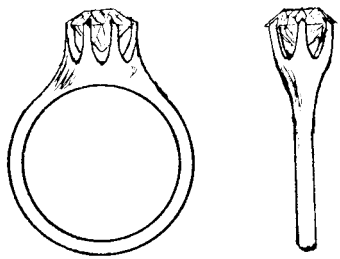
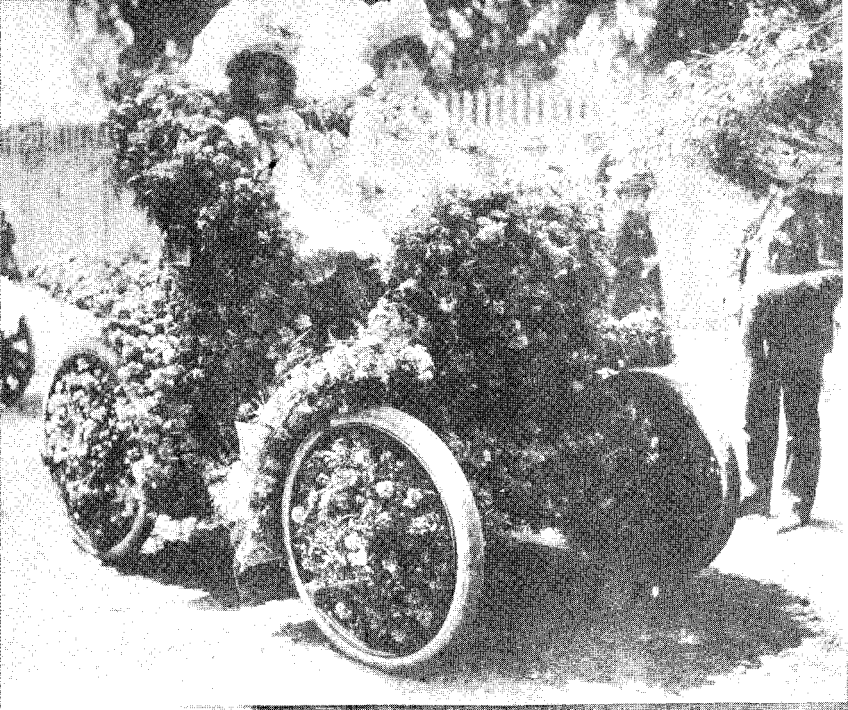
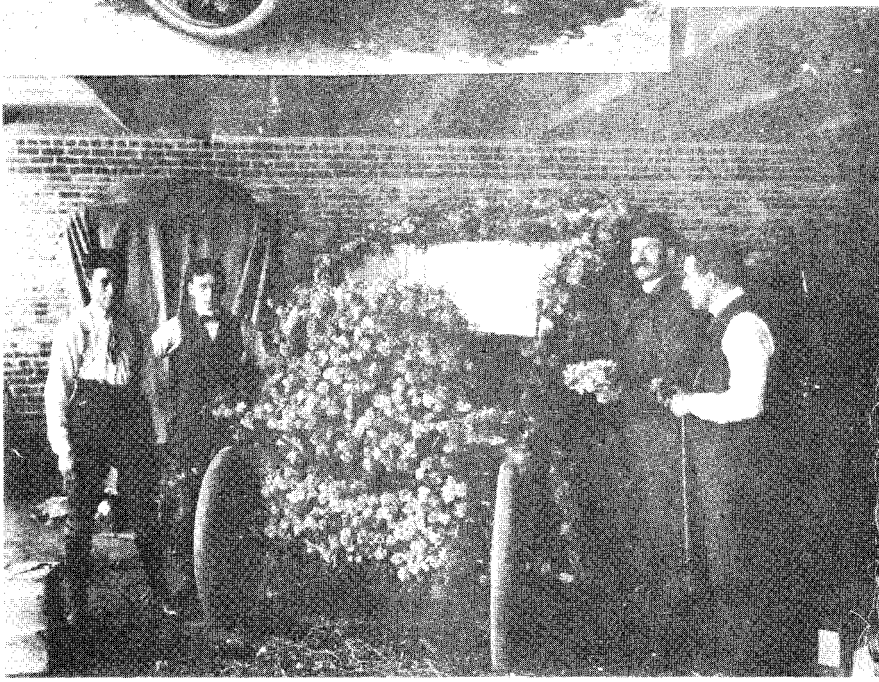


Figure 3

Turning back to Mr. Ballard's tasty workmanship, he gracefully tapered the shank right up into the prong part of the ring, then gently rounded the edges under the top where it touches the finger. This simple improvement brought us a good deal of extra business, yet I cannot recall that any competitor made mountings like them.

For passers-by—and for a "taster" of what might be seen inside– we built along the front of the lower deck of one of the win-





• On Fiesta Day in Los Angeles Mrs. F. A. Marcher (right) and daughter Berenice ride in the family electric which is being decorated in the photograph below. Left to right are seen Emil Liebert, Frank Stansfield, F. A. Marcher and Will Tarr.

dows a trough for a row of electric lights covered with a strip of plate glass. This we covered with rough pyrope garnets that had been very slightly oiled to improve their transparency. Sometimes we intermingled them with rough peridots for a contrasting and pleasing effect. This induced many people to go into the store to see what else might prove unusual.

Our store set-up was unique. On one side was a short string of showcases—three as I recall. The one nearest the window was made to order and was designed particularly for the display of loose, or unmounted, stones. It was about 32 inches high, about that of a dining room table, and was supported by legs instead of a counter, which enabled us, as well as our customers, to be seated and have plenty of room for our knees underneath for comfort.

The plate glass top was low, only about four inches high inside, which would not permit us to reach in for the merchandise, but it did allow the customers a close view—a very desirable feature. To reach the stones the case was provided with six large, standard-sized jewelry trays, 11¾ x 23½ inches, and each in turn contained boxes, of black velvet lined with white satin, except a few that were lined with black for opals and moonstones. Of course, behind each large tray was a door to keep out dust and flies. To remove the small trays readily a scallop was put into one side of the tray for a finger hold while the straight side at the back provided a good place for a label.

Now when the 72 little trays were supplied with their respective quotas of carefully assorted qualities and sizes of gems and when they were juggled about to get them into harmonious color relationships and to avoid clashes such as dark garnets next to pale amethysts (horrors!) and when several trays of one kind were scattered to emphasize diversity, this uniquely colorful display proved fascinating to the tourists.

Of lesser importance, but still worthy of noting, we constantly kept a soft, black velvet pad on this case and always tried to keep it under a gemstone being shown in tweezers to avoid breakage if the stone should be dropped. Furthermore, its black color was effective for showing opals and moonstones.

In a shallow drawer under the case, in which we kept job envelopes and a few other needfuls, we also kept a thin pad of white second sheets cemented at both ends by our printer. This served two purposes: (1) It provided a white background to exalt the color of most stones when under consideration in selling, and (2) it covered and avoided the distraction of other stones below.

The store faced east so we carefully located this case up next to the display window on the north side. Thus, we could hold faceted stones conveniently opposite the customers' eyes from the daylight illumination, and thereby impress them better with the brilliant beauty of the faceted gems.

On the opposite side of the store, behind other showcases, we had a string of noisy lapidary equipment, which extended the entire length of the store. The purpose of having this all within view was to demonstrate to the public that we were actually lapidists. It was good. But a disadvantage later developed which annoyed us considerably. Two or three frequent visitors, who were not customers, would lean over the showcases and study the details of our equipment and the other mysteries of the lapidary art—in order to build shops of their own in competition with us!

Nevertheless, by keeping the store open from 7:30 in the morning until 9 or 10 o'clock at night, business was getting along pretty well—until suddenly a dark cloud appeared. It was the *sheriff!* His arrival was made at the instigation of one of F.A.'s creditors from a previous venture of his. For some reason, they had been unable to arrive at an agreed settlement. The deputy ensconced himself in an easy chair right by the closed and locked safe—to see that its contents were not removed! I thought the sky had fallen on us.

While in this humiliating predicament,

Mr. F. B. Silverwood of the Silverwood Clothing Company—who later was the composer of the still popular song, "California Here I Come,"—bought a $25.00 ring, without making any comment regarding the troubling visitor. To me that was a real ray of sunshine.

Indeed, we were in a desperate predicament. Seven hundred dollars was the amount involved. *Seven hundred dollars!* To me it seemed like seven thousand dollars. Old man Lyons, the New York stone dealer, surely had his thumb on our jugular. Nearly everything my brother owned was inside that big safe and there beside it, slouched down comfortably in an easy chair, officially and lawfully unsympathetic, sat the stern old deputy. Rent and other expenses were piling up, and how long could we eat? F. A. had but little money in the bank—the Citizen's National Bank, then at 3rd and Main Streets —and very little in his pocket. When he visited the bank in "hopes," the cashier said "Attached? Did you say your stock is attached? No! Sorry. Very sorry." No one else that he knew had that much money. As for me, I had nothing and knew no one. It was all a blank wall without even a window to see through.

But F. A., who was always a good pinch hitter, figured out a scheme with the aid of his attorney, old man Rose, to twist out of this headlock—if it would work. His wife's jewelry. Old L. B. Cohen, the pawnbroker.

The next morning Rose came down to the store to help in the plan, if need be, and I was let in on the secret maneuvering so I could help in case of need. Then F. A., who was always the best looking member of our family, putting an extra twist into the waxed ends of his handsome mustache and flashing an easy and airy expression into his blue eyes, like the kitten that ate the canary, sidled up to the old deputy still so comfortable in his close-fitting chair.

"One of my good customers who is leaving town today," he declared, "has a little piece of junk here in the safe and it would save considerable trouble all around if I could give it to him. Would you mind?"

• **Herman Bosshard, gem cutter for Pacific Gem Company, later known as Marcher Brothers.**

"Oh, I guess so," he grudgingly responded.

While the old fellow remained in his comfort, F. A. unhurriedly worked the combination, and fished around inside till he found what he wanted besides the "customer's little job."

"Who the devil put this bit of trash in here," he ejaculated as he threw an old bunched-up stocking out on top of the safe. Clanging the door shut, F. A. stepped over to the minion of the law to confirm the worthlessness of the customer's job while Rose tossed the old stocking into the wastebasket. With the kitten-like expression still on, F. A. thanked the deputy for his graciousness and went to the wastebasket for a scrap of paper to wrap the job in (and the trashy old stocking). Everybody felt good.

After all it's a beautiful world we are living in.

The old stocking went to Uncle Cohen, the money to Lyon's attorney, and we back to business as usual—free again.

Those were the days of starched shirtwaists, large billowy sleeves, and swishing petticoats. Sometimes the girls wore five, six, or even seven of these rustling garments —I think. The skirts were so long they swept the sidewalk, and the men—instead of paying overparking tickets—paid $5.00 fines for spitting on the sidewalks. Those were the days of the chamois skin bag in which ladies pinned their surplus diamond jewelry safely inside the tops of their stockings—I think. They were the days of extreme modesty, long before the advent of the capacious handbag, and when an extra costly gemstone had to be paid for it became quite a problem for the lady to bring forth another chamois skin bag, containing extra money, from the other stocking top—I think.

Those were the days when the girls' cheeks were all white—very white. And they wanted only small gemstones—from a half carat to three or four carats in size. Larger seemed vulgar.

These fair customers approved of pale blue turquois, pale aquamarine, and pink tourmalines. They had a high appreciation of "subtle effects" in their choice of jewelry. They never dreamed that there would one day be motion picture actresses who would introduce the style for large stones in rings that would weigh as much as 100 carats each, and for mammoth citrinites*, amethysts, and aquamarines that would weigh up to 600 carats each in bracelets.

Those were the days when imitation jewelry was made to look as real as possible, instead of dropping all such pretense. Those were the days when the best gemstone substitutes were garnet topped doublets of various colors. They were the days when every retail jeweler was the enemy of every other retail jeweler.

*This is my choice of nomenclature for citrine or topaz quartz.

During my diversified experience I have seen the advent of several gemstones into the market as first timers.

As nearly as I can recall, in 1901, Mr. L. B. Cohen, a Main Street pawnbroker—a friend of my brother's—brought in a large paper of black opals. To the best of our knowledge, none had been seen before in the country.

The paper contained, probably, 300 carats ranging in size from about 1.00 carat to 4 or 5 carats each. After a little negotiating we bought them for $125.00. That was an excellent stroke of business. They were properly dark and displayed good fire and lucidity. They were the beginning of an important business with this gem, particularly after another firm, Walton and Company, years later recognized their great merit and specialized on them. This firm bought only the finest quality obtainable and dramatized them by the finest type of mountings with diamonds. Their pieces ranged from $100 to $5,000 each. This gained for them an international reputation.

Shortly after our bit of good fortune in getting this original lot of black opals, another gemstone opportunity came to us right out of the blue sky. In fact, according to Kunz, it was known among our North American Indians as a "fragment of the sky." It was turquois—blue, blue turquois.

For us, this stone was destined to become the very cornerstone of our business. It happened this way. One bright sunny morning a blue-eyed, broken-nosed, stubby-built old miner—lugging an ore sack over his shoulder —came in, put down his burden, and asked us to look at some turquois he had been mining in Mineral Park, Arizona. Putting some paper on the counter to protect the glass, we spread out some of the stones for inspection. It was then that I saw for the first time this historic old gemstone in the rough. Some of the chunks were as thick and large as your hand. Of course these large pieces, as well as the smaller ones, were not all solid turquois but were profusely intermingled with masses and veins

• Mayor Meredith P. Snyder (1919-1921) goes for a spin with F. A. Marcher (right) in his Waverly Electric.

of the brownish mother rock, or matrix.

Yes, we bought the lot, cut it, mounted it, sold it and—in course of time—we bought various other lots like it from him. This old Arizonan, by the way, was reported to be "quick on the draw" and well able to take care of himself in that rough country of he-man rule.

Back to the turquois—it was not long before we had built up a stock sufficient to fill entirely one of our show windows and one of our showcases. Mr. Carl Entenmann, a grand old red-whiskered German manufacturing jeweler—in our opinion the best one in Los Angeles at that time—did our jewelry work. Vividly do I recall the good-looking wire-shank, finger-form, box-set rings that he made for our three or four carat turquois, which usually had a distinct marking of matrix across the top. Usually we ordered them made with an "English finish" and sometimes a "rose finish" but they were never polished bright. I'd like to see others now made like them.

Besides rings, we made and sold many scarf pins, and dumb-bell cuff links made with a gold ball or a bean on the end opposite the turquois.

Another item that seems somewhat characteristic of that period—particularly in our store—was the necklace, which was modestly worn outside the collar about two inches below the neckline. Usually the design called for a graduated pattern of seven to 15 stones suspended from a medium-sized chain about the neck, with lighter weight chains festooned from stone to stone in front. Sometimes drop-shaped turquois, drilled and mounted at the small end, were fringed into the arrangement. Soon we installed equipment to make beads of turquois, which we sold in lengths of 18 to 20 inches.

Our crudely designed lapidary equipment, with its heavy overhead line shaft with a series of belts leading down to ten- or twelve-inch carborundum wheels, and other equipment resulted in heavy electric bills each month. In an effort to avoid some of

this expense, F. A. conceived the idea of putting in our own power plant.

Consequently, a 10 or 20 horsepower gas engine and a generator were bought and installed in a back room on heavy cement foundations to lessen the noise. This did reduce the expense, but every pop of the gas engine produced a pulsation in the speed of the generator and a variable pulsation in our lighting. Then, too, our gas engine proved to be fully as temperamental as the automobiles of those days, and would stop popping and our lights would go off. When this occurred one of us would have to rush back, switch on the city current, prime the gas engine and then rotate the heavy three- or four-foot flywheel to get it started again. At first we had the electric company concerned for fear others might install their own plants, but it proved to be another "best laid scheme o' mice and men.'

While we were successfully building our business with turquois, one of my schoolmates—by the name of Will—came to Los Angeles. He was honest, studious, industrious, mild and pleasant. Jobs were hard to get, but he finally got one with a small cleaning and pressing establishment. While doing some cleaning outdoors in our warm California sunshine, the gasoline ignited and one arm and both hands were severely burned. After he returned from the hospital without money, and without a job, I persuaded my brother to take him into our shop to learn gem cutting. He proved to be a good dependable workman and through our friendship Will gained an intimate knowledge of the excellent profit we were making on turquois, and how it was done.

After he had been there a year or two, and vacation time had again arrived, Will left for a week's rest. For some reason his week proved to be a long one. Sometime during the third week we received a curt note from him announcing that he was not coming back, but henceforth would be in a business of his own, with a partner. In his exuberance he stated in part—"We have bought the Haas property. Hereafter you will not be able to buy your turquois for a song, and sing only the first verse." Thus, right out of the sky a large piece of the blue fell away. My brother gnashed his teeth and said things. But that is the way competition often works in this good land of ours. We did not have the foresight to secure a more permanent connection for our supply.

Soon Will and his backer opened a lapidary* a few blocks away from us to specialize in turquois, and Will was put in sole charge. Being without experience in managing a business, he soon found himself in serious financial difficulties, and his backer had to come here from Wisconsin to save the business, and Will was relegated to Arizona to work the mine. But that is another story.

Fortunately, we had a modest amount of rough on hand and before long material from another source came to our attention. It was in California, in the extreme northeastern part of San Bernardino County near a place then called Manvel. Much of this turquois came in nuclear form, instead of being deposited in jagged seams, or one-time cracks in the rocks which later became cemented together again with turquois. This latter quality, which characterized what we had been getting from Arizona, produced good-looking matrix turquois, while the nugget type contained parts within the lump that had no seams or flaws, which we designated as gem turquois. Both types were popular, but the gem quality sold for five to ten times as much as the other. Now and then from these nuggets we obtained exceptionally large flawless gems for which we obtained prices ranging from $100 to $500.

One day a very old lady, belonging to one of California's distinguished families, came in and sat down at the gemstone counter. F. A. waited on her. She wore no jewelry, was dressed in black – probably mourning attire—a poor-looking prospect.

When people came in as if visiting a museum just to "oh" and "ah" over the

*It is my belief that "lapidary" refers to the shop or equipment, while the cutter is known as a lapidist.

stones, F. A. would show them but scant courtesy. Having appraised this prospect as another timewaster, he thought he would put her in her place. He put before her our finest gem turquois—a 50 carat stone. "How much is it?" she softly inquired. "Five hundred dollars," he replied. "I'll take it," said she. F. A. immediately snapped to attention. His demeanor abruptly changed. Those words from such a seemingly unpromising prospect flashed an impulse along a certain nerve in his anatomy that turned on all the suavity and charm at his command. Of course this contact later resulted in a good deal of business with her.

To digress a moment, I will briefly relate a story that went the rounds among rug dealers about that time. A certain Armenian, who had been having a tough struggle getting established in that business, happened to contact this lady. She liked rugs. Before long he sold her so many rugs and allied merchandise that he became sufficiently prosperous to go on a buying trip to New York. But he had to leave his store in the hands of an inexperienced boy unused to so much responsibility. After giving profuse instructions to the young man what to do when the prize customer came in, he left Los Angeles for the big market. Among the things bought was a certain rug for about $200, which he felt sure would please this special customer. Not yet ready himself to return, he shipped his new stock home and wrote in careful detail to his boy-manager of what to do when the lady came in. Above all things, he admonished, "don't price this rug too cheaply."

Soon after the new stock came and was unpacked this principal customer came in. She was delighted with this best rug, and asked, "How much is it?" "Fifteen hundred dollars," he replied, with some trepidation. "All right," said she, "I'll take it."

This momentous accomplishment by the young salesman completely upset him. Her words tingled along a different nerve from F. A.'s. The boy fainted, and fell over on the rugs. This so agitated the frail and elderly woman that she too fainted, and fell on the rugs. She was taken to the hospital briefly, then returned to her home. The sale was never consummated, and she died soon thereafter. As a sequel to this strange story, her executors later called on this rug dealer and various other merchants, including us, and urged us all to take back many things and refund the amounts paid for them. But this, I understand, did not meet with much success.

Let us now return to a more concrete consideration of turquois as it concerned us, as well as some of its vicissitudes in the gemstone market. One of our competitors, who devoted his lapidary facilities almost altogether to trade work, took an active part in this gemstone market. He was William Petry, a German of unquestionable integrity and a reputation for excellence of workmanship. Soon after our source in Arizona was snatched away from us, the nugget variety proved to be a source of more and more importance. We found that many customers preferred the flawless gem turquois to those marked with matrix and they would pay a higher price for it.

Mr. Petry had a distinctive style of cutting the little oval stones that gave them a good deal of class, and made them look different from the imitations that then crowded the market. He gave the stones a little extra height and developed a sort of crest over the top, as if a round conoid were stretched endwise into an oval, and instead of flattening the back and beveling the edge he convexed it slightly *(Figure 4)*. When

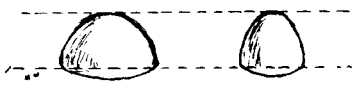


Figure 4

we matched up a graduated set of five stones and mounted them into a "hoop ring," this

style of cabochon cutting gave zest to the design and proved very popular *(Figure 5)*. Sometimes we would nestle little diamonds into the corners at the end of the stones *(Figure 6)*. Two or three times we bought all the gem turquois Mr. Petry had on hand. This gave us a better opportunity to do matching in color, shape, and size.

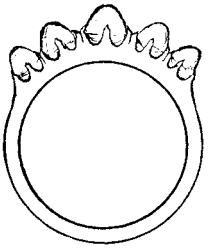


Figure 5

Figure 6

Before long other deposits of turquois were found, especially in Nevada, and each locality produced a type that differed more or less from all the others. One such source in Nevada produced fine, hard, clear blue stones that were nonporous and, therefore, quite permanent in color. A New York firm, the Azure Turquois Company, recognized the opportunity it presented and bought the property. Each stone that came up to a certain standard was marked with a tiny circle on the back, and the stone was guaranteed not to change color. Following this lead another New York firm, the Aztec Turquois Company, adopted the idea but put a cross on the back of their stones for identification, and for a trademark. Now, after nearly half a century, these trademarked turquois are occasionally found.

All of this activity with turquois finally convinced a local firm, Wood & Johns, that it could be exploited successfully at wholesale. Consequently, this firm — and soon others — made up rings, scarf pins, brooches, cuff links, and put their lines out all over the country. For two or three years it had quite a run of popularity, then began to waver. At this stage Mr. Wood, who knew at first hand the true situation, offered F. A. a job lot of several hundred dollars' worth at very attractive prices. Sold.

But it devolved upon me—who was then on the road with loose stones—to resell it. The fun was over. The market had become saturated and people, seemingly as of one mind, began to think turquois was not so pretty. Having sold so much during the years gone by, I could not easily accept such an idea.

While I was struggling with it up in northern Michigan somewhere—in Petoskey, I think—a kindly old "curio dealer" (a term that used to be applied to those who dealt in more or less curious articles of interest to tourists) contended that it was not saleable merchandise. To clinch his argument against my contrary opinion he declared, "You have shown it to me, I do not want it; if you show it to the man across the street, he will not want it; then offer it to the man down the street, he will not buy. Surely we are not all crazy."

According to the saying "What goes up must come down," I have seen turquois in the ascendancy three times within my experience. Why should this have occurred? My version of the answer is about as follows:

Its color is distinctive in that it does not overlap that of any other important gemstone. It is sufficiently showy for popular appeal, yet it conveys a considerable degree of refinement. In other words, it is not gaudy nor is it, like lapis lazuli, too subdued for popular taste. It can be had in tiny sizes or very large ones if desired. Under artificial light it retains all its vigor. Its price range, too, is favorable.

But another important influence has con-

tributed strongly to its repeated runs of popularity. Having been found in so many localities in Arizona, California, Nevada, New Mexico, and Colorado, many mine owners have at times lent their combined efforts to promote its sale. By this I do not mean that they did much to promote appreciation of it, but they enlarged its market gradually so more retailers displayed turquois, and as best they could, made it attractive to their customers. People of means lead the procession of buyers for the good articles while the manufacturers struggle to produce cheaper and cheaper articles for the general mass of buyers who continue their interest after those who led the procession have turned to something else.

One of the detrimental features of turquois is its greater or lesser degree of porosity. All opaque stones are not completely opaque. If an opaque gemstone displays a certain hue of color it is due to the fact that white light, if that is the illumination, penetrates the stone a short distance before a portion of it is reflected back—due to the lack of homogenity in the stone. During this course of travel certain component parts of the light are absorbed, while others are more freely transmitted and reflected.

In the case of turquois it is the blue components that survive. The deeper this light penetrates before it has been reflected, the more thorough is this filtering process and the more intense is the blue. But if the turquois is quite porous the light is reflected back by the myriad of minute surfaces before much filtering can take place, thereby causing a paler color.

Snow is intensely white because of the vast number of tiny reflections. Now if you place a drop of water on, say, a pink blotter, the wet spot appears a deeper pink because the water, having a higher optical density than air, allows the light to penetrate deeper and become more intense in color when it has been reflected back.

Similarly, if we soak porous turquois in water, its color is deepened, but when it dries out its paleness returns. Sometimes the miners, having learned of this wet trick, would soak their rough material before showing it to us. If our suspicions were aroused by the specially bright color, or by an extra strong mineral odor, we would take a piece to our Bunsen burner and pass it back and forth through the flame to dry it out, then confront the miner with the evidence and bargain for the rough to better advantage.

Back again to the porous cut stones. Since water would evaporate so quickly we all had to turn to something that would prove more lasting and paraffin ultimately proved best. But turquois so treated was not made equal to grades that were of equal color without being paraffined. Hot weather seemed to cause the greasy substance to travel inward away from the surface, and soap and water and general wear attacked it from without. Furthermore, minute particles of dirt of all kinds eventually joined with the surface paraffin and gave it a dingy appearance. Turquois so treated could be readily detected by heating it to a degree that would melt the wax, which would expand and float out on the surface, giving it a wet appearance.

Soon an important market for turquois began to develop in the Indian country of Arizona and New Mexico, and it was there that we sold large quantities of turquois to the Indian Traders, some of which was paraffined and some not. For a long time it made little difference whether or not it was so treated.

F. A. made the trips into that territory after huge quantities had been accumulated in our lapidary at home. Some sales were made for cash, some on credit, and others—many others were trades for Indian rugs, runners, and pillow tops, as well as Indian jewelry, which always contained turquois. By marking these things up a bit, and reselling and consigning we made ready for another batch.

Gradually competition increased. Certain dealers began to specialize in turquois for this Indian business and some of them ob-

tained leases on the best producing mines. Later some of the Indian Traders themselves leased some of the better mines in Nevada and Colorado, which tended to concentrate the turquois business where it was most used. We had other gemstone interests and, not caring to combat the heat of the summers and the coldness of the winters in that region, faded more or less out of the picture.

Some further sidelights on this important gemstone I think will prove of interest. Matrix turquois lent itself particularly to the barbaric type of silver jewelry and it soon preempted the use of the gem to the exclusion of all gold jewelry. When a fine blue piece was found suitable for gem turquois it was left, perhaps with a bit of matrix on the side, and was put right in with the others regardless of its gem possibilities.

One of our competitors, a German, learned how to color turquois through his connections in Germany, and he did quite a thriving business with soft pale material otherwise almost worthless. This was not just an intensification by filling the pores, but was done with the regular iron formula that stained the surface and penetrated a short distance into the stone. By placing a drop of ammonia on the back of such a stone, the beautiful blueness faded. He always sold it without any misrepresentation.

An importer, the late Walter Smith, who made regular trips to and from China, showed us some baroque-shaped turquois beads that were crudely blocked out and tumbled to make them smooth and nearly polished, then were artificially colored and dipped in hot paraffin in lieu of a polish. They looked good. Feeling certain that they would sell readily in the Indian country, we a bought about a bushel and sold all of them on F. A.'s next trip.

When ordinary matrix stones were given the final finish, polishing was done with oxide of tin or putty powder. Some of this white powder nearly always remained in the tiny crevasses that characterized such stones, but we found that a touch on a rough buff replaced the unsightly white with a richer color. Since neither one could be readily washed out, it seemed just as ethical to leave a dark powder in these markings as to allow the white to remain. Later when worn, say on the finger, this dark powder would become replaced gradually with other substances, but the appearance would remain about the same.

Before taking these stones out to sell, we would cover a large table with a white cloth, dump all the stones on it and assort them carefully according to color and amount of marking. Otherwise, stones with heavy markings alongside those with scant matrix would make the latter seem insipid; similarly dark blue would damage the appearance of the paler ones if in the same paper.

In January, 1935, after I had terminated an unsatisfactory partnership with F. A., I decided to visit the market in Arizona and New Mexico in order to sell the turquois acquired in the division of our stock, and to learn at first hand more about this "Indian Trade."

A friend, who wanted to contact owners of some gold mining properties, accompanied me. The Great Depression was still dragging on and my old Buick had absorbed too much of that leanness to be very efficient. On the way to Albuquerque — our first important stop — a desert rain poured upon us with such fury that we could hardly see the roadway. The dips put into the pavement instead of culverts were filled with water. In one case the water was too deep and we were driving too fast and we came too near an accident far away from anywhere.

On arriving in Albuquerque and visiting the tourist section I was, naturally, quite impressed with the general growth of the city since my former visits about 25 years previously. Several curio stores featured Indian jewelry, all of which was made of silver and nearly all mounted with matrix turquois. To the tourists from the middle states the display of two or more show-

(Continued Page 287)

La Belle Helene; A Type II Diamond

by

DR. J. F. H. CUSTERS
Diamond Research Laboratory,
Johannesburg

IN the Fall 1952 issue of *Gems and Gemology* a short note on the famous 160 carat "La Belle Helene" has appeared. It may be of interest to give some more particulars of this diamond which was carefully examined at the Diamond Research Laboratory in Johannesburg before it was sold, and which was also found to be remarkable from a scientific point of view.

The diamond was of the fairly rare Type II, the common type being classified as Type I. Later, some characteristic differences in the properties of these two types will be given.

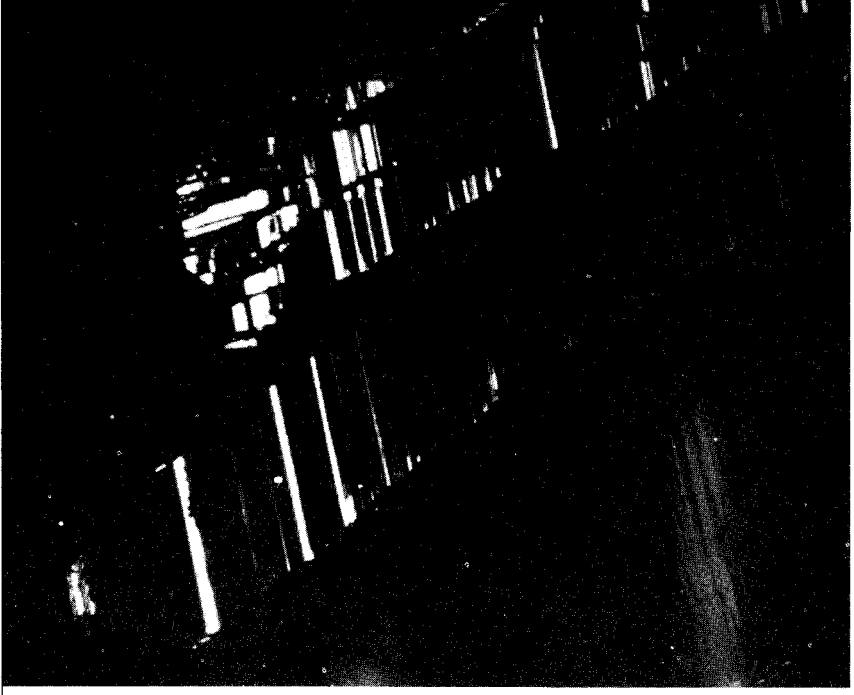
It is estimated that about one in a thousand diamonds is of Type II. Their frequency of occurrence is, however, very varied for the different diamond mines in South Africa. As these Type II diamonds are of scientific interest, the Diamond Research Laboratory regularly searches for them among the large collections of industrial stones which are sorted in Johannesburg. We have not yet come across a Type II diamond from Wesselton or Bultfontein Mines. They are, however, occasionally found in the alluvial gravels near the mouth of the Orange River in South-West Africa, and "La Belle Helene" was one of these.

The Premier Mine at Cullinan, on the other hand, produces a high percentage of Type II diamonds. Actually, we do not know of any other mine where so many of these unusual diamonds, most of which are of industrial quality, are regularly found. The Premier Diamond Mine is known for the great variety of diamonds which it produces. Among these are cleavages, graphitized diamonds, round black stones similar to carbonados, brown industrial stones and also many diamonds of gem quality. It would seem that the diamonds in this pipe were formed under conditions which were different from those in many other mines, and that they were carried to the surface rather rapidly, at temperatures and pressures far from a state of equilibrium. This might explain the occurrence of so many cleavages and the fairly high percentage of graphitized diamonds; diamonds will readily graphitize at high temperatures and normal pressures when oxidizing agents are almost entirely excluded.

In the following some of the differences between the two types are given:

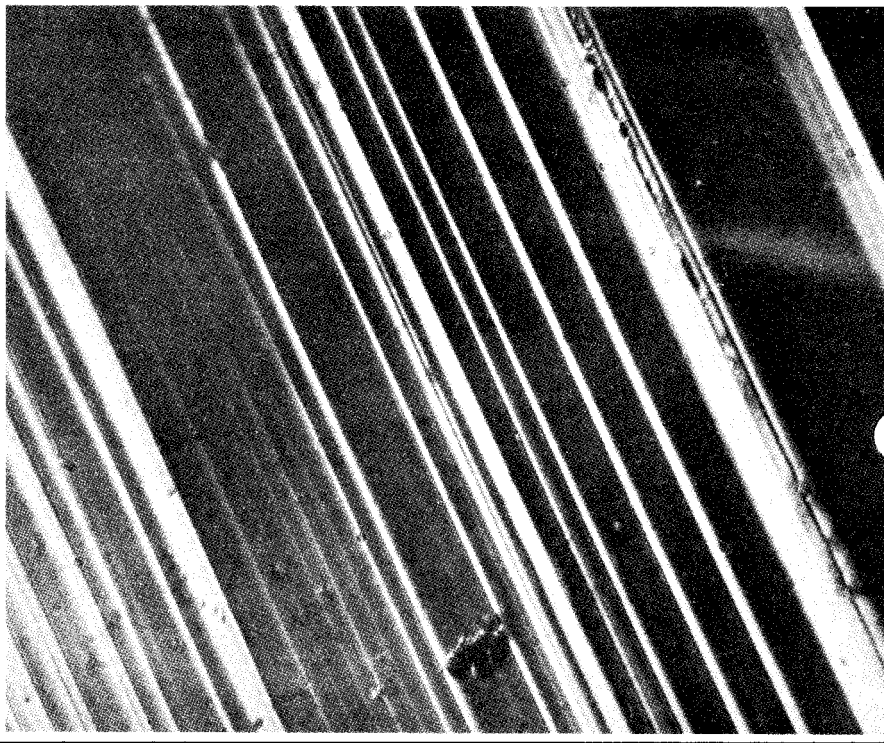
1. Type II diamonds are laminated, whereas Type I stones are not.

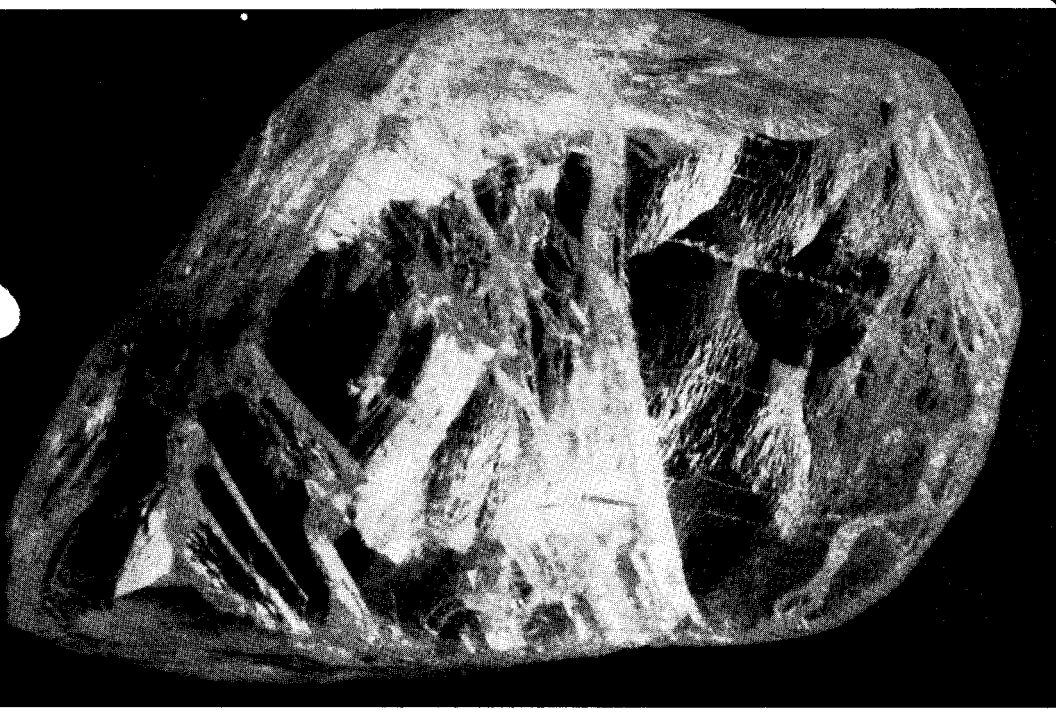
Two photomicrographs taken from a cleavage face of the "La Belle Helène" are reproduced in *Figure* 1. The striations are clearly visible and they point to the diamond being built up of layers. These layers are



• Photomicrograph showing natural cleavage face of the La Belle Helene. Magnification 22½x.

• Striations typical of Type II diamonds are clearly visible in this photomicrograph of La Belle Helene. 290x.





• La Belle Helene in the rough state. Magnification about 5x.

parallel to the cleavage planes, that is, the four octahedral planes.[1]

2. Type II diamonds are transparent in the ultraviolet part of the spectrum down to about 2250 Angstrom-units; Type I diamonds are transparent to about 3000 Angstrom-units only.

3. Type II diamonds do not fluoresce when irradiated by ultraviolet light, sometimes called "black light," as emitted by a high pressure mercury vapor lamp with a nickel oxide filter. Every Type I diamond will fluoresce, mostly giving a blue color, while others will display a yellowish green color. Generally, however, the fluorescence of Type I stones is weak.

These are the most important and striking differences in properties, although there are others, such as their behavior with regard to absorption in the infrared part of the spectrum, and also the different counting properties, (for alpha-particles and gamma-rays) of these two types of diamonds.

Quite recently, evidence which points to the existence of two classes of Type II diamonds, namely Type IIa and Type IIb[2], has come to light. These show different phosphorescence when irradiated by short wave ultraviolet light of wavelength around 2500 Angstrom-units, while their electrical conductivity also differs. A Type IIa diamond will not phosphoresce, and will not conduct electricity, whereas a Type IIb stone phosphoresces strongly emitting a bluish color, and can carry a strong electric current when under a potential difference of 100 volts. "La Belle Helene" was of Type IIa.

Up to now there appears to be no relation between the type of a diamond and its quality as a gemstone. Some Type II diamonds are light brown in color, others like the "La Belle Helene" are of the finest white color.

This 160 carat diamond, of which a reproduction is given in *Figure 2*, showed one large and two small cleavage faces. The

(Continued Page 287)

Mexican Opal

by

DR. WILLIAM F. FOSHAG

Head Curator, Department of Geology, U. S. National Museum

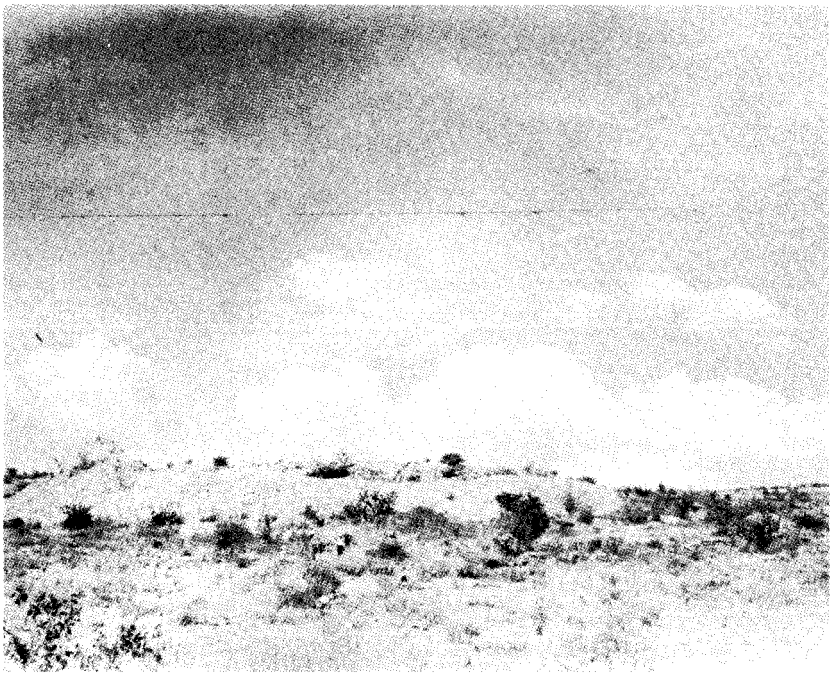
ALTHOUGH the Mexican opal has been an object of trade for more than one hundred years, there exists much confusion and many misconceptions about this interesting gem. Despite the showing of this stone at some of the early expositions, its market in the United States appears to have always been limited. There has been a wide diversity of opinion regarding the merits of this stone. Burnham *(Precious Stones in Nature, Art and Literature,* 1886) said of it: "The fire opal, the most resplendent of all the different kinds of this wonderful gem, is found in the greatest perfection in porphyry at Zimapan." On the other hand Castellani *(Gems. Notes and Abstracts)* is of the opinion that "The common opal is of very little value; the Mexican red is of less; the Oriental is very much esteemed."

The poor reputation of the Mexican opal is probably due, in large part, to the oft repeated statement that it is an unstable stone, quick to dry out and crack. This statement, made in all textbooks on gemstones, is so similar in all its expressions, that one suspects that it has passed down from one "authority" to another without critical examination. My own experience with Mexican opals has been quite the contrary. I have found only one stone which, within a few weeks after mining, showed any appreciable change. This stone, almost transparent in body quality, became slightly milky, thereby diminishing its fire. Hundreds of others show no cracking or deterioration in quality after many years in museum cases and drawers. Rather than being an unstable stone, I would say it is the most stable of the opals.

Perhaps, too, the poor reputation of the Mexican gem results from the widespread distribution of inferior stones, material without fire, or very little of it, leading to the impression that the Mexican opal is a dull and lifeless gem. Fine quality stones are rare and no great numbers are available, even on the Mexican market.

I believe that the connoisseur, who knows the finest examples of Mexican opal, will agree with me that they are not only unsurpassed in beauty, but are unique in character. There is, of course, a difference of opinion as to which variety is the best.

The American trade has shown a distinct preference for the fire opal, the orangy or red-colored stone of translucent body, with abundant interior fire of red and green spangles. There are some dealers who will state, categorically, that this is the only kind that will sell. The *lechosos,* or milk opals, are too similar to Hungarian opals to command much attention. The *azules,* almost transparent with a blue opalescence, and vivid flecks of burning red and cooling green, is a stone of entrancing beauty. In this writer's opinion the *lluviznandos* (you-vees-nahn-does) *(lluviznar*—to sprinkle with rain) is the opal that exceeds all other opals in beauty because of its distinctive and lively pattern of colors. In the high plateau of Mexico



• **Esmeralda Opal Mine near Queretaro, Mexico.**

there are frequently very local showers during the rainy season. When the sun shines through such a slanting shower each rain droplet reflects its individual minute rainbow, as a shaft of moving color. The *lluviznandos* have this character. Shafts of color, sometimes minute, sometimes bold, penetrate an almost transparent body of bluish or faint topaz opalescence with each movement of the stone.

The Mexican opal, except for the *lechesos*, differs from the better known Australian opal and the now rare Hungarian opal in the limpidity of its body. Only in the *lechesos* does one find the mosaiclike pattern at the surface of a dense white stone. In the more characteristic stones the colors move through an almost limpid body giving the play of colors a movement not shown by other types of opal.

The Queretaro opal, the only Mexican opal available today, is characterized by its particularly vivid red and green reflections. It is unusually rich in a hyacinthine red, while the green has the shade and quality of quetzal feathers. Orange and yellow flashes are less commonly conspicuous.The rare blue is a deep gentian or metallic blue. In general, the colors of the Mexican opal are more varied in a single stone than in other types.

The body of the stone may vary from a clear, almost glassy transparency to dense white opacity. Commonest is a translucent, almost transparent, stone with a pale bluish "water in milk" opalescence or a faint wine yellow color. This may grade to a "thin" milky white, usually with a concomitant loss of fire. The fire opals range from wine yellow, through topaz yellow, resin yellow,

orangy brown to cherry red. There are also dark gray to black opals. The fire may be in broad spangles, small flecks, even pin points of color, or in the shafts of light of the *lluviznandos*.

Naturally black opals, with fire, have been reported. The black opals that are occasionally offered now at low prices are impure white stones that have been carefully heated, a process that turns these impure stones black in color. These heated stones are very brittle and can be broken in two easily between the fingers. This heat treatment has been referred to in some of the earliest accounts of the Mexican opal fields, many years before the Australian black opal was known.

Because of the transparent nature of the stone and the interior fire, a high cabochon is the most appropriate cut, rather than the flat ovals such as one frequently sees in other opals. Large stones are not common, and cabochons an inch in diameter would be considered large stones among Mexican opals. The fire opals without fire but of good topaz yellow or orange color are sometimes faceted, usually step-cut. They are soft and brittle, and except for interesting nuances in color have nothing to commend them.

The prices asked for Mexican opals are usually much lower than those asked for Australian stones of equal or comparable merit. Most of the best quality stones find their way to dealers in Mexico City. Weston's Curio Shop, on Avenida Madero, often has fine stones to offer. Prices in Mexico City are double those of Queretaro, where the stones are cut. Before the war, German and particularly Japanese buyers visited Queretaro and often purchased good stones. Fine stones found their way into the United States only haphazardly. Prices in Queretaro varied enormously according to quality. Polished opal, without fire, could be purchased for as little as five cents; fine large pieces of best quality would fetch several hundred dollars. It has been reported that as early as 1890 some stones sold for as much as $3,000. Bargaining is the rule in trading with the lapidaries, but a concession of 20 per cent was hard to obtain. Purchasers are sometimes invited to a "sight" at five o'clock, when the evening light shows the stones to best advantage. A small table, covered with a black velvet cloth, and covered with a selection of fine opals is something to admire under these conditions.

Opal vendors meet all trains at the Queretaro railroad station. Junk opal and imitations are freely offered, but never good stones. Initial prices are high, but drop rapidly as departure time approaches, until, at the "all-aboard" signal no reasonable offer is refused. Since cherry red stones, even without fire, are in good demand, considerable automobile taillight glass changes hands at the stations. Another good sales item is a glass "replica" in which two pieces are joined together by an iridescent film. Many station dealers have added "amethyst" and "aquamarine" to their stock in trade .

To find good opal one accompanies a station merchant to his home where the fine stones are held for the regular buyers. In order to inspect a reasonably good assortment it is necessary to arrange a sight a month or two in advance in order to give the lapidary an opportunity to accumulate sufficient stones for a fair showing. Today it is difficult, even under these arrangements, to find an outstanding stone. Some fine gems can sometimes be found at Tequisquiapan, a supply point for the Carbonera Mine, and perhaps occasionally at San Juan del Rio, a town on the Queretaro-Ixmiquilpan highway. Almost all the rough, however, finds its way to Queretaro, where it is cut, polished and marketed.

The Queretaro opal was first discovered by a servant of the Hacienda Esperanza in 1855, but there was no production until 1870 when Don Jose Maria Siurob of Queretaro located the Santa Maria Iris Mine. The fine stones secured during the next few years stimulated considerable activity. Many spots were in operation at one time or another, but within the last few years only the Carbonera Mine, not far from San Juan del Rio, and accessible

• Opal cutters at work in the patio of their home, Queretaro, Mexico.

most easily for Tequisquiapan, has been in operation.

Perhaps most famous of the opal mines is the Santa Maria Iris Mine, on the Hacienda Esmeralda. The mine is a wide opencast on a low rhyolite ridge, lying immediately by the side of the Queretaro-Cadereyta road. The broken rock on the mine dump shows abundant "pinta" or spots of precious opal. This mine was the largest and richest of the area, and produced a wide variety of opal of superior quality.

Mineralogical literature mentions a number of localities in Mexico as yielding opal. Principal of the early recorded places is Zimapan, state of Hidalgo. Today one cannot find an opal in Zimapan, nor is there any knowledge of any nearby productive place. Since Zimapan is on the principal tourist road to Mexico, it is more than likely that any nearby source would be diligently exploited. It is not unlikely that the source of early Zimapan opals was part of the region that now supplies Queretaro with rough material, the change being induced by the arrival of the railroad to Queretaro. This opal-bearing area occupies a zone of low rhyolite hills that extends from the vicinity of San Juan del Rio to Colon, in the state of Queretaro. The city of Queretaro is the trade center for this area. The rhyolite in which the opals are found is a rather soft reddish or flesh-colored rock disposed in an accumulation of rather thin lava flows. In many places this rhyolite shows an abundance of lithophysal or irregular steam cavities and it is in these cavities that the opal occurs as a later silica filling. Sometimes the opal does not completely fill the cavity but

forms a loose concretionary mass resembling a dried prune or almond in shape. If such a nodule should show much fire, a gem of the highest quality results. Usually the opal is well attached to the rhyolite, in which case the matrix must be chipped away. Masses as large as a hen's egg have been reported but they are very rare. Certainly a mass as large as a pigeon's egg would be considered an excellent find. Much material recovered is, of course, worthless, or nearly so. High quality opal is extremely rare.

The opal mines are worked as open quarries. The rock may be broken down by dynamite, or black powder, and then stacked in a pile to be broken and sorted later under the supervision of an overseer. The rock is broken into a two-inch size or less in order to explore all reasonable possibilities. Usually the cavities of the lithophysal rhyolite are completely filled with opal, intimately joined to the rock. Sometimes the opal occurs as loose nodules in the cavities. Such nuggets may produce the finest opal, for they remain undamaged by breaking away the matrix. On the other hand they sometimes fracture upon grinding. I have seen such loose nodules as large as a pullet's egg.

About once a week, when the mines are in operation, the rough stones are taken to Queretaro and sold to the cutters. Cutting is a home industry, the master of the house, sometimes aided by a son, being the sole gem-worker. The cutters fashion the stones on foot-operated grindstones, shaping them to a symmetrical cabochon. The stone is then further prepared on sandpaper disks of increasing fineness on a hand-operated wheel and the stone finally polished on a soft rough leather or chamois lap.

Other Mexican localities have been mentioned but now yield no gem production. In fact, opal occurrences in these localities are generally unknown to the inhabitants of the places today. Opal of the finest quality was reported as occurring near Huitzuco, Guerrero, once a famous quicksilver mining town. The opal was described as having rich red and green fire. A particularly rare and beautiful form had a dark bluish gray, almost black, body illuminated by intense red reflections. Topaz yellow and pale reddish opal with red, green and yellow reflections was said to occur in a feldspar porphyry near San Nicolas del Oro, a small gold placer mining district in a remote corner of the same state. I have seen a specimen of milk opal with good fire at Coacoyula that came from nearby highly silicified rhyolites, but no commercial supply was evident.

Good opal has been reported as occurring in the Barranca de Tepezala, in the Cerro de las Fajas, Hildago; Tlaxiaco, Oaxaca, and Sierra de Mezquital, San Luis Potosi; all in rhyolitic rocks. Very large masses of pale salmon-colored common opal, very clean, pure and fractureless, has been found near Sisoquichic, in the Sierra de Tarahumare, in western Chihuahua.

The Mexican opal was known to the early Aztecs. Sahagun in his *Historia general de las Cosas de Nueva Espana* described the stone known to the Aztecs as *quetzalitzlepyollotli* as a "stone which appears to have many colors, and varies with the direction of the light; it is precious by reason of variety of its colors with the light." Specimens have been recovered from ancient tombs, and examples of the stone are to be found in the collections of the National Museum of Mexico. None found so far are important for size and quality. Occasionally an opal is offered on the market with the fantastic claim that it was once the possession of Montezuma. The invoices of precious objects sent by Cortez to the Emperor Charles do not list any such stones, although numerous objects of jade and turquois were included.

The Mexican opal certainly deserves a far wider acceptance in the trade than it now receives. In order to assure a steadier supply to support a wider market, higher prices are necessary to encourage the miner to search for and mine this very desirable stone. And much higher prices for this top quality stone are, in this writer's opinion, certainly warranted by the unsurpassed loveliness of this unique gem.

PECULIAR INCLUSION FOUND IN SYNTHETIC EMERALD

Editor's Note: *The following is a letter from G.I.A. student Robert A. Wells, Snyder, New York.*

It was with great interest that I read Robert Webster's article on the synthetic emerald in the August 1952 issue of *The Gemmologist*. Mr. Webster related that an inclusion, something like a three-phase inclusion in American Synthetic Emerald, had been found by Mlle. Dina Level of Paris, and reproduced a photomicrograph of this inclusion. It was also stated that Robert Crowningshield of the G.I.A.'s New York Laboratory had also noted such an inclusion in synthetic emerald but had been unable to retain the stone long enough to photograph it.

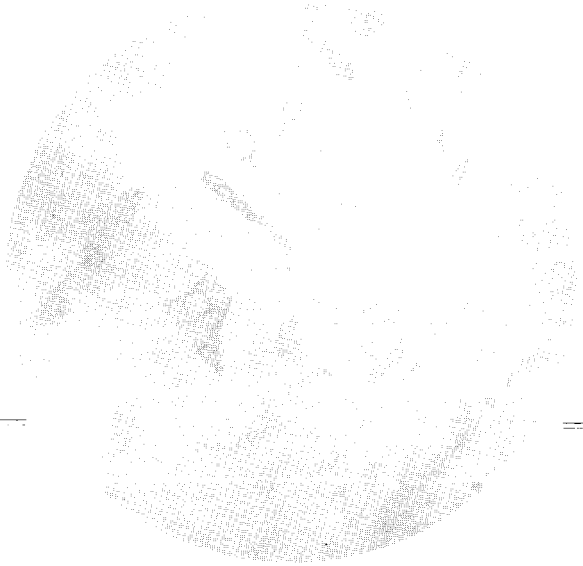
In an endeavor to correlate these findings, I began searching for a three-phase inclusion in Chatham Synthetic Emeralds. The accompanying photograph of an inclusion is for your consideration. I am not contending that the "shoe-shaped" inclusion is a three-phase inclusion. However, I do contend that its appearance is sufficiently "three-phaselike" to confuse the average jeweler-gemologist. This inclusion is readily discernible at 60x and its general appearance denotes a three-phase inclusion, i.e., a bubble and two square inclusions (cubic crystals?) within a negative crystal.

My personal opinion is that this inclusion is possibly a film of coloring agent. Note the spangles radiating from the round opening (bubble?) as described by Shipley, and reiterated in the Spring 1946 *Gems and Gemology* by Dr. George Switzer. As to the two square inclusions (crystals?) I have no explanation of this.

In reference to the Chatham Emerald used, I obtained the crystal from Matheson Stone House, Seattle, Washington. I originally found the inclusion at approximately 100x, using my Leitz Monocular, 16 mm objective, 10x eyepiece. The photomicrograph was taken at approximately 200x, 16mm objective, 20x ocular, at 160 mm tube length on "Super X" film, no filter. The contact print is approximately 90x, and the enlargement approximately twice that, or 180x. I'll have to apologize for the quality and workmanship of the photomicrographs, since my equipment is homemade and not the best available.

The elongated inclusion above the "shoe-shaped" inclusion appears to be a negative crystal filled with liquid containing bubbles. The large "squarish" inclusion appears to be a coloring agent film. Numerous liquid-filled inclusions are discernible, surrounding the other larger inclusions. *Robert A. Wells*

• **Chatham Synthetic Emerald. 180x.**



History of Diamonds in Wisconsin

by Edwin E. Olson, C. G.
Bloedel's, Inc., Milwaukee

California had its gold rush in 1849. Later came the great gold rushes to Juneau, Fairbanks, and the Yukon of Alaska. These events were all of great geological importance, and are now past history.

Wisconsin has had no "gold rush" but it does have its claim to fame through the discovery of diamonds, and fabulous, beautiful freshwater pearls.

The discovery of diamonds in Wisconsin—as well as in Michigan and Ohio—is of considerable interest to geologists as they are found in the terminal moraines of the great glacial sheet which is supposed to have spread southwards from the region of Hudson's Bay.

After considerable research and examination of old records, I have found that—although sparsely distributed—Wisconsin has produced some 20 diamonds in isolated areas. From their general shape and character, the diamond crystals found in the state are all rolled pebbles, having the appearance of a piece of alum or frosted surface material. It is believed that all were carried down by the great Laurentian Glacier, dating to the Ice Age of 25,000 to 30,000 years ago, and deposited with the debris of sands and gravel in the Great Kettle Moraine Valley.

The earliest report of a diamond found in Wisconsin was in 1876 when a 16¼ carat stone was found in Waukesha County—from which the stone took its early name. This is the first important link to Wisconsin diamond recovery and is recorded in the files of the Circuit Court of Milwaukee County, and of the Supreme Court of the State of Wisconsin.

Records reveal that the discovery was made during the drilling of a well by the Charles Wood's who were tenants on a farm of Devereaux near Eagle—a little town in Waukesha County. The drilling had extended through 40 to 50 feet of clay, and then through loose gravel of approximately 15 feet, when a six-foot layer of a hard yellow material was struck. During the process of penetrating this stratum, a hard stone of unknown identity was recovered.

Seven years later—in 1883—this peculiar pebble was taken to a Colonel Boynton in Milwaukee who identified the stone as "topaz" and purchased it for $1.00. Knowing it was a diamond, he later sold it to Tiffany & Company of New York for $850. This crystal, originally known as the Waukesha Diamond but later as the Eagle Diamond, is of a warm, sunny color and weighs 16¼ carats. It is now in the American Mu-

seum of Natural History in New York City.

Col. Boynton — who might conservatively be described as none too ethical — made his next move by salting the area with diamond crystals and forming the Diamond Producing Company of Wisconsin. The project boomed, and stock was sold by his associate diamond swindler. However, the deliberate attempted fraud boomeranged when the salted diamond crystals were proved to be of South African origin.

In 1880 a number of small diamond crystals were found in the river banks of Plum Creek, in Pierce County, the largest of which weighed three fourths carat. In 1893, a 4 carat diamond was discovered on the Charles Devine farm, 12 miles south of Madison near Oregon, Wisconsin. This stone was later sold to Tiffany's for $50. In 1903 another crystal was found in Racine County, and a diamond weighing 2.11 carats was recovered by G. Pufahl near Burlington. In 1908 it was reported that a diamond weighing 6.57 carats was found at Saukville by Conrad Schaefer. It has been claimed that this stone was actually found in 1881 but was never identified as a diamond until 1896.

THE THERESA DIAMOND

The stone which created the greatest interest in the possibility of diamonds in Wisconsin was found in 1888 by Louis Endlick of Kohlsville on or near the Green Lake Moraine and is known as "The Theresa Diamond." The stone weighed 21½ carats and is the largest diamond on record ever recovered in the state.

This diamond was of further interest, and most unusual, because of its peculiar color. One side of the crystal was colorless, while the other portion was almost cream color. These differing color portions were separated by a flaw, or distinct cleavage plane. The crystal was almost spherical in shape.

Shortly after the diamond was found, the Endlick family moved away from Kohlsville, taking the diamond with them. Later inquiries regarding the whereabouts of the diamond were fruitless until an article on the subject was published in a newspaper. This story was subsequently read by a son of Mr. Endlick and he made a trip to Milwaukee to reveal the present status of Wisconsin's most important diamond. He explained to me that the family had moved to Kewaskum and that in 1918 the "Theresa Diamond" had been cut by the New York firm of John Wood & Company into ten stones at a cost of $400. Total weight of the ten stones was 9.27 carats, divided as follows: 1 stone weighing 1.48 carats; 1, 1.09 carats; 1, .97 carats; 1, .96 carats; 1, .95 carats; 1, .85 carats; 1, .84 carats; 1, .83 carats; and two stones weighing .65 carats each.

So, the mystery of the "Lost Theresa Diamond" has finally been solved. Not only has this research proved of scientific and geological interest and importance, but the facts concerning the recovering of diamonds in Wisconsin is of great historical value to the state.

Book Reviews

INCLUSIONS AS A MEANS OF GEMSTONE IDENTIFICATION *by Dr. Edward J. Gubelin, published by Gemological Institute of America, Los Angeles, $6.75. 232 pages, 258 illustrations. Complete bibliography. Reviewed by G. Robert Crouningshield.*

Inclusions as a Means of Gemstone Identification is the result of years of research and photography on the part of one of the world's most accomplished gemologists. This book is the first of its kind, though articles and photographs by Dr. Gubelin relating to this study which he has virtually made his own, have appeared in gemological literature over an extended period.

One outstanding feature of the book is the discussion of the genesis of inclusions which incidentally sheds light on the origin of gemstones themselves. This factor, coupled with the profuse illustrations, takes the subject of inclusions out of the opus of im-

perfections and accents their aesthetic as well as practical value.

For each species where diagnostic inclusions have been noted by the author a separate chapter has been included. In the important gemstones — ruby, sapphire, and emerald — the chapters have been further subdivided as to peculiarities due to the source of origin. The chapter on diamond with its illustrations is particularly illuminating.

The choice of type for the book has been a happy one which makes for easy reading. The extensive bibliography will be welcome to those wishing to do further research in the subject.

This long-anticipated book will be welcomed by gemologists throughout the world because of its value as an identification accessory and its stimulation of gemstone research. In the words of the author, "Although confirmation of the diagnostic value of inclusions has now been established, more — much more — work remains to be carried out before full advantage can be taken of this relatively new study."

PHYSICAL GEMMOLOGY *by Sir James Walton. Pitman Publishing Corp., New York City. $6.00. 304 pp.*

It is interesting that the latest book in this field, written by the English scientist Sir James Walton, has the following dedication: "To Her Most Gracious Majesty, Queen Mary, who has so keen an interest in, and so wide a knowledge of gemmology, this book is most humbly and loyally dedicated."

In his preface, Sir James states that students of gemology fall into three groups. These groups he classifies as students of mineralogy or geology who specialize in gem minerals, professionals with gemstones as their business, and hobbyists. Of the first group Sir James says, "such have had a thorough training in the basic sciences and require no further aid." Accordingly Sir James has written this book for jewelers and gem dealers on the one hand, and hobbyists on the other.

His premise is that people who fit into these two categories, and who desire a further knowledge of the underlying principles upon which the physical phenomena of minerals are based, are confronted with the difficulty that the information is scattered through many textbooks. He endeavored to gather this information into one book because of the tremendous volume of material in the many textbooks which such students would have to consult in order to obtain the small amount which was of particular interest to them. Sir James felt that the mathematical treatment common to texts in the physical sciences made the information contained therein too difficult, or too frightening, for the average student of gemology. Sir James has been highly successful in his effort to present the material he considers important from physics, chemistry, and crystallography, in a simple and easily understood form.

It is perhaps unfortunate that the title "Physical Gemmology" was chosen since one unfamiliar with the subject matter of gemology, and led by the title to choose this volume as a textbook, would obtain a false idea of what constituted this subject and the relative importance of the various topics which make up the whole.

For example, while important laws of physical chemistry seem germane, fossil invertebrates do not. All through the text, the subject matter emphasized seems that which is seldom used because it is not practical for use with gemstones. For example, more emphasis is given to determination of minimum deviation by goniometer than refractometry for refractive index determination; and sedimentary and historical geology seem overemphasized.

Giving as his reason the fact that more can be shown in each illustration, Sir James has used drawings rather than photomicrographs to illustrate gemstone inclusions. This decision seems difficult to defend when one

(Continued Next Page)

examines the drawings. For instance, Walton shows needlelike inclusions at 90° in almandite and refers to 60° inclusions of rutile in garnet, corresponding to the edges of dodecahedral faces. We have yet to encounter 90° inclusions in garnet and dohecahedral face edges are at 70°, not 60°.

It seems surprising that the section on magnification contains no reference to the important dark-field illumination and little mention of more satisfactory means of mounting the stone than the use of plasticene on a glass slide.

However, Sir James is to be complimented on the masterful way in which he has simplified and presented the principles underlying the basic sciences from which gemology draws. This book would make a valuable addition to a gemological library.

A Jeweler's Notebook

(From Page 274)

cases of this barbaric type of blue jewelry was in strong contrast to the fewer articles of smaller gold jewelry seen at home.

It was here that I first saw samples of newly discovered turquois which was from the Hall Mine in Colorado. I was quite surprised to find it to appear so different from that of other localities. The pieces were uniformly of a deep blue color, entirely clean from matrix on the outside—and seemingly so on the inside—and were about one fourth to three eighths inches thick. In outline the angular fragments, an inch to two and one half inches across, were apparently broken in mining from a continuous seam in a soft, easily detached rock. In handling them and clinking them together they would "ring" like pieces of chalcedony, loudly testifying to their density and hardness.

Sixty dollars a pound without "singing the first verse." The price was high, but cheap. Let us figure a bit. An avoirdupois pound contains 2267.97 carats, to be quite exact, and the yield in this case I estimated would be about 40 per cent, or more than 900 carats. By dividing $60 by 900 we find the cost of the material alone would be about seven cents per carat. To this, of course, must be added the cost of labor and overhead, to arrive at the cost of production, then the selling expense and a little for lost accounts must be considered. Yet this good quality would bring a dollar a carat from the traders. Good? Yes, indeed.

But do not infer that the gemstone business is all as creamy as that. One good deal must take care of other poor deals. No, I did not have, at that time, a lapidary shop, nor the money to carry the deal through, nor had I decided whether I wanted to continue this Indian business.

Soon I was through with my visit in Albuquerque and was ready to go elsewhere It was not my intention to confine my visits to the larger towns and cities, but I wanted to learn first hand about the Indian Traders, who were scattered here and there in remote places, and there were certain old turquois mines I was curious to see.

(To be continued)

La Belle Helene

(From Page 277)

large face was of the shape of a trapezium with parallel sides of about 25 and 18 millimeters respectively, and nonparallel sides of 23 and 15 millimeters respectively. It contained no interior spots, cracks or flaws. It was exceptionally pure. Two tiny, pitch black spots, probably amorphous carbon or some form of graphite could be seen very near the surface. To remove these by cutting must have been a simple matter.

The stone also showed many growth triangles, which are tiny depressions of various sizes and of exactly equilateral shape. Such triangles are typical markings of the octahedral faces of diamond crystals and were formed when the diamonds crystallized.

1. Robertson, R., Fox, J. J. and Martin, A. E., *Phil. Trans. Roy. Soc.* London A, 232 (1934) 463-535.
Custers, J. F. H., *Research,* London 4 (1951) 131.
2. Custers, J. F. H., *Physica,* The Hague 18 (1952) 489-496.

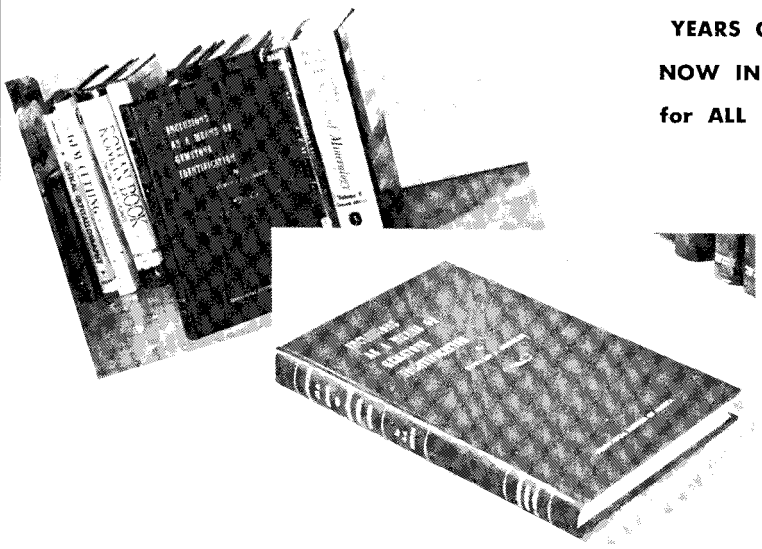
As new as 1953 . . .

INCLUSIONS AS A MEANS OF GEMSTONE IDENTIFICATION

BY DR. EDW. J. GUBELIN

Representing

YEARS OF RESEARCH
NOW IN BOOK FORM
for ALL GEMOLOGISTS



Your Copy

READY FOR IMMEDIATE DELIVERY

$6.75
plus postage

258 PHOTOMICROGRAPHS — COMPLETE BIBLIOGRAPHY

FRONTISPIECE IN NATURAL COLOR

California Residents Add Sales Tax

GEMOLOGICAL INSTITUTE OF AMERICA

541 South Alexandria Los Angeles 5, California