Gems and Gemology

FALL 1959

See Inside Cover

Gems & Gemology

VOLUME IX | FALL 1959 | NUMBER 11

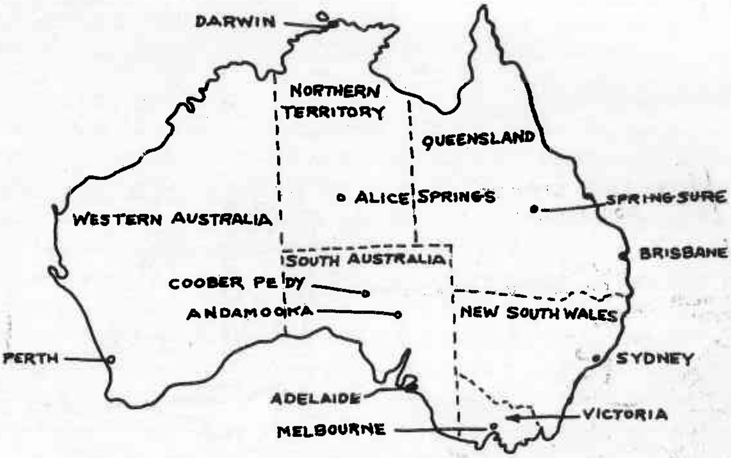
IN THIS ISSUE

On the Cover

This watch bracelet containing diamond baguettes and brilliants conceals a tiny Patek-Philippe watch under one of the entwined panels. Designed by Patek-Philippe of Geneva, Switzerland, it was shown in the Diamonds-International Awards collection in New York City.

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

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.



Opal

by

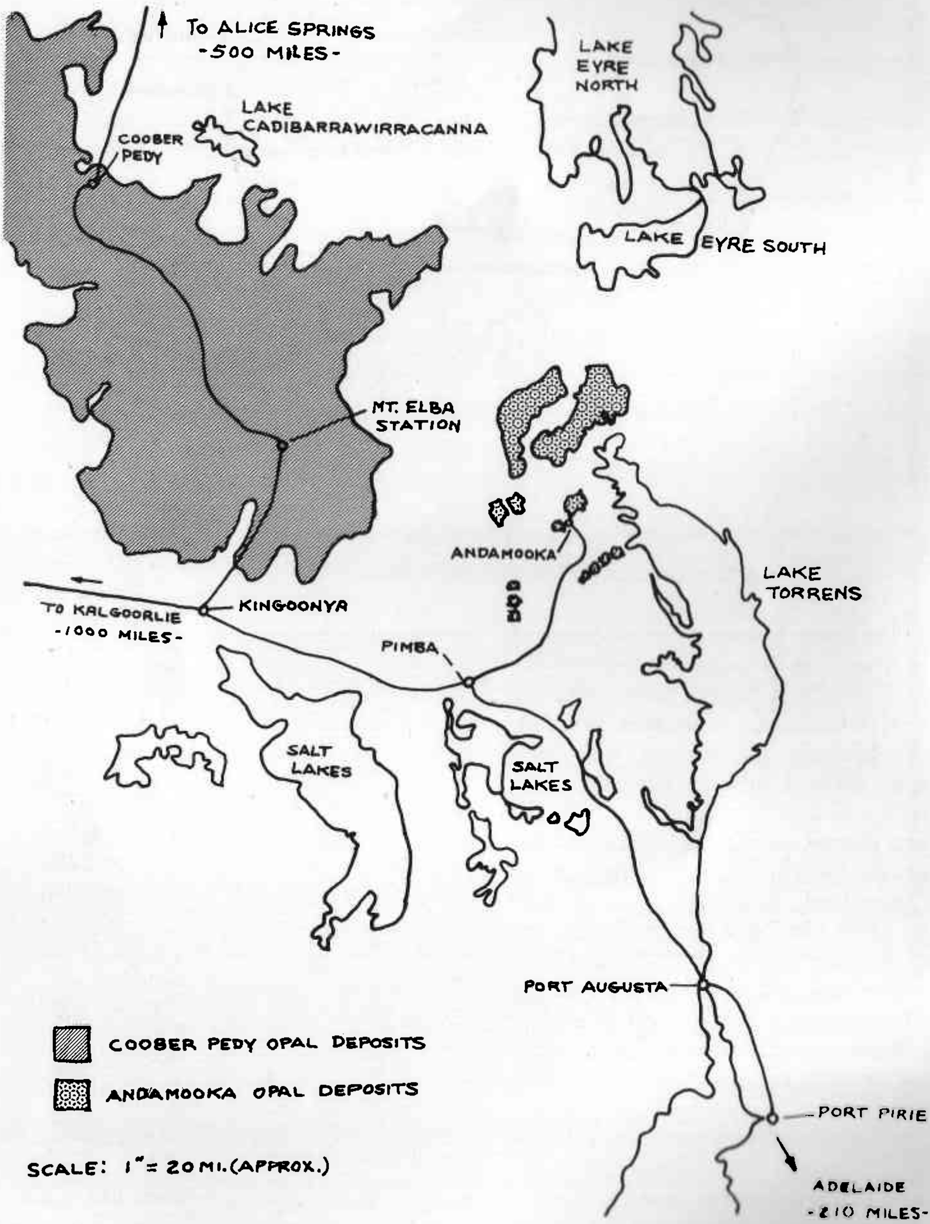
Charles H. Derby,

A visit to the main sources of precious opal today, Coober Pedy and the Andamooka deposits, in the northern areas of South Australia Province, Australia.

The early history of opal discovery in Australia is rather vague. At the time the Forty-Niners were venturing west to California, a German geologist, one Mingaye (or Menge) was struggling through inland wastes near Adelaide and discovered precious opal. The first precise records, in 1872, show Listowel Downs and Springsure, in Queensland, as sources. During 1880 to 1890, in New South Wales, the Lightning Ridge and White Cliffs rushes took place. 1890 marks the establishment of White Cliffs as a town and starts opal production as an industry. In 1905, the first commercial efforts were made at Lightning Ridge. Production for one 12-year period was valued at $7,000,000. The United States has been the best buyer of opal.

Twentieth-century Australia not only is making outstanding contributions to our world of science, it is also giving us outstanding and fabulous discoveries in the gem world. In 1915, and later in 1930, two new sources of precious opal were discovered. Today, these deposits, at Coober Pedy and Andamooka, eclipse all others, and supply more than 95% of the world production of precious opal. Lightning Ridge and White Cliffs remain but dazzling and romantic names. Records show a mere $2000 for a recent year's production. These facts should not be construed to mean that the opal deposits have been depleted or worked out. The simple facts are that cruel drouths, lack of supplies and primitive living conditions in the above-mentioned locations make other areas more desirable to work and live in.

Sydney, the point of entry into Aus-

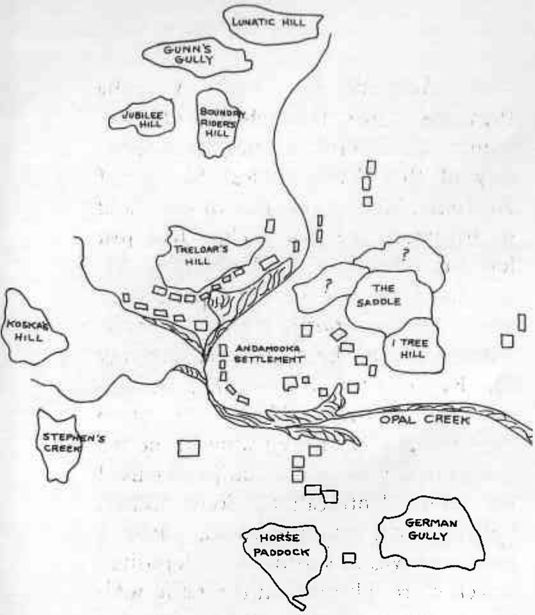


To ALICE SPRINGS
-500 MILES-
LAKE CADIBARRAWIRRACANNA
COOBER PEDY
LAKE EYRE NORTH
LAKE EYRE SOUTH
MT. ELBA STATION
ANDAMOOKA
LAKE TORRENS
TO KALGOORLIE
-1000 MILES-
KINGOONYA
PIMBA
SALT LAKES
SALT LAKES
PORT AUGUSTA
PORT PIRIE
ADELAIDE
-210 MILES-
COOBER PEDY OPAL DEPOSITS
ANDAMOOKA OPAL DEPOSITS
SCALE: 1" = 20 MI. (APPROX.)

tralia by air, is a modern giant, an industrial city spreading out for miles and tucked into the scenic splendors of the middle-east coast. The first crispness of fall was in the air (this was April) and one was dazzled by the cleanness of everything. Here I met Mr. Hinkley, a kindly old opal dealer. I was privileged to wander through his vast collections and ask questions. Opal such as one never dreams of lay exposed row after row on deep shelves; boxes of the flaming beauty came out one after the other, and it seemed to me that they were better and better. Doublets, solid cabochons and then rough were shown me, each a mass of scintillating, multicolored fire. Here and there were huge boulders covered with paper-thin shells of opal. These have no gem value, but certainly make a wonderful display.

The next person I was able to see was Percy Marks II. He is the son of the incomparable opal buyer, Percy Marks, who after years of struggle, brought the fabulous collection of black opal to the Franco-British Exposition (London, 1908), thereby establishing his unparalleled reputation. In the author's opinion, the Marks collection is still the best in the world. Velvet-lined cases contain opal that, when exposed to light, jump to life. The beauty displayed defies adequate description, ever changing with new colors. Mr. Max Walker, publisher of the Australian Jewelry Magazine, similar to our *Jewelers' Circular-Keystone,* introduced me to the gemological people here. He armed me with letters of introduction to jewelers and gemologists in other cities, which not only made the trip more pleasant but filled it with information.

At Adelaide, in South Australia Province, I met, through one of these letters, Mr. P. Grove-Jones, local secretary of the Gemmological Society of Australia. We began to talk of opal, and he informed me that a chap had just left his office for the University. He was from the Andamooka Opal Fields, about 400 miles north. Leaving quickly, I proceeded to the University and met Mr. Reg Harvey, director of gemological training there. While waiting to meet the opal man, Reg showed me the museum as well as the equipment used for gem identification. Soon Robert Giltrap came into the room, where a gem class was in session, and deposited a sack of rough opal on the table with the generous words, "Help yourselves boys." We were then introduced, and in the conversation he asked me, "Why don't you come on up to the opal fields?" Thinking that he was joking, I said, "Sure thing." Later, at the suggestion of Mr. Harvey, I visited the office of Mr. Wollaston, also the son of one of the fabulous pioneers of the opal field, who in the last century followed for years the movements of the Ghans, Mohammedan traders who travelled with camel trains, trading throughout the area. It was he who lost his mate from thirst while on a trek, yet they were less than one-half mile from water. Mr. Wollaston told me that Gilley (Robert Giltrap) had come by and told him of a stroke of luck in his finding an American to take back to the fields. At the time, no American had visited the fields. While in the office, Wollaston showed me a magnificent necklace of round jelly-opal beads. Clear-honey color, graduated, and of magnificent size, these came out of the

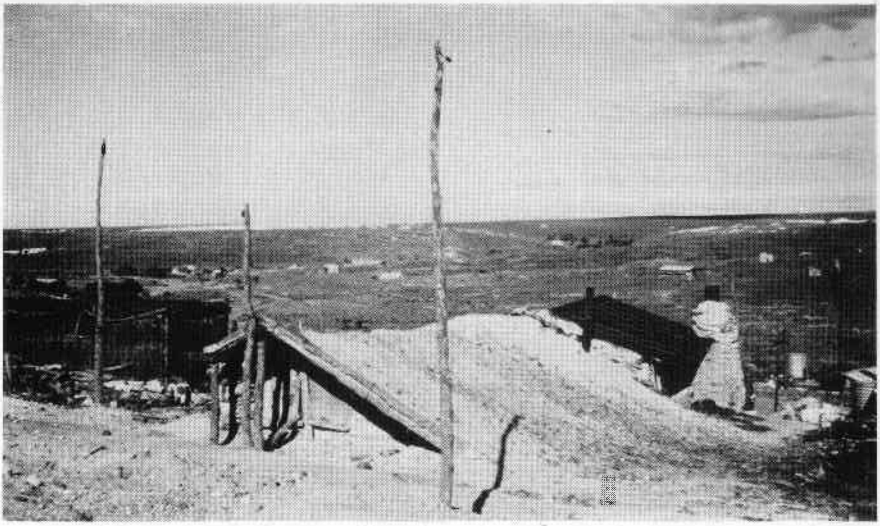


THE ANDAMOOKA OPAL FIELDS

box glowing with a wonderful play of color. They were to have been presented to the Queen on her recent tour; however, the Government felt that a single strand would not be adequate. A search was under way to try and locate additional beads for a second strand; then, at Andamooka an opal of staggering size and beauty was found. This gem was polished and fashioned into a glittering neckpiece and matching earrings. The pendant of opal has been redesigned into a brooch and is worn on the Ribbon of the Garter as a part of the Royal Regalia. Weighing 205 carats, the stone has been called the *Andamooka Opal.*

Andamooka, meaning "no-name area," is a waste of red sand and low rolling hills, but two fresh-water lakes and underground water made it possible to establish a sheep station there in the late 1800's. It was while repairing a dam about thirty miles north of the homestead that two boundary riders discovered opal, in 1930. Three years later, some hardy souls began the first diggings. Mr. Alan Treloar, the first digger, did well. He was able to gouge out better than $5000 worth of fine opal on the first try. Word went out and more gougers (opal miners) were attracted from White Cliffs and the Ridge. Most of the early diggers were part-time shearers, boundary riders, and bushmen (itinerant laborers), who came in between jobs, if they had enough money to buy the tools and a packet of food. Life was indeed rough in the early days, since they were isolated from all civilization. Soon, however, the continued good finds made it possible to establish a settlement at the diggings.

Today, Andamooka is a tiny but progressive settlement. There is one store that is well supplied with necessities, a post office with a weekly mail service, telephone connections, and a pedal-generator radio station on the Broken Hill and Alice Springs hookup. They also have the service of the flying doctor, who can, in about an hour, come to the landing strip. The strip was built by a series of "working bees," where everyone, including the few black aborigines, came out to help. A new school, housing the infirmary, has been built since my visit. Water is pumped from a Government-drilled deep bore and is adequate for the present population. Firewood is there for the taking, but it must be hauled more than ten miles. There is no timber in the area, and all wood of this kind must be imported and is very expensive. Houses in the town are unique. The first operation of



Looking west over the roof of a typical gouger's house. Note windmill for water and lights. School house in distance is the old one, now rebuilt. White snowlike deposits on hills are the dumps of old mines. Behind the house is the old horse-paddock area. At right are the diggings of Stephen's Creek. The twig shelter on the left is to protect the two cars owned by these miners.

construction is to dig an open trench as long as you wish the house to be, running into the side of a hill. By using stones, the end is walled in and a door of sorts is hung. The roof, made of dead and dry trunks of the wattle bush, is then covered with layers of tough grass and clay and the earth is then scraped back to finish the job. These roofs are usually rainproof, and although the rainfall is less than six inches a year, sudden downpours bring great amounts of water in a few moments. Windbreaks are made to shelter the door openings, as well as the tiny efforts in gardening. Tomatoes will ripen throughout the entire year. Today, there are a few houses above the ground, but they have clung to the insulating methods of using stone, clay plaster and thatch for comfort.

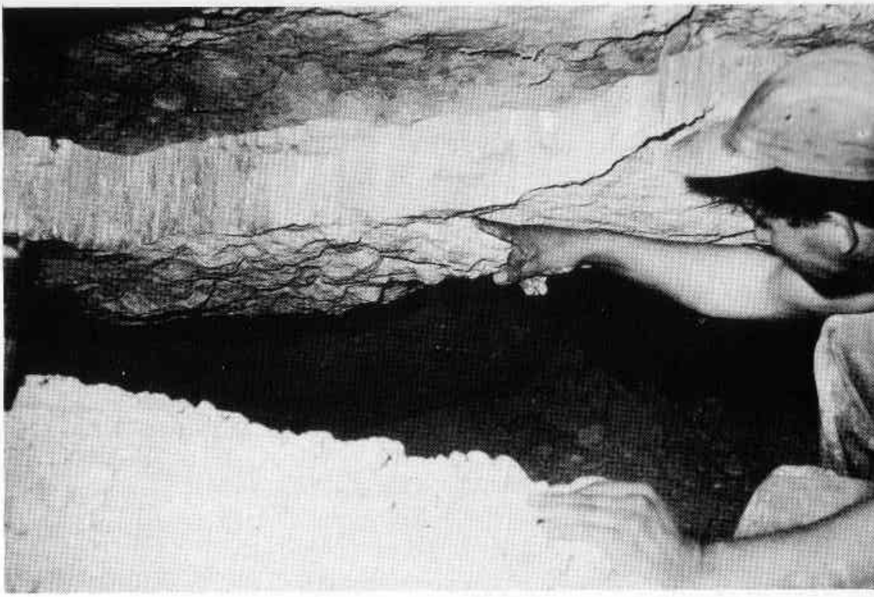
My introduction and coming out to Andamooka was an adventure. Gilley asked me when we went to get his new jeep, "Can you drive? I can't." Later, after leaving all traffic behind and in the comparative safety of the open road he said, "Well, it's now or never. Show me." He soon found the gas pedal and we were off in a swirl of dust, going from side to side and faster and faster. Fortunately, he soon got the feel of it and things began to slow down. The last part of that trip was made in the wee hours of the night, and certainly his guardian angel was hovering there, or maybe his private leprechaun rode the hood, since he was from County Cork. We made it! No house was in sight, but the piercing blast of his horn brought glows in doorways and flashlights guided running friends with greetings of welcome. In our jammed-full cargo there were several gallons of wine and a new accordion. Soon a fire was blazing, tea was on, and many friends gathered to whoop in a welcome. I must add that the tea was for me. They soon retired to other houses to keep the party rolling, leaving me to fall into Gilley's bed exhausted.

I awoke to the warmth of the fire and a ball of ten cats rolled on the foot of the bed. They took one look and, not seeing Gilley, fled. Looking out of the long, low window, six panes in a row, I saw I was at ground level under a steep eave. The landscape was one bleak sheet of low-rolling hills, with heaps of snow-white tailings attesting to the efforts of many former gougers. How many dreams and hopes vanished at the bottoms of these holes? Yet, they kept putting down new ones, and as often as not would strike opal within a few feet and come out screaming with joy. This was Andamooka, and I was to be a part of it for a few weeks.

The first question to be answered was where to live. Gilley needed his house and his bed. This was resolved in the early afternoon. The Clarkes were at home, and after some talk agreed to have me in their summer house. It was a square room with jalousies all around and proved to be most comfortable. Mrs. Clarke is the local nurse and Mr. Clarke is the postmaster and also one of the best cutters of opal in Australia.

Early the next morning I finally met the opal gougers. The next-door neighbors, the Dunstuns, are all gougers. They took me out to their claim. Here, about three miles north of the town, we came to the area known as Lunatic Hill. The whole area was potholed with the diggings and tailings, or mullock, dumps. Into this maze we drove carefully, coming to a stop near a new pile of waste. Two heads popped out of a nearby hole and I was introduced to the two young Van Brugges, boys from Holland who are trying their luck out here. A handmade wooden windlass

Mr. Van Brugge and his two sons at the top of their shaft. George Jr., has come to the top to rest. Tom has a bag of opal-bearing rough; his digging is on the left. If they have luck here, these two shafts will join at the bottom. Mr. Van Brugge was formerly with a diamond house in Holland, but has moved to Australia and is buying opal. He lives and has offices in Sydney. His circuit takes him through most of the other diggings; i.e., Lightning Ridge, White Cliffs, etc.



The bottom of a shaft in German Gully, showing wide seam of gypsum. The gouger points to the seam of opal that he is working. The *horizon* here is very easy to follow, since this seam of gypsum indicates the deposit of opal.

stood astride an oval hole about 2½ x 4½ feet in diameter. These shafts are designed and dug for digging comfort as well as for getting to the bottom of the hole when it gets deep. Into the walls of the smallest diameter they cut steps big enough to get a good foothold. In going down a shaft one sits into the hole, grasps the rope, and fits his feet into the side holes and goes down easily. Down the shaft you go, 20 to 30 feet, as the case may be. The deepest hole that I explored was over a hundred feet deep. One man stays on top to hand things up or down as needed. The gouger for the day goes down first, then comes his equipment; padded mats to lie on to gouge carefully if he strikes opal, the lamps, tools, picks and shovels, etc., and the bucket to haul up the waste materials. If they have reached a point and have mutually agreed to put in a blast, the caps, fuse and dynamite come down in a separate pail. The Dunstun's shaft was not a big operation. The underground shaft belled out at the lower opening, big enough for a tall man to stand easily. Off at the end of the small tunnel and to the side they had begun to *open.* Opening means they had begun to explore along the *horizon* in the *hard band,* the gravels in which opal is found. The shaft is sunk and "bottomed" in these gravels, and then they "explore out" in all directions in an effort to find the opal seams. The story is often told of men working claims and leaving them after finding nothing at the bottom. Then some other chap arrives and begins to explore out and soon finds opal. That's the luck, they say. Today, some of the biggest and best finds of opal are in the pillars of old diggings. When the country rock was soft, these pillars were necessary in order to prevent cave-ins. Circulating air has now hardened the roof structure

At the bottom of the Dunston shaft, young Doug Dunston bores a hole into the face of the *horizon* to loosen the massive deposit to get at the opal below. The cavity below shows where they have carefully gouged up to the opal layer. Note that the charge is very small and will remove only the deposit above the cavity, not damaging the deposit, if there is one.

and it is safe and easy to gouge the opal out. It is easy mining, since they don't have to bring up any waste.

Mr. Dunstan, having decided that they had to blast, let me see and take photos of the operation. The first job was to bore a hole in the face of the upper horizon with a bit and auger. Then, using a partial stick of dynamite, his son set the fuse, tamped the hole and we scrambled out. The dull boom below told us it was over, and we lowered a hollow cloth tube into the shaft to ventilate it. The open flat top of the tube, stretched across a stick, faces into the wind and takes fresh air to the bottom of the shaft. After a time, we again went into the shaft to survey the results. We began to scrape up the waste and send it to the top. Soon all was clean and clear, and by word signal Doug asked his father to come down and see the opened wall. Very carefully they began to gouge, and at the moment that the fine-headed pick struck the potch they knew they were near opal. Here all is caution, lest they break a wonderful stone. Going up and under the potch area they dig up to the gemstone so that it may be broken out. It was amazing to me to note how many old dentist's tools were in use for these operations. Chip . . . chip . . . careful . . . careful . . . plop! . . . and the stone falls into eager fingers. At once it is put into the mouth to be wet with the tongue and there is a line of fire! Not a word is said, but one feels tension and elation — they are on opal.

All finds are put into a cloth bag to be examined during the lunch hour or at the end of the day. A knife with a staunch, sharp blade is always a part of everyone's equipment, so they can "shell" a stone to see if it will show color. Nothing that indicates opal is thrown away until it has been carefully inspected. In spite of all the care used in sorting, some pieces get away. One of the great pastimes is *noodling,* or looking through old dumps; the aborigine is often too lazy to dig, but he finds some excellent opal in this way.

Most of the mining here is done in more or less the same manner. There were two new experiments being tried while I was on the field. One of these was a tractor operation. The procedure was to dig a trench with a digging arm. One man would be in the trench and watch for signs of the opal gravels, and by examining these he would know

Mr. Woods and his digging tractor, a new experiment in gouging for opal. In shallow deposits, he is able to dig a trench down to the *horizon* and, with his son, Bryan, following the arm, they can tell when they have reached the opal-bearing gravels. Further exploration is then made by hand.

if they should explore out in any direction. The second experiment was that of Mr. Frank Shulton, cutter-buyer from Sydney, who brought out a pneumatic hammer to explore the old areas of Koska's Hill. He was, in a matter of hours, able to gouge out the equivalent of two weeks of hand labor. It is debatable if his take is as good as hoped for, since by these methods he may shatter fine opal. In our many conversations, he did not divulge the answer; however, from photos taken of some of his fine opal, it seems he is doing alright.

The gouger, having found his opal, places it in a bag to be taken back to camp. Here it is scaled and cleaned. The first operation is to wash off all of the muck. By scaling he can look into the stone. He is adept in removing just enough to see into the stone and leaving the most possible weight. Most of the people today know how to *face* a stone and thus have a better return for the rough. After cleaning, scaling and nipping off the waste, these stones are saved until finally a parcel is made up.

When this day comes, the parcel is taken to the evaluator, where it is sorted

The evaluater looks over a packet. Notice that they have separated the opal into classes, etc. and have weighed each parcel. Papers indicate weights. Note cloth bag. This picture was posed by Mr. Dunstan and Old Bill Hallion.

Dick Clark, opal cutter and polisher, seated at his bench in the most complete workshop in Andamooka. The work turned out here is some of the world's finest. He is noted for his work on doublets and for making, matching, and creating designs in opal.

and carefully weighed. During these operations, much discussion takes place and they come to a minimum price. If the gouger listens to the advice of the evaluator, an old and experienced miner, he generally comes out with a better price. These packets are often brought to prospective buyers, who quote a higher price than that set by the evaluator, with the casual word that so and so is interested. The buyer contemplating a parcel again separates the opal, and by selection and weighing determines whether he can buy and still make a profit. If he decides to buy, he counteroffers until the buyer and seller reach an agreement. Usually, the gouger is paid in cash.

In the early days, the gouger seldom received a fair price or percentage of the true value of his finds. Today, however, the fields have many cutters and polishers and competition is keen among the buyers. My trip proved that there is a brisk demand for fine opal all over the world. Miners are riding the crest of this wave of demand and are realizing better prices. Because of the secrecy necessary in these remote areas, it is hard to estimate the true value of the rough gems mined in the Andamooka area to date. A value of between three to four millions of dollars seems a good estimate.

Compared with other opal fields, those of Andamooka are tiny. The location of the deposits is from four miles north to four miles southeast of the post office. The widest point measures three and one-half miles across. This makes an area of approximately 27 square miles. Coober Pedy, by comparison, is a vast area more than 160 miles long and 60 miles wide.

At the invitation of Mr. Vin Wake, resident buyer, I was asked to join the party that was taking Mr. Manning, of the Manning Opal Corporation in New York, to Coober Pedy. It was most unusual, but at the time of our visit there were seven buyers on the fields. I sup-

(continued on page 350)

Leucite

A Gem of Volcanic Origin

by

Dr. E. J. Gubelin, C.G.

Some time ago, I had the good fortune to acquire some leucite crystals of trapezohedral habit from which three clear specimens could be cut into pretty gemstones. After being cut into brilliant and square forms, they surprised me by an unusually high degree of fire. This was most uncommon, in view of their very low refractive index, and stimulated me to examine them further.

Occurrence

Leucite is a comparatively rare mineral, prevailing exclusively in igneous rocks, particularly in young lavas, as one of the results of crystallization of basic magmas rich in potash and low in silica, and in paragenesis with minerals of a high percentage of alumina and alkalies or with ferromagnesian minerals, such as augite, olivine, melilite and feldspars. It is hardly ever met with in deep-seated rocks, obviously because it is easily altered, and under conditions of strong pressure orthoclase is the more stable combination.

It is found in Italy, on Vesuvius and Monte Somma, where it is densely disseminated through the lava in grains or in large, perfect crystals. In central Italy, from near Lago Bolsena to the north of Rome, it occurs in a leucite-tephrite, as far as to the Monti Albani, south of Rome. Some of the lavas appear to be almost entirely composed of it. Chief localities are Capo di Bove, Albano, Ariccia, and Frascati. The three specimens I tested came from Ariccia. In the Rhineland, leucite is encountered in the rocks of the Eifel district, at Rieden, near Andernach, and at the Laacher Lake. Other localities are in New Jersey, Arkansas, Wyoming, Yellowstone National Park and Montana, U.S.A., as well as on Vancouver Island, British Columbia, where magnificent groups of crystals have been found as drift boulders.

Name

Leucite owes its name to the Greek word λευχος (white), in allusion to its color. However, leucite does not occur in colorless only, but also in ash gray, smoky gray, and yellow.

Chemical Composition

Leucite is a potash-alumina silicate, with the formula $KAl(SiO_3)_2$ (or $K_2O \cdot Al_2O_3 \cdot 4SiO_2$), containing 55% silica, 23.5% alumina, and 21.5% potash. The yellow tinge is probably attributable to a tiny trace of iron, whereas soda, which is also often present in small quantities, replacing some of the potassium, seems to be responsible for the gray and often cloudy ap-

Figure 1 Typical habit of leucite.

pearance. Traces of lithium, also of rubidium and caesium, have been detected.

Morphology

The pseudocubic polytwinned individuals are generally found in well-developed crystals as simple deltoidikositetrahedra (or trapezohedra) (211), sometimes combined with the cube (100) or the dodecahedron (110) as subordinate forms. Twinlike growths and fine striations due to twinning indicate low symmetry. Generally, leucite is poor in variety of forms *(Figure 1)*.

Physical Properties

The mineral is brittle and although the cleavage after (110) is very imperfect, translation (shear) planes might form, but the fracture is conchoidal. Hardness varies from 5.5 to 6. Although theoretical specific-gravity figures in textbooks are 2.45 to 2.50, with my specimens I found 2.4792, 2.4768 and 2.4626, which may reveal that the specific gravity of pure crystals from one locality is quite constant.

The mean R.I. for sodium light at normal temperature is indicated as 1.508, usually displaying a weak birefringence of not more than .001, but it may vary from 1.504 to 1.509. My three pieces gave the following readings: 1.507-1.508, 1.506-1.507 and 1.504-1.505. The luster is vitreous to greasy, which is in concurrence with the low refractive index same as the dispersion, which is but .008, though contrasting strongly with the vivid "fire."

Microscopic examination under the polarizing microscope is especially intriguing. Larger specimens are commonly not wholly isotropic and, further, show complicated systems of twinning lines. Generally, leucites are profuse in inclusions of natural glass, magnetite, spinel, augite, olivine, apatite, etc., and frequently, these are oriented in zonal arrangement. In some cases, the glass enclosures are so dense as to render the host quite turbid *(Figure 2)*. Of all the solid inclusions, the vitreous ones are the most interesting; they are either tiny molten looking lumps or broken fragments and appear always to contain minute air bubbles. In certain leucites, the glass inclusions are remarkably well oriented. Their characteristic pattern of arrangement and orientation can only be explained by the process of progressive growth from skeleton forms, between the ribs of which glass was enclosed. When the leucite crystal was completed, the glassy portions were embedded *(Figure 3)*.

Between crossed Polaroids, the leucites immediately assume amazingly vivid interference colors and cloudy to striated extinction, which indicates strong anomalous double refraction. Some of the color bands are circular and almost simulate interference figures *(Figure 4)*.

The polysynthetic twinning is betrayed by fine parallel striæ and colored patches being oriented strictly parallel to a set of striæ *(Figure 5)*. All

(continued on page 350)

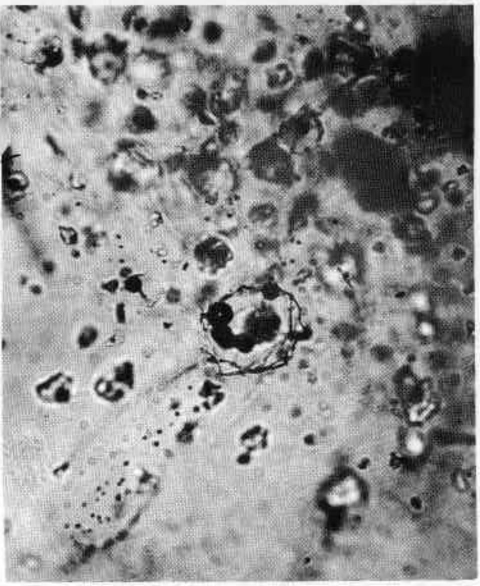


Figure 2 Great number of glassy lumps. Air bubbles are seen in the central inclusion.

Figure 3 Relatively large vitreous inclusion with spherical air bubbles.

Figure 4 Anomalous double refraction by tension expressed by irregular extinction.

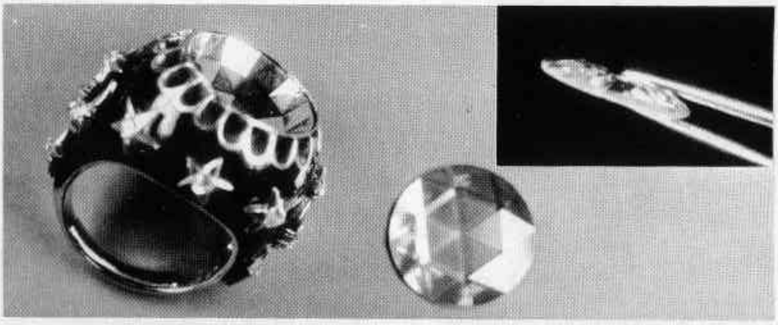
Figure 5 System of parallel lines form the traces of polysynthetic lamellae.

Highlights at the GEM TRADE LAB in Los Angeles

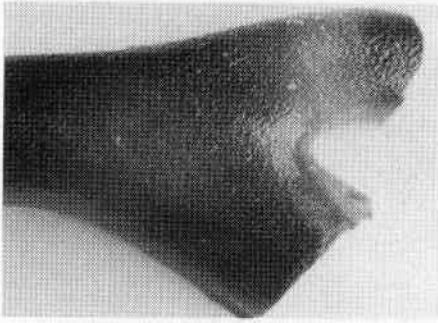
by

Lester B. Benson, Jr.

In a previous Lab Column we mentioned a hollow, closed-back ring capped with a thin rose-cut diamond. The depression under the stone contained a metal foil that had been previously molded over the stone to duplicate the facet arrangement. Recently, we encountered a similar ring of exceptionally large size (see the accompanying photograph). The diamond was 15 mm. in diameter and had a depth of only 2.1 mm. The ring was made of yellow gold but was almost completely covered by black enamel encrusted with a number of small diamonds. The metal foil under the diamond had been formed over a special die simulating facets of the same shape, and the resulting cavity was approximately 6 mm. deep; this combination gave the diamond considerable "life." It would be very difficult for a jeweler to detect the true nature of this stone with the unaided eye, in spite of its large size.



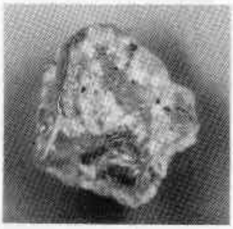
Diamond ring showing foil-lined cavity and thin cap of diamond. Inset shows the thin cap of diamond as it appeared from the girdle.



Black coral.

Cross section of coral revealing a radial structural pattern.

Upon reading Robert Crowningshield's comments on Hawaiian black coral in the Spring 1959 issue of *GEMS & GEMOLOGY,* GIA graduate Anthony Ching, Honolulu, kindly gave a speciman to the Los Angeles Laboratory, together with source information. The coral was recovered off Lahaina Maui at depths ranging from 80 to 200 feet. Two of the three divers, all partners in the venture, suffered severe cases of the "bends" as a result of their diving and have therefore suspended recovery operations. A manufacturer here on the mainland, who had an option on the total recovery broke off the association after this unfortunate incident. Tony states that unless other divers locate the deposit, the exact position of which has not been revealed, and obtain sufficient backing to cover the recovery and processing costs, it is unlikely that much of it will be encountered in the trade. This coral occurs in the shape of a tree or leafless bush; one piece that was recovered intact was approximately four feet high. It reacts similar to shrubbery in that it is somewhat flexible; a sharp bend, however, will break it. The material has an R.I. of approximately 1.56-1.57, with a consequent birefringence of approximately .01 and an S.G. of approximately 1.37. It displays no fluorescence under ultraviolet radiation or X-ray. Very thin sections are reddish when held over a strong light. It is slightly sectile and could possibly be confused with plastic, if this test alone were used. Magnification of a cross section reveals a radial structural pattern, which is typical of true coral. Unlike true coral, however, it is not attacked by acid. These properties are not consistent with those of the usual pink coral seen in the trade. This is because black coral is almost pure conchiolin, in contrast to the predominance of calcium carbonate in the pink material.



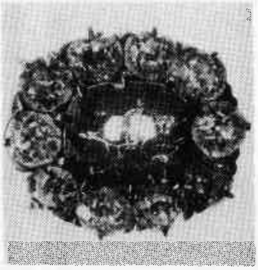
Specimen of pink amberlike resin.

A mineral dealer from San Diego submitted a large specimen of pink amberlike resin, the color of which was quite similar to that of rose quartz. The material responded to all of the usual tests for amber except specific gravity.

These tests included refractive index, hardness, toughness, resistance to ether, odor from burned fragments, etc. The dealer declined to reveal its source, other than saying that it came from "a locality on a southern coastline." He stated that approximately two tons would be recoverable from this one source, and is considering using it for jewelry.

* * *

The large sapphire in the accompanying photograph is set with ten dia-



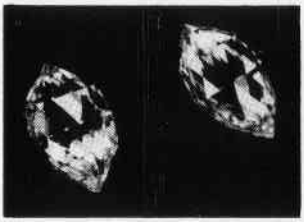
monds in a very expensively made ring. It was first thought to be synthetic, because it exhibited the pronounced crackling that is often introduced into synthetic material to impart a natural appearance. Magnification quickly revealed the typical striæ and color banding in natural sapphire.

* * *

A new accessory for the hand spectroscope has been made to supplement our Lab equipment. Essentially, it is a variable-speed spinner that provides speeds from zero to approximately 3600 rpms. The fully adjustable light source consists of one of the new Sylvania 100-watt zirconium-arc lamps, coupled with an adjustable triplet lens for focusing the arc light to an area of approximately one and one-half millimeters, the same as the light source. A unique feature of this lamp is that the illumination, even when thus concentrated, remains cool and therefore will not heat the stone. The brilliancy of the lamp is rated at 25,200 candles per square inch. The spinner plate is approximately two inches in diameter and is drilled and slotted for holding various clips and springs for securing both loose and mounted stones. Rapid spinning of the specimen eliminates the normal flashes and interrupted lights that are emitted by a faceted stone, as the result of reflection and refraction of light from the various small facets. The result is an even, intense glow. In addition, the directional selective absorption and consequent absorption patterns associated with many stones are mixed, thus providing a composite absorption spectrum. The spectroscope itself is mounted on a movable arm, permitting the spinning stone to be observed from a horizontal to a vertical position. The spacing of the spectroscope from the stone is also adjustable. The construction of the unit was not intended to furnish new information on spectroscopy; rather its purpose was to simplify setups that formerly were sometimes quite complicated and time consuming. Initial tests have shown it to be a worthwhile accessory, not only from a time-saving standpoint but because it increases the clarity of absorption lines.

* * *

The pair of diamond briollettes illustrated here were yellow stones weighing a total of 16.58 carats. The tip of each stone was drilled for a wire or ring to facilitate their use for drops. Diamonds fashioned in this manner are very rare, yet this is the second pair of stones encountered in the last month.



Diamond briolletes.

Graduate Ken Umberson donated two beautiful treated turquois carvings of an elephant and a dog, each measuring approximately one and one-half inches in length. Some additional cabochons and tumbled stones were included. Mr. Umberson deals primarily in turquois Indian jewelry and has handled a wide range of both treated and untreated materials. He assisted us in locating several persons who are currently treating stones. Since our initial contacts we have had time to receive information and samples from only one of the men: Mr. Maryott from Claypool, Arizona. Mr. Maryott is a chemist and was kind enough to submit a cross section of untreated stones, as well as stones treated with a polyester synthetic resin. He states, with the exception of inexpensive tumbled nuggets, that all of his output is sold abroad. The main identifying characteristic of this material is the typical odor of this type of plastic when burned by touching the stone with a hot metal point. In addition, the low specific gravity of approximately 2.25 to 2.40 would also indicate a stone of this type. This apparently is the source of the material that has caused some concern in Europe recently, according to a statement from Dr. Karl Schlossmacher, of Idar-Oberstein, Germany. Additional work is being conducted on the detection of treated turquois, particularly with respect to mounted stones; a full summary of the results will be presented in the next Lab Column.

* * *

A phone call from a dealer, who was attempting to estimate the weight of a diamond against two different weight-estimation gauges revealed major discrepancies in the weight-versus-diameter figures that accompany the majority of pierced metal gauges and printed gauges on the market. Specifically, these weight estimators may be pierced metal gauges, cardboard gauges, or charts bearing imprinted circles that are matched against the outline of round diamond brilliants. Several makes of these gauges that are widely used for rough estimations by appraisers and pawnbrokers were checked by the GIA. All of them obviously were based on the same measurement-versus-weight relationships, the origin of which is unknown. The gauges are fairly accurate for stones up to ¾ carat; however, they reflect low estimations beginning at approximately 10% in the one-carat range, increasing to an error of approximately 30% for six-carat stones. These comparisons are based on the weights of stones that are cut to ideal proportions. The average large diamond is not well cut; instead, it possesses a depth in excess of 61% and usually displays a thick girdle and a fairly large culet. For such a stone, the error in weight estimation against these gauges could easily approximate 40% to 45% below its actual weight. Anyone using such a gauge can easily check the various openings and corresponding weights against the following formula: depth times radius squared times .0245.

For example, the 12-mm. opening on one of these gauges shows a corresponding weight of five carats. A 12-mm. stone cut to ideal proportions would, by the formula, weigh approximately 6.36 carats. The formula is very accurate for well-cut stones.

* * *

We are grateful to **Captain John Sinkankas, C.G.,** for a set of the excellent color plates made from his original watercolor paintings that he prepared expressly for his new book, *GEMSTONES OF NORTH AMERICA*. A review will be found elsewhere in this issue.

We appreciate the gift from **George A. Bruce,** International Import Company, Forest Park, Georgia, of a blue jadeite cabochon, which will add to our selection of colors for this gemstone. Also appreciated are the specimens of moldavite, australite and Libyan glass that he recently donated. They will make an interesting addition to the GIA collection.

From **Jules Sauer,** Rio de Janeiro, Brazil, we received a few emerald specimens from a new, and as yet unannounced, source in Brazil. Mr. Sauer attended the GIA's most recent Los Angeles Diamond Evaluation Class.

Victor Esser, St. Louis, Mo., who attended a recent class held at Los Angeles, gave the GIA a ruby and a garnet, both of which contained interesting inclusions.

The GIA appreciates the generous invitation extended recently by **Marcel Einhorn,** of Montreal, Canada, to all students of the GIA to visit his diamond-cutting establishment in Montreal when they are in that area.

Our appreciation goes to student-collector **John Krzton,** Chicago, for a small faceted chrysoberyl that shows a change of color, and for cabochons of mauve jadeite and bonded turquois.

We appreciate the gift of black coral received from GIA graduate **Anthony Ching,** Lambert & Sons, Jewelers, Honolulu. It will add variety to our coral collection.

From GIA graduate **Norman R. Clark,** Norman Ingle Jewelers, Salisbury, N.C., we received a new comprehensive book *Mineral Localities of North Carolina.* We are grateful for this addition to our library collection.

Honor Roll

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

Robert S. Freeman, Hart's Jewelers, Inc., Quincy, Massachusetts; **James J. Bielmaier,** Hayne's Jewelry, Webster City, Iowa; **Lawrence E. Ball,** Ernest V. Ball Jewelry, Akron, Ohio; **Richard Jessop, Jr.,** J. Jessop & Sons, San Diego, California; **Samuel Hopkins,** New York, N.Y.; **Kenneth C. Hoffman,** Detroit, Michigan; **John R. Hugli, Jr.,** Silver Springs, Florida; **Alan R. Hartstein,** Irvington, New Jersey; **Joseph A. Ghegan,** George W. Frost & Son, Irvington, New Jersey; and **Joseph A. Eschenbacher,** Eschenbacher's Jewelers, St. Paul, Minn.

Highlights at the GEM TRADE LAB in New York

by

G. Robert Crowningshield

The photograph *(Figure 1)* is of a necklace of badly worn cultural pearls for which a price in four figures was paid in 1922 in Europe. The owner hardly needed to tell us that she wears them constantly. We were able to deduce for ourselves that she rarely had them restrung! The pearls from about five from the center on either side could have been "peeled" (technically, scraped to former roundness) had they been the natural pearls they were purported to be. The combination of an acid perspiration and a lack of appreciation of the care of pearls and cultured pearls is responsible for such damage. The reintroduction of atomizers for perfume may begin to give trouble, according to some pearl dealers.

* * *

Recently, while examining large lots of caliber rubies, we detected a type of fraudulent practice heretofore confined, in our experience, to solitaire-sized stones. This was the inclusion of from 4% to 20% of crackled synthetics in the lots. These small stones, with their natural-appearing flaws (introduced by heating the stones and plunging them into water to introduce strain cracks), are very convincing and were not included in the lots by accident, we feel

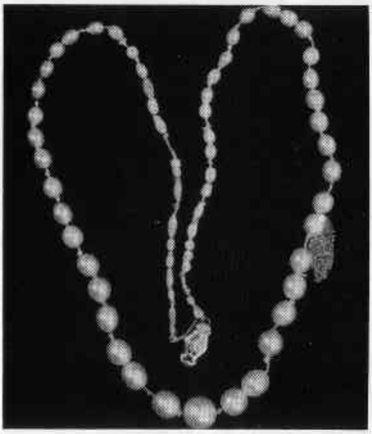


Figure 1

An exceedingly fine carved jade bird in a platinum brooch was unforgettable for the fact that in one area on the wing of the bird was an absolutely transparent green crystal of jadeite that showed dichroism clearly and had the normal absorption pattern for jadeite. Although the piece as a whole was unusually translucent, the single crystal, by contrast, made the jade around it seem opaque.

* * *

A material occasionally found in jewelry but that is little understood appears to be gray blister pearl, and indeed it is frequently offered for sale under that name. We refer to sections of pearly nautilus shell backed with cement. *Figure 2* is a side-view radiograph of a ring showing the thin nautilus section with portions of its chamber walls visible beneath the surface. *Figure 3* is a cross section of a nautilus shell showing the chambers (made famous by the poem *The Chambered Nautilus* by Oliver Wendell Holmes). *Figure 4* is a view of a complete nautilus shell that illustrates the area from which these sections are taken. A clue to the identity of these attractive "blisters" is the fact that they have transverse ridges, which are impossible in a true blister formed in a bivalve or univalve shell. A term that has been used for these sections of the nautilus shell is *"coque de perle."* Sections of other molluscs with a nacreous shell are seen occasionally in the trade. One type, called "French river pearl," is really a section of the lip of a salt-water bivalve. It seems that only one valve yields the "pearls"; hence many of them appear to be baroque worked pearls. A few years ago the Jewelers Vigilance Committee was in-

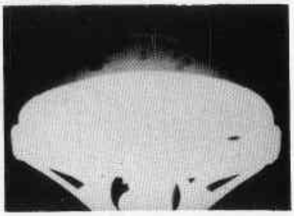


Figure 2

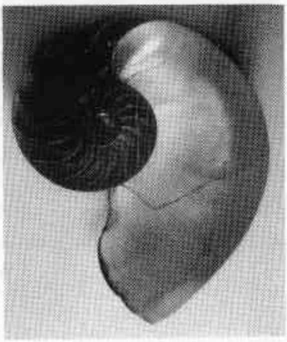


Figure 3

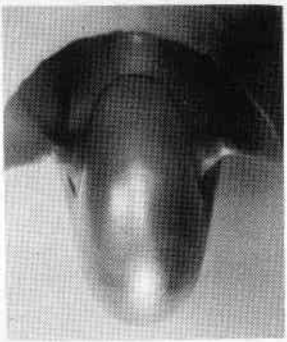


Figure 4

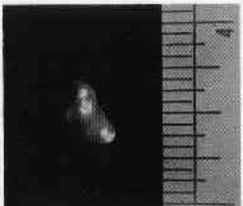


Figure 5

strumental in obtaining an agreement from a large New York department store not to advertise the gold-filled pins containing these objects as "French river pearls," since they do not come from rivers and are neither true pearls nor blister pearls but natural configurations of the shell near the hinge. *Figure 5* shows one magnified approximately one and one-half times.

* * *

In recent months we have identified several dyed jadeite specimens cut in other than cabochon form, which was the form in which they were first encountered. Necklaces of graduated round beads and sets of drops are being offered in the trade.

* * *

A red tourmaline of unusually fine quality was submitted to the Laboratory twice over a period of time because the owners of the ring in which it was mounted could not believe it to be other than a ruby.

* * *

A ring containing what was described to the customer to be black opal was purchased in South America for a modest sum. After several years the stone began to show wear and was taken to a lapidary to be repolished. During the repolishing operation it lost the black color and ordinary white opal was found to be just beneath the surface. It was the opinion of the Laboratory that the stone was an example of carbon treatment, which has been described in an early issue of *GEMS & GEMOLOGY* (Fall 1947). By this treatment, the stone was given a black surface coloration. The treatment introduced fine carbonaceous depositions along minute cracks near the surface and occasionally produced a rather attractive dark opal.

* * *

A pair of light-blue brilliant-cut diamonds had us reaching for the circuit tester, which is used to prove natural blue diamonds. However, a glance through the microscope showed the stones to be coated with a poorly applied violet-blue substance. Although we were not permitted to experiment with the coating to determine its nature, surely it would not be difficult for a jeweler to detect it with a loupe.

Gemological Digests

Russia

The Soviet News Agency Tass has reported that in addition to the 37.35-carat diamond found in Yakutia last month, a 40.4-carat and a 46.85-carat diamond have been discovered recently.

Singapore

Although the Singapore Government relaxed its restrictions recently on the import of many items, diamonds and gold are still among those imports that will require licenses.

Arkansas

It has been reported that another diamond, weighing 3.65 carats, has been found in the Crater of Diamonds at Murfreesboro, by a tourist from Louisiana. This is the largest diamond found since 1956, when the Star of Arkansas was found.

U.S.A.

It has been reported that the Office of Minerals Exploration of the United States Department of the In-

(continued on page 349)

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 cristals, formations of minerals and their physical properties that began inthe Spring 1958 issue of GEMS & GEMOLOGY.

Other Properties

Special Properties Involving Light

The optical properties of minerals, which represent the effects of their constituent atoms and atomic structure upon light, are of profound importance in the general field of gemology. Most of these properties, however, cannot be investigated effectively without use of the polarizing microscope, and thus are of limited application in ordinary work with the hand lens or loupe.

The brilliance and sparkle, or general "liveliness," shown by cut gemstones are related fundamentally to their indices of refraction. Reflection and refraction of visible light at an interface between substances of different optical density, as between air and a gemstone, are complex but well-known phenomena that need not be treated here. Suffice it to say that maximum brilliance in a faceted stone is obtained when its gross proportions and the orientation and positioning of its facets are related in the most effective manner to its crystal structure and its index or indices of refraction.

A few gem minerals, notably diamond and sphene (titanite), have markedly different indices of refraction for components of light corresponding to different colors. This property, known as *dispersion,* is responsible for the so-called fire in stones that are appropriately cut.

Differential absorption of light in different crystallographic directions is characteristic of many colored minerals, and commonly is strong enough to be observed megascopically. Thus equal thicknesses of transparent tourmaline or muscovite appear darker when viewed in some directions than when viewed in others. If different component colors of the light are absorbed in different crystallographic directions, the mineral shows different colors when appropriately viewed by transmitted light in these directions. This property is known as *pleochroism.*

In addition to such general features as transparency, color, streak and luster, some minerals show an internal *iridescence,* or even a *play of colors,* if they are rotated during observation in reflected light. This is due either to the presence of small flaws, as in opal, or to an unusually strong dispersion, or power of the mineral to break up white light into its variously colored components, as in diamond. Labradorite and a few other minerals show not only a play of colors, but a general *change of colors,* during rotation.

Opalescence in a mineral is caused by tiny imperfections, generally oriented inclusions, and appears as pearly or milky reflections from the interior of the specimen. It is common in some varieties of opal, feldspar, quartz, beryl and tourmaline. Surface films of different composition give some minerals an iridescent appearance, and develop a *tarnish* on others. Many of the opaque minerals tarnish readily, even on newly broken surfaces, so that their true color is quickly and effectively concealed by that of the surface film.

The ability of a substance to emit light at temperatures below those of incandescence is known as *luminescence.* The intensity of emitted light generally is so weak that this phenomenon is best observed in the dark. A few minerals become luminescent when crushed, struck, scratched or even rubbed (some fluorite, sphalerite, calcite, diamond), and a few become luminescent when heated to temperatures below those of red heat (some fluorite, calcite, apatite). A more common type of luminiscence, known as *fluorescence,* involves emission of light by a substance during bombardment by ions or electrons or during exposure to X rays, ultraviolet light or certain other types of radiation. If the substance remains in an excited state and continues to glow for an appreciable length of time after the period of its exposure, it is said to be *phosphorescent.*

Among the minerals that show fluorescence are calcite, diamond, fluorite, opal, scheelite and willemite. The emitted light commonly is colored, and the color appears to be unrelated to that of the mineral as seen in ordinary light. Further, the fluorescent colors typically vary somewhat from one specimen to another of a given mineral.

Magnetism

A few minerals are so strongly magnetic that this property can be recognized and used as a means of identification. Magnetite and ilmenite, for example, can be distinguished from other heavy, dark-colored minerals, and pyrrhotite can be distinguished from chalcopyrite and most pyrite through appropriate use of an ordinary compass.

If a specimen of magnetite is brought close to the face of the compass, the needle will swing promptly in response to any change in lateral position of the specimen. Ilmenite is more weakly magnetic, and a specimen of this mineral must be moved slowly back and forth over the end of the compass needle before the needle will begin to respond with swings of increasing amplitude. The magnetic nature of pyrrhotite can be recognized only if the compass needle is delicately balanced on a sharp pivot, and such a needle will respond with weak swings after the specimen is moved back and forth ten times or more.

Reaction to Acid

Although not strictly a physical property, the reaction of some minerals to dilute hydrochloric acid is very useful in rough identification of carbonate minerals and of materials that contain these minerals. A drop of acid placed on a grain of calcite or aragonite causes a brisk effervescence of carbon dioxide, whereas dolomite will effervesce very slowly unless it is scratched or otherwise powdered. Magnetite, siderite and rhodochrosite react with effervescence, but only if the acid is heated.

Some sulfide minerals, including sphalerite and pyrrhotite, yield hydrogen sulfide when treated with hydrochloric acid, especially if they are powdered. The fetid odor of this gas is easily recognized.

Taste Odor and Feel

Many of the water-soluble minerals have characteristic *tastes,* which ordinarily are classified as saline, or salty (halite), bitter (epsomite), cooling (saltpeter and some other nitrates), nauseous (chalcanthite), feebly sweetish (borax), sweetish astringent (alum), and sour (acid-water films on some mineral coatings in mine workings). The best results are obtained by briefly touching the specimen to the tip of the tongue. Each investigator can establish the taste of a given mineral species according to his own reactions.

Some minerals have characteristic *odors* when they are heated, struck sharply, broken, or when they are moistened by the breath. Thus, many limestones and dolomites give off a fetid odor similar to that of rotten eggs when struck repeatedly or broken with a hammer, and a sulfurous odor is similarly obtained from pyrite. Arsenopyrite yields a garlic like odor when struck. Kaolinite and other clay minerals commonly give off an earthy odor when moistened, and a few minerals emit distinctive odors when heated.

Feel is a rather elusive property that nevertheless is helpful in recognizing a few minerals. Talc, for example, has a greasy feel, and some compact, fine-grained aggregates of soft minerals, such as chlorite, sepiolite, and pyrophyllite, have a smooth feel. The surfaces of other minerals can feel harsh, rough, tacky (adhering) or scaly. Feel is useful in estimating differences in the perfection of cleavage in many minerals.

Blowpipe Reactions

Some minerals behave in characteristic ways when heated before the blowpipe or some other type of flame. The most useful reactions involve differences in *fusibility,* the quietness or liveliness of fusion, the color imparted to the flame, and certain characteristics of beads made by fusion of the mineral with borax, sodium carbonate or some other flux. Standard textbooks on mineralogy should be consulted for a complete treatment of blowpipe reactions.

References

Barrer, R. M., *Diffusion in and Through Solids*, Cambridge University Press, Cambridge, England, 1941.

Bragg, W. L., *Atomic Structure of Minerals,* Cornell University Press, Ithaca, New York, 1937.

Buckley, H. E., *Crystal Growth,* John Wiley and Sons, Inc., New York, 1951.

Buerger, M. J., *The Role of Temper-*

ature in Mineralogy, American Mineralogy, Vol. 33, PP. 101-121, 1948.

Dana, E. S., and Ford, W. E., *A Textbook of Mineralogy,* 4th edition, John Wiley and Sons, Inc., New York, 1932.

Evans, R. C., *An Introduction to Crystal Chemistry,* Cambridge University Press, Cambridge, England, 1948.

Kraus, E. H., and Slawson, C. B., *Gems and Gem Materials,* 5th edition, McGraw-Hill Book Company, Inc., New York, 1949.

Liddicoat, R. T., Jr., *Handbook of Gem Identification,* Gemological Institute of America, Los Angeles, California, 1947.

Mason, Brian, *Principles of Geochemistry,* John Wiley and Sons, Inc., New York, 1952.

Pauling, Linus, *General Chemistry,* W. H. Freeman and Company, San Francisco, California, 1947.

Book Review

GEMSTONES OF NORTH AMERICA, by Captain John Sinkankas, C.G. 676 well-illustrated pages with color plates reproduced from author's original watercolor renditions of gem minerals. Published by A. Van Nostrand, Inc., New Jersey. Price $15.

Each year there are many books published on some phase of gemstone technology or lore. Most of them are routine—usually substantially the same as an earlier work or as portions of several earlier works. From this regimen, *Gemstones of North America* is a welcome relief.

John Sinkankas, the author, is a remarkable person. A captain in the U.S. Navy, Sinkankas has made gemstones a life-long hobby. Many of the recently acquired gemstones in the fine collection of the United States National Museum have been cut by Sinkankas. His earlier book, *Gem Cutting, A Lapidary's Manual,* was an outstanding work in that field. The new book culminates an immense research task that must have occupied years of nights and weekends.

Following a brief chapter on the properties of gemstones, Sinkankas proceeds directly into the "meat" of his book: an exhaustive discussion of North American sources for every important gemstone and many rarely fashioned gem materials. Every deposit of the important stones known to Sinkankas and his colleagues is discussed thoroughly. The rare-gemstone section includes a number of stones that only a hobbyist cutter would consider including; for example, microlite, stibiotantalite, algodonite, breithauptite, friedelite, and other minerals equally obscure to the jeweler and commercial gem man. The sources are outlined in sufficient detail so that one seeking to locate them should have little difficulty. The history and development of the various gem deposits are covered effectively. Sinkankas displays his versatility further by rendering the paintings from which the excellent color plates were made.

Gemstones of North America is an awesome testimonial of the dedication of a devoted hobbyist.

Buffalo Diamond Class

Members of the Buffalo Diamond Evaluation Class, which met July 27th through July 31st. Standing left to right: **Pete Waytena,** Ft. Erie, Ontario, Canada; **Ned Austin,** Weston, Ontario, Canada; **B. Walters,** Toronto, Ontario, Canada; **H. Weinstein,** Toronto, Ontario, Canada; **George Walker,** Guelph, Ontario, Canada; **Bertram Krashes,** GIA Instructor; **Benjamin Grelick,** Buffalo, N.Y.; **R. H. Hughes,** Jamestown, N.Y.; **Isaiah Zissor,** Olean, N.Y.; and **Gerald Birzon,** Buffalo, N.Y. Seated left to right: **Norman Teufel,** Buffalo, N.Y.; **J. Frank Gilbert,** Newark, N.Y.; **Clayton W. Engelbert,** Buffalo, N.Y.; **Allen N. Presant,** Buffalo, N.Y.; **H. L. Holliday,** Fredonia, N.Y.; **William J. Scheer,** Rochester, N.Y.; **Frank G. Cecala,** Angola, N.Y.; **Karl Freheit,** Buffalo, N.Y.; and **Richard K. Smothers,** Pensacola, Fla.

Chicago Diamond Class

Members of the Chicago Diamond Evaluation Class, which met July 13th through July 17th. Standing left to right: **Russell Wheeler,** Oak Lawn, Illinois; **John M. Hunt,** Chicago; **John J. Hunt,** Chicago; **Charles N. Van Sipman,** Chicago; **Bertram Krashes,** GIA Instructor; **Robert J. Drucker,** Chicago; **Clayton M. Taylor,** Argo, Illinois; **Albert Diness,** Chesterton, Indiana; and **John W. Teegarden,** Crown Point, Indiana. Seated left to right: **William R. Satkamp,** Elmwood Park, Illinois; **Hilary E. Chelf,** Peoria, Illinois; **Mrs. June R. Bagnall,** Denison, Iowa; **Mrs. Bernice L. Johnson,** Wheaton, Illinois; **Mrs. Phyllis Brantley,** Dixon, Illinois; **William G. Nusser,** Iowa City, Iowa; and **William L. Richardson,** Gainesville, Florida.

New York City Diamond Class

Members of the New York City Diamond Evaluation Class, which met August 3rd through August 7th. Seated left to right: **William R. Scheer,** Rye, N.Y.; **Harold D. Carroll,** Marion, Ohio; **Nat Cabot,** New York City; **Harold M. Marans,** Kingston, Ontario, Canada; **A. Aldo Del Noce,** New York City. Standing left to right: **Bertram Krashes,** GIA Instructor; **Paul Bradshaw,** Elizabeth City, N.C.; **Thomas Primavesi,** Montreal, Quebec, Canada; **Joseph Rubino,** Morristown, N.J.; **Joseph Knapp,** Johnstown, Penna.; **Albert L. Land,** Malverne, N.Y.; and **G. Robert Crowningshield,** Director of the Eastern Headquarters of the GIA.

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.

Gemological Digests

(continued from page 343)

terior is prepared to finance citizens in the search for at least thirty-two varieties of minerals, including industrial diamonds. If they are able to meet the necessary requirements, such as description of known ore reserves in the area, sketches of the geologic features of the property, and reasons for expecting to find ore, the Government will lend up to $250,000 for exploration work. It must be shown in the application, however, that requests for loans have been made to at least two banks and that the requests were either refused or the terms were unacceptable. If the exploration proves unsuccessful, there is no obligation to repay the loan. However, if an exploitable deposit is found, the loan must be repaid by a five percent royalty.

U.S.A.

A seven-piece diamond-and-sapphire-set palladium dinner place setting, costing $5000, has been made by Lucian Piccard, it has been reported. The long, slim palladium handles are set with sapphires in the filigree at the base of the fork tines and spoon bowls. Diamonds form a coronet at the end of the handles, and just above them a circle of sapphires forms a shield suitable for inscribing one's initials or his coat-of-arms.

OPAL *(cont. from page 330)*

pose that rumors of my visit, the first American to visit the Andamooka area, plus the fact that Mr. Manning had arrived in Australia, led them to hope that they might buy all of the available opal before our arrival. You can imagine their surprise when they learned that neither of us was interested in buying on the spot. Mr. Manning was the first commercial opal buyer from America to visit these fields. Coober Pedy, an aboriginal term meaning *white man in hole,* is some three hundred miles farther to the northwest. After waiting out a deluge of rain (who said it rains only six inches a year? . . . we seemed to get that much in one afternoon), plus three wonderful drying days, we started off, only to be mired a few miles from the town on a dry-looking flat. We all set to digging and carrying rocks to build the road out. Then we traveled on to Pimba and that last hotel at Kingoonya. We were on the main road north to Alice Springs and Darwin. What road? Where is it? Down through steep hills mirrored in salt lakes and through miles of puddles we kept going. At last, in the late afternoon, after shooing hundreds of kangaroos and emus from our path, we came out onto a long flat plain; there, twenty miles away, we saw two sets of buildings. At last, there was the Coober Pedy Trading Post.

(to be continued)

LEUCITE *(cont. from page 334)*

of these different kinds of inhomogeneities were observed in my three leucite specimens.

The observation made with the polarizing microscope reveal that these apparently isometric crystals are in reality assembled crystals. Single individuals of weak double refraction are so intimately twinned that assembled crystals of cubic habit are formed. Exact measurements, however, prove that the angles of the pseudocubic faces do not precisely coincide with the isometric system. Heated to a temperature of 620°C (pressure, one atmosphere) the angles change, the twin lamellæ disappear and the leucites become isotropic and truly cubic. Upon subsequent cooling below 620°C, the lamellæ and the anomalous double refraction reappear. Thus leucite is characterized by an $\alpha-\beta$ alteration at 620°C. The knowledge thus gained is that, optically, the leucite crystals consist of orthorhombic twin lamellæ that can be recognized by the striations on the faces, the fine microscopic striæ as well as the anomalous double refraction. This particular state of internal structure may be responsible for the remarkably high "fire" displayed by gem leucite even though the dispersion is but .008.

Leucite will never be knighted as a member of the aristocracy among gemstones, but for its interesting properties it certainly deserves to be appreciated by gem collectors and gemologists.

ABOUT THE AUTHOR

Charles H. Derby was born at Worcester, Massachusetts, in 1909. He attended Williston Academy at Easthampton, Massachusetts, and the Stockbridge School of Agriculture, of the University of Massachusetts, at Amherst. He graduated with a Certificate in Floriculture. Upon graduation, he was gardener on one of the famous estates in New England. Later, he managed floral shops and then an interior-decoration gallery in Rochester, New York.

World War II made, and has continued to dominate, the issues of his life. Being transplanted from the security and well being of modest success in upper New York State, in 1940, he found himself in the U.S. Army. In the fall of 1944, he went on a cruise to Australia and India. This was not one of those "you-dream-of-or-long-for" trips; 29,000 enlisted men, 5000 officers, 2000 Chinese and some 1500 Red Cross personnel were jammed into a single ship. 29 days later, having been chased by subs, he finally came to the safe Port of Melbourne. The only view of the town was from the long single wharf four miles away; it was here that he saw his first precious opals. After refueling and taking on supplies, he was off for India. Landing at Bombay, he soon was surrounded by Indian gem *wallahs*. Gems by the hatfull! Quality? Every beer bottle and broken taillight had been well preserved and finely cut to resemble gems. Genuine rubies, moonstones, sapphires and garnets, etc., were carefully placed in the assortments for "bait." He later proceeded overland into northern Burma. Soon after liberation, Burmese stone dealers and traders from Mogok and Mandalay flooded the bazaars and camping areas. From hats, shoes, packets, boxes and briefcases came the carefully folded papers displaying rainbow assortments. These ranged from the most exquisite rubies to the boldest glass imitations.

These dazzling memories kept prodding him after his return to the U.S.A., and it was little wonder that, when the opportunity presented itself to return to India, he threw security to the winds and went off in the Spring of 1947. The most important result of that trip was, that soon after his return, he became a student of the GIA. This study and work soon placed him as a salesman with a retail jewelry firm, Wiss Sons, Inc., of Newark, New Jersey. Later, he was to open a new branch store as manager. Five years later, seeking a change and refreshment of ideas, he decided to make a trip around the world to visit important gem areas. Now, luxuriously, he repeated the trip of 1944, taking time to stop and see everything. After three years, he returned to the United States and entered the lecturing field, telling of his many travels and experiences. His very interesting article on opal mining in Australia appears on page 323 of this issue of *GEMS & GEMOLOGY*.