

# *Gems and Gemology*

WINTER 1956-57



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# Gems & Gemology

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## On the Cover

*A matched set in diamonds and sapphires for the man who prefers a watch on his wrist around the clock. Shown on the Diamonds U.S.A. Awards collection at the Plaza, New York, 1956. The dressup dial is bordered by baguettes and round diamonds, complemented with sapphires: shirt studs and cufflinks to match. Created by Lucian Piccard Watch Corporation, New York, one of the eighteen precious-jewelry designers from the U.S. and Canada who received awards.*

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# Diamond Mining In Arkansas

by

JOHN R. BURGOON, JR.

Diamonds have been found in almost every state of the United States. Miners, panning the streams of California for gold, have found small diamonds among the heavy minerals in their pans. In Manchester, Virginia, a 23.75-carat octahedron, called the Dewey Diamond, was found in 1885. The largest alluvial diamond found, the Punch Jones<sup>1</sup>, weighing 34.46 carats, was picked up by Grover C. Jones while playing horseshoes near Peterstown, West Virginia. These, and many of the other diamonds found in this country, were probably carried south from Canada by the tremendous sweeping action of the glaciers. According to Professor W. H. Hobbs,<sup>2</sup> who made a detailed study of the glacial striae in 1899, the probable source of these alluvial stones is in the vicinity of James Bay in Canada. However, in spite of many well-organized prospecting surveys, the source has not been located.

The most important discovery of diamonds in the United States was made in Pike County, Arkansas, in 1906. This discovery was important because the stones found were *in situ* and had not been carried by glacial or water action from some unknown locality. The Arkansas deposit consisted of an ac-

tual volcanic pipe, similar to the diamond-bearing pipes in South Africa. The Arkansas diamonds were found in decayed peridotite, more commonly known as *kimberlite* or *blue ground*. The Arkansas deposit has produced several thousand stones and shows promise of being a potentially important source of industrial and gem diamonds.

The first geological survey of the Murfreesboro area in Pike County, Arkansas, according to J. C. Branner,<sup>3</sup> was made by W. Byrd Powell, M.D., in a somewhat vague paper entitled, "A Geological Report on The Fourche Cove," which was published in 1842. This report only offered the suggestion that this area was related geologically to the formations at Fourche Mountain, Saline County, and the Magnet Cove igneous areas.

A more complete and detailed study of the Murfreesboro area was made in 1889 by John C. Branner and R. N. Brackett.<sup>4</sup> In

1. Now on display at the Smithsonian Institute.
2. R. M. Shipley, *Diamonds*, Geological Institute of America, Sec. 17, p. 7.
3. J. C. Branner and R. N. Brackett, *The Peridotite of Pike County Arkansas, Annual Report of the Geological Survey of Arkansas. II* (1890), 377.
4. *Ibid.*, pp. 377-91.

their survey, Messrs. Branner and Brackett recognized the exposed deposits 2½ miles southeast of Murfreesboro as being peridotite. Dr. Branner recognized this deposit as being similar to the deposits in South Africa that were then producing diamonds. J.G. Ferguson,<sup>5</sup> Arkansas State Geologist in 1922, states that Branner spent half a day combing the surface of the exposed peridotite area for diamond specimens.

Dr. Branner did not find any diamonds in his search, so he refrained from making a public announcement of his belief that this was a possible source of diamonds. He feared that such an announcement might cause another fruitless rush like the one that had resulted in the loss of several millions of dollars in unwise and unwarranted gold-mining ventures in that area.<sup>6</sup>

Another reason for Branner's reluctance to publicize his discovery is given by J. T. Fuller:<sup>7</sup>

... In this report Branner mentions that the rock resembled closely the diamond-bearing rocks of South Africa, but scouts the idea of its containing diamonds, due to the absence of any bituminous shales surrounding the "pipe," or crater, such as occur about the pipes at Kimberley, and from which it was at that time (1889) supposed that the carbon required for the formation of the diamond was derived ...

Dr. Branner's report did, however, stir a great deal of interest among geologists of the time, not because it hinted of the possibility of a diamond pipe in the area, but because the survey suggested the geological age at which the greater part of Arkansas had been sunk beneath the ocean.<sup>8</sup> In retrospect, it seems strange that Dr. Branner's report did not stimulate any further study of the Murfreesboro area.

According to J. B. Wood,<sup>9</sup> Dr. Branner had an interested bystander when he was searching the washes of the area so carefully. If this story is true, it seems strange that it took John Huddleston, the curious bystander, 17 years to make up his mind to

buy an option on the farm on which the exposed area of peridotite existed.

John Huddleston was considered by his neighbors to be a little strange in his ways. Legend has it that John was one of the few men in that area who could drink the local brand of "white lightning" without "cutting" it. It is also said that John and "Uncle Ed" Velvin could take a steaming pot of coffee off the fire and drink from the spout. John was a ne'er-do-well farmer who might have been more successful if his side interests had not kept him away from the farm so much. He was inquisitive by nature and enjoyed roaming the countryside as a guide or searching for Indian relics and the "lost" Comanche gold at Caggo Gap.<sup>10</sup>

Early in 1906, Huddleston decided to buy an option on the site of Branner's survey. He didn't have the cash to close the deal, but the owner accepted a mule as down payment for an option to buy the farm for \$10,000. He is said to have suspected that lead or copper existed in the strange looking green dirt on an eroded hillside of the farm. At any rate, he spent the next few weeks crawling around on his hands and knees, carefully searching the ground as Branner had done 17 years before.

On the first day of August, 1906, while making this search on hands and knees, Huddleston's attention was caught by an unusually brilliant reflection from a crystal on the ground. Picking it up, he realized immediately that this stone was different from the other similar crystals of quartz, barite, and calcite that were scattered on the

5. J. G. Ferguson, *Minerals in Arkansas*. Little Rock, Arkansas Bureau of Mines, 1922, p. 55.

6. Ferguson, *op. cit.*, p. 55.

7. J. T. Fuller, *Diamond Mine in Pike County, Arkansas, Engineering and Mining Journal*, LXXXVII (1909), 152-55, 616-17.

8. Ferguson, *op. cit.*, p. 55.

9. J. B. Wood, *America's 35 Acres of Diamonds*, *Nations Business*, XXXVII (Mar., 1949), p. 63.

10. According to local legend, a young army officer named Lee, later distinguished as a Confederate general, pursued a band of Comanche Indians through Texas to the Caddo Gap of the Little Missouri River near Murfreesboro. In crossing the river, the Indians are said to have dropped a fortune in Mexican gold coins. There are some who believe that Huddleston did find a part of this treasure.

surface of the green-tinted ground in that area.<sup>11</sup> John had found his first "deemint," as he called it.

According to H. W. Wheeler:<sup>12</sup>

... The tradition that his little girls were the first to pick up the "pretty stones" with which they decorated their outdoor playhouses seems to be unverified, for the keen-eyed farmer was himself the finder of the first stones . . .

Huddleston forgot about looking for lead and copper and excitedly continued the search, alert for another reflection like the first. Several false reflections from other crystals no doubt distracted him in this continued search, as they did the author in his visits to the crater. However, unlike the author, Huddleston did find another stone that afternoon in the rut of a road not more than 500 feet from the spot where the first was found. This stone was white like the first and weighed three carats. (The first stone weighed 4.5 carats.)<sup>13</sup>

Huddleston told his family about his finds, and they spent the next several days carefully but unsuccessfully searching the area for other stones. On the 8th of September, however, Huddleston found a yellow hexahedron weighing one-half carat.<sup>14</sup>

On the day he found the third stone, Huddleston rode into Murfreesboro to see Jess Riley, who was cashier of the Pike County Bank. John reasoned that the cashier of a bank would be able to tell him the value of the stones he had found. However, Riley knew little more about diamonds than Huddleston, so he referred Huddleston to J. C. Pinnix, who was the local lawyer and president of the bank. Pinnix, in turn, suggested that they be sent to Charles S. Stiff, a prominent jeweler in Little Rock. Stiff felt sure that these stones were diamonds, but hesitated to make a positive appraisal. Stiff wisely decided to send them to the foremost diamond expert in the United States at that time, Dr. George F. Kunz, who did appraisal work for Tiffany's in New York.<sup>15</sup> Meanwhile, Stiff and several others purchased

options on Huddleston's farm and other property adjoining it.<sup>16</sup>

Dr. Kunz examined the stones submitted and declared them to be of the finest gem quality, comparable to the stones mined in Africa. When this appraisal reached Little Rock, six businessmen pooled their resources with New York investors in the formation of the Arkansas Diamond Company. Samuel Wallace Reyburn, the energetic young president of the Union Trust Company of Little Rock, was selected to head the speculation and was dispatched to Murfreesboro to arrange for the purchase of Huddleston's property. On the way to Murfreesboro, Reyburn met a lumberman friend, Horace Bemis, who guessed that something unusual must be luring Reyburn to such an out-of-the-way place as Murfreesboro. Perhaps Reyburn's excitement melted his banker's reserve, for he finally divulged the objective of his mission to Bemis. At any rate, Reyburn and Bemis continued the trip to Murfreesboro together.<sup>17</sup>

On arrival, Reyburn contacted John Huddleston and asked him what he would take for his farm.

... "The price is \$36,000," he declared when that detail was reached.

"How do you figure that?" the banker asked, knowing the lanky discoverer had never had \$100 in his jeans and could neither read nor write.

"Well, there's me and the old lady and we've got four girls," Huddleston explained. "We figure it's worth \$6,000 apiece..."

J. B. Wood<sup>18</sup>

The acquisition of \$36,000 and the publicity he was receiving gave John Huddleston

11. G. F. Kunz and H. S. Washington, *Diamonds in Arkansas*, Scientific American Supplement, LXIV (Oct. 5, 1907), p. 211, as abstracted from the U. S. Department of Interior Bulletin 808, p. 148.

12. H. E. Wheeler, *Diamonds in Arkansas*, *Hobbies*, LI (May, 1946), p. 118.

13. Kunz and Washington, *loc. cit.*, p. 211.

14. *Ibid.*, p. 211.

15. Wood, *loc. cit.*, p. 63.

16. Kunz and Washington, *loc. cit.*, p. 211.

17. Wood, *loc. cit.*, p. 63.

18. *Ibid.*, p. 64.

a new stature in the eyes of his neighbors. He was still considered something of a "character," but the word now had a more flattering connotation. Huddleston bought a store and several farms; his daughters received modest dowries. In New Orleans, several years later, Huddleston pawned the diamonds that he had for return fare to Murfreesboro.<sup>19</sup> In 1936, at the age of 76, he was a part-time junkman and part-time farmer.<sup>20</sup>

Shortly after Reyburn's purchase of the Huddleston farm, Dr. Washington, an eminent geologist associated with Dr. Kunz, arrived to study the character of the rock and mineral formations at the crater. Between Huddleston's discovery and Washington's arrival, an additional 21 stones had been found. Washington spent several weeks studying the area. Later, in January of 1907, Kunz and Washington studied the area together. Their survey disclosed the following facts;<sup>21</sup>

The exposed peridotite on the surface of the crater covered an area of approximately 100 acres, forty acres of which was the actual surface of the pipe, the rest being an overburden of decomposed kimberlite. In association with the kimberlite were calcite, barite and quartz crystals. A small number of peridot and pyrope garnet crystals were also found. Dr. Kunz was particularly interested in the brown "puddingstone" that was so common in the area. This stone was the Cretaceous conglomerate composed of pebbles of various sizes, mostly quartz, which had been cemented together with chocolate-colored iron oxide. Dr. Kunz noticed a striking resemblance of this conglomerate to the *casalbo* conglomerate which had produced diamonds in Brazil. He thought, at first, that this conglomerate might be the source of the diamonds in this area also. However, after further investigation, in which no diamonds were found in the conglomerate, he realized that the crater had to be the source of the stones. This belief was further substantiated when a 1½-carat dia-

mond was found in a rock at a depth of 15 feet in the crater. The rock containing the diamond was studied carefully by three geologists, all of whom agreed that the rock could not have been altered in any way and that it was proof that this was a primary source of diamonds. This was the first time that a diamond had been discovered in matrix on this continent.

About the same time that Drs. Kunz and Washington were making their survey of the peridotite area, the news was rapidly spreading over the country of the Arkansas diamond "find." The sleepy little Ozark town of Murfreesboro found itself totally unprepared for the hectic influx of "prospectors" who visioned themselves making a "strike" of another pipe in the vicinity, or perhaps "high grading" the property that had been already claimed. Mr. Howard Millar, in an interview with Kenneth Johnson,<sup>22</sup> of the *Memphis Commercial Appeal*, said that for the first few years the countryside around Murfreesboro assumed the appearance of a great, sprawling tent camp, and that from 1907 to 1908, the 10-room log hotel at Murfreesboro turned away 10,000 people seeking lodging. The town of Kimberley sprang up along the Little Missouri River between Murfreesboro and the Huddleston property. Farmers in the area who had been fortunate enough to purchase options on land near the crater received more than \$75,000 for their options from speculators.<sup>23</sup>

Mining operations in the Murfreesboro area followed a sporadic pattern for the forty-year period following Huddleston's discovery. All but one or two of these ventures resulted in disappointment to the owners and

19. *Ibid.*, p. 64.

20. Diamond Finds; New Capital Obtained to Reopen Mine in Arkansas Ghost Town, *Literary Digest*, CXXII (Nov. 14, 1936), p. 10.

21. R. S. Lanier, Has Arkansas a Diamond Field? *American Review of Reviews*, XXXVI (Sept. 1907), p. 303.

22. K. Johnson, Arkansas Diamond Hunt, *The Commercial Appeal*, (Feb. 26, 1956), Sec. 5, p. 1.

23. Diamond Finds; . . . , *loc. cit.*, p. 10.

investors of the mines. It is difficult to follow the operations of the many companies that have mined the area because most of the operators, with one exception,<sup>24</sup> have kept their production figures to themselves. The best known, and perhaps most important, of the mining enterprises are the following:

The Arkansas Diamond Company was the first organized to mine diamonds in the Murfreesboro area. The company was formed in the later part of 1906 under the leadership of Samuel W. Rebyburn of Little Rock, Arkansas. The company purchased the farm of John Huddleston as well as additional property adjoining the crater. Drs. Kunz and Washington were called in to make a preliminary survey of the pipe and its formations. Surface-mining operations were carried on until 1908, at which time the original plant was closed by bankruptcy tests.<sup>25</sup> Additional capital was received, and the mine went through a period of intermittent operations. Two washing plants were constructed in 1912, and sporadic operations were continued until 1931, when the world decline in diamond prices brought a halt to all operations in the Arkansas area along with some of the African mines. By this time several million dollars had been invested in the venture with an estimated yield of \$100,000 in diamonds. This included 40,000 stones which totaled 12,000 carats in weight.<sup>26</sup>

In 1936, the property was leased to the Arkansas Diamond and Engineering Company.<sup>27</sup> The end of the world depression and the subsequent rise in diamond prices prompted the new company, under the leadership of Roy Thompson, a Little Rock printer, to raise \$400,000 for the resumption of operations. In spite of the increased price of diamonds, however, the new company was no more successful than its predecessors. In 1941, the Arkansas Diamond Corporation sold its property to the North American Diamond Corporation.<sup>28</sup> This company hoped to take advantage of the further rise in diamond

prices caused by World War II, which was then in progress in Europe.<sup>29</sup> The entry of the United States into the war six months later brought their plans to a halt, for the machinery required to reopen the processing plant was only available on a war priority basis to essential defense productions. However, the increased demand for industrial diamonds in war production and the possibility of losing the major sources in South Africa to the axis powers led the owners of the mine to feel that a priority would be justified in their case.<sup>30</sup>

A committee, including the governor of Arkansas, took a selection of Arkansas diamonds to Washington and obtained interviews with President Roosevelt and William L. Batt of the War Production Board. The committee was received favorably, and the Bureau of Mines and the Geological Survey were instructed by the War Production Board to investigate the Arkansas property to determine the advisability of granting a priority for the purchase of \$506,000 in equipment and machinery. Although the request was reduced to \$225,000, the priority was not granted. Ironically, money was appropriated to supply machinery to British-owned mines in the Belgian Congo and other mining areas.<sup>31</sup>

Finally, in April of 1943, a team of investigators was sent to the Arkansas area where they spent eight months (until January of 1944) surveying the crater. The official report of the survey, which was not published until 1948 revealed that 54 borings of shallow depth on a small area of the crater had produced 32 diamonds.<sup>32</sup> It is difficult to understand why approval was not granted to the Arkansas syndicate to start production.

24. This exception was the owners of the Ozark Mine, the late Austin Q. Millar and his son Howard A. Millar, who now owns the property.

25. *Diamond Finds*; . . . , *loc. cit.*, p. 9.

26. *Diamond Finds*; . . . , *loc. cit.*, p. 9.

27. *Ibid.*, p. 9.

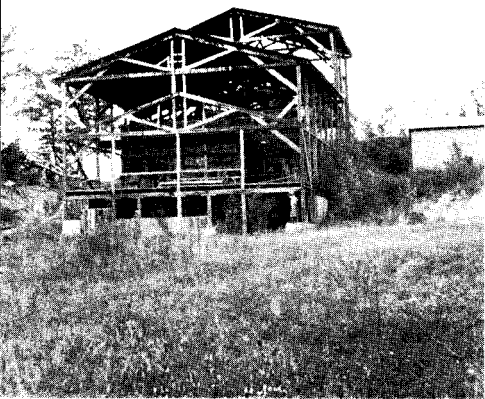
28. Wood, *loc. cit.*, p. 63.

29. *Domestic Diamonds*, *Time*, XXXVIII (July 21, 1941), p. 71.

30. Wood, *loc. cit.*, pp. 6-62.

31. Wood, *loc. cit.*, pp. 61-62.

32. *Ibid.*, pp. 61-62.



• All that remains of the Glenn L. Martin Recovery Plant.

In November of 1945, a 50-year renewable lease was given to the Diamond Corporation of America by the owners of the largest part of the crater. The new corporation was headed by Glenn L. Martin, the successful aircraft manufacturer. Martin planned the construction of a plant for the primary purpose of recovering industrial diamonds on the old Huddleston farm. He also acquired an operating lease on the Mauney property. A modern recovery plant was constructed which was capable of handling 1000 tons of earth a day.<sup>33</sup> The only information available to the author in explanation of the failure of this latest mining attempt was obtained from unreliable sources in Murfreesboro and could not be substantiated.

Today, the "Martin Plant" is sufficiently intact to allow study of the equipment and its arrangement, but only at some peril to the investigator, for the timber supporting the open framework of the main structure threatens to collapse at the next gust of wind. There is no caretaker in residence on the property, but Mr. Howard Millar, who owns the adjoining property on the south side of the crater is entrusted with its surveillance. Visitors to the Millar property, advertised as the "Crater of Diamonds," are, for the admission price of \$1.50, permitted access to the "Huddleston" side of the crater. Mrs.

33. Wood, *loc. cit.*, p. 64.

34. Wood, *loc. cit.*, p. 64.

Ethel Wilkerson, one of the chief owners of the property has always encouraged access to the crater by visitors. In an article by Junius B. Wood,<sup>34</sup> Mrs. Wilkerson is quoted as saying, "It is a public service, if not, in fact, a public duty to enable residents of Arkansas and their visitors to have an opportunity to view this unique spot."

Horace Bemis became interested in the diamond area in Pike County after a chance meeting with Samuel Reyburn when the latter was on his way to negotiate for the Huddleston property. Bemis accompanied Reyburn to Murfreesboro, and, when it was discovered that the crater extended into the Mauney farm adjoining the Huddleston property, Bemis made a working agreement with Mauney, then County Clerk of Pike County, to mine his part of the crater. Later, Bemis purchased 30 of Mauney's 40 acres, and after Bemis's death in 1912, the 30 acres were sold to Austin Q. Millar, a former iron miner from Minnesota, for \$110,000. Millar leased two other pieces of property, and in 1914 he and his son, Howard A.

• The grease table at the Martin plant.







• Landmark at the "Crater of Diamonds": Pumphouse from old Millar plant.

• The Ozark Mine. Building in background was part of Millar's old plant. Author in foreground.



• Plowed area on the Millar property. A few yards from the spot where the 15-carat diamond was found by Mrs. Parker of Dallas, Texas.

Millar, who had just returned from college, began washing operations of the surface material. Father and son conducted exploratory mining operations for five years, by which time they were both convinced that commercial mining on a large scale would be profitable.<sup>35</sup> \$350,000 was invested in equipment and buildings, and in January of 1919 they began full-scale operations. At midnight, on January the 15th, ten days after operations had begun, the processing plant on Millar's property was burned to the ground.<sup>36</sup> Kenneth Johnson<sup>37</sup> discussed the burning of the plant in an interview with Mr. Howard A. Millar, who thought that it had been sabotaged.

Today, 50 years after Huddleston's discovery, the only activity in the Arkansas diamond crater is the tourist attraction, operated by Howard Millar and his wife, known as "The Crater of Diamonds." In March of 1956, considerable attention was given to the crater in Texas and Arkansas newspapers when a Dallas housewife and "rockhound," Mrs. Arthur Lee Parker, found a flawless, white cleavage fragment weighing 15.51 carats lying on the surface of an area of "black ground"<sup>38</sup> that had been turned over by a scraper and washed by rains shortly before. During the week that the author spent at the mine, a call was received from the cutter who later fashioned Mrs. Parker's stone. He told Mrs. Howard Millar that the stone would be fashioned into a marquise cut whose estimated weight would be seven carats and which would be valued at \$15,000. Mrs. Millar said that her husband estimated the cleavage to be part of a crystal that must have weighed 300 to 400 carats. (Editor's note. An article on the diamond found by Mrs. Parker with further information on the discovery, cutting, etc., will be published in a forthcoming issue of GEMS & GEMOLOGY.)

The Millars have hopes that the finding of this stone, named the "Star of Arkansas" by the Governor in a ceremony at Little Rock, may interest investors in putting up the capital for a reopening of the mine. In fact, a deal may be in the offing, for, during the week of the author's visit to the crater, Mr. Millar was, according to Mrs. Millar, in Dallas discussing the possibility of financing a new company with an unnamed person or persons. Perhaps one of the Texans who gained a fortune in oil speculation may succeed in bringing this "wildcat" in.

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<sup>35</sup> *Literary Digest*, CXXXII, p. 1.

<sup>36</sup> *Time*, XXXVIII, p. 71.

<sup>37</sup> *Literary Digest*, CXXXII, p. 1.

<sup>38</sup> Black, laminated clay consisting of decomposed kaolinite mixed with organic material.

# THE BARCLAYS

## Rockhounds

by

MILDRED FIELDER

A doctor recently asked George Barclay, "What are you doing now, George?"

"I'm pleasing George Barclay," was the answer. "I worked fifty-two years to please the public and now it's my turn."

The doctor need not have asked if he had taken one good look at the bouncing enthusiasm of his friend. At 76 years of age George Barclay and his wife Corinne are having the time of their lives. George retired from ownership of Barclay and Sons Jewelry, Newport News, Virginia, in 1948, and since then the two of them have covered the United States in a rock-collecting spree that has made them famous.

They own the largest private collection of minerals and gems in Virginia. They maintain a laboratory for analysis of their finds. Every one of more than three thousand pieces are identified correctly and catalogued. His lifetime experience as a manufacturer of jewelry, first Black Hills gold jewelry and then Omar Khayyam jewelry in a similar grape-leaf design, gave him a basis on which

to build his gemological knowledge. He finished the gemological course prescribed by the Gemological Institute of America and supervised by Dr. Rob of William and Mary College, Williamsburg, Virginia, receiving his certificate of Certified Gemologist November 15, 1935, to become the first Certified Gemologist in the state of Virginia. In following his hobby, he is constantly consulted by specialists in related fields as well as giving freely of his time for illustrated lectures in high schools and colleges.

The Barclay collection is housed in a replica of a cabin that George built as a young man in the Black Hills of South Dakota, where he was born the son of one of the earliest Black Hills jewelers. Charles Barclay, his father, set up his jewelry manufacturing and selling business in early-day Central City, near Deadwood, in 1878. Young George grew up in the business, ready to join his father actively at the age of sixteen, when the family moved to Virginia.



• The Barclay mineral collection is housed in this cabin at Newport News, Virginia. The cabin is a replica of one built by George Barclay as a young man in South Dakota. Corinne Barclay at the door. 1956.

*Barclay photo*

• One corner of the Barclay mineral collection building, showing George and part of the shelf display area.

*Barclay photo*



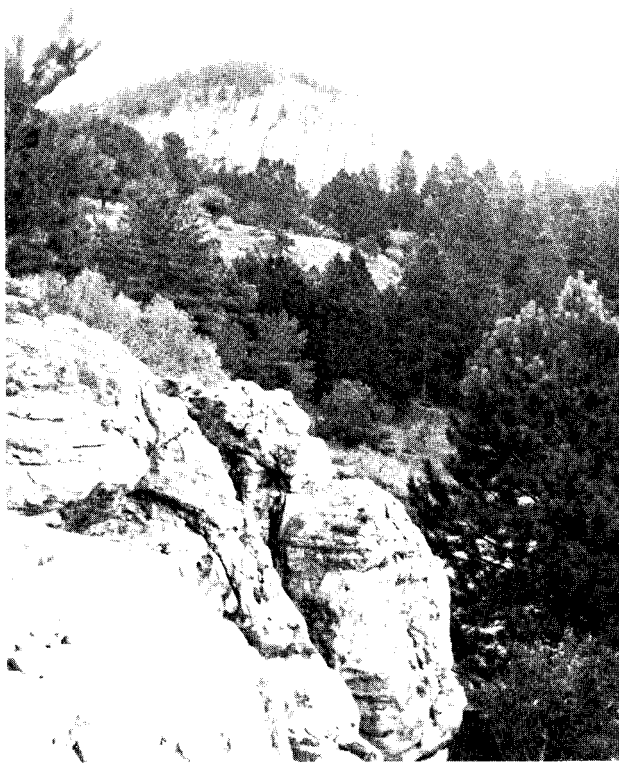
• George and Corinne Barclay find a specimen of interest near Ragged Top, granite-topped mountain in the northern part of the Black Hills, South Dakota.

*Barclay photo*



• Ragged Top, a granite outcropping in the northern Black Hills, South Dakota.

*Fielder photo*



Now that George is retired, he and his wife Corinne ("my moral support and inspiration," George says) have covered the United States in their rock-hunting expeditions. Each day's find is always "the best," they say with a smile. The specimens in their collection represent nearly every state in the Union, but they admit that most of them come from the West. They have spent every summer for the last seven years in the Black Hills of South Dakota, which they describe enthusiastically as the best hunting grounds of all.

Why the Black Hills?

"I have always been interested in the Black Hills because I was born here," George Barclay admits, "but besides that, the Black Hills offer a greater variety of specimens than any other place in the United States."

Geologically speaking, the Black Hills

area is considered the oldest upthrust of mountains in America, and Barclay says its age is one of the reasons why it is a rock-hunters' paradise. The granite outcroppings in the southern half of the Black Hills are partly responsible for the considerable pegmatite areas, he believes. The crystals found there are far larger than he has found anywhere else, and he mentions that the crystals in pegmatite are worth more for their size than their gem properties.

"In gemology you have to know everything about them: sources, whys, wherefores," he explains. Then he speaks with a slight amazement in his voice when remarking about the largest spodumene crystal ever found. In the Etta Mine near Keystone, in the heart of the Black Hills, a spodumene crystal was once found that measured approximately forty feet long and six feet thick. That, Barclay says, is size.



• The granite outcroppings known as the Needles, in the Black Hills of South Dakota.  
*Fielder photo*

George and Corinne Barclay work together on their hobby. They do not try to make it pay financially, they say, getting adequate pleasure from their interest to repay their time in full measure. They speak of the satisfaction that comes to them in the frequent consultations they are asked to give to other specialists in related fields: mineralogy, geology, or gemology. A recent interview which they particularly enjoyed was that with an outstanding paleontologist regarding the fossil formations exposed in Virginia. Another of similar interest concerned a conference on fossils connected with oils and oil formations. These technical discussions with other scientists are of high interest to them, but one realizes as he talks to George and Corinne Barclay that they are most enthusiastic when giving illustrated lectures, for which they are known in high schools and colleges in the vicinity of their home town.

William and Mary College is nearby, and they have lectures there with very satisfactory reaction from the students. They feel, however, that their most intriguing challenge lies in speaking to high schools and younger students. They have appeared on the plat-

forms of many high schools in Virginia and nearby states, always on a guest basis and always evoking interest from students.

"You'd be surprised how many children bring rocks to us for identification," George says, "both negro and white. We make no distinction in color when we accept school engagements."

The Barclays tailor their lectures to the needs of the group, using technical references for the more advanced students and using a "language they can grasp" for the younger ones.

George Barclay reached in his pocket for a bulgy envelope.

"I have ten specimens in here," he explained. "I'm sending them to a little fellow four years old, a friend of mine back home in Virginia who is interested in rocks. These boys get interested, you know, and although their interest may not stay in rocks it gets them on a track that takes them into nature."

Pleasing himself? Looks like George and Corinne Barclay are pleasing more people now than they ever dreamed possible in their jewelry days. The best of it is that the whole thing is fun.

# Recent Gem Mining at Ramona San Diego County, California

by

CAPTAIN JOHN SINKANKAS, USN  
Certified Gemologist

## INTRODUCTION

Dormant for many years, the gem region of Southern California shows signs of re-awakening interest in the commercial production of gemstones. One of the most recent ventures, and one which is still continuing, is that of Mr. Louis B. Spaulding of Ramona, who is engaged in working several gem-bearing pegmatite dikes on his Little Three property in Hatfield Creek Valley, only a few miles eastward from Ramona, San Diego County, California. In addition to the deservedly famous orange spessartite garnets, an interesting assemblage of pocket minerals is being produced and marketed. The occurrence of these minerals and the pockets in which they are found will be described below. A recent analysis of the orange gem garnet from the Little Three property shows that it is true spessartite; in fact, it corresponds almost perfectly to the ideal composition of manganese garnet.

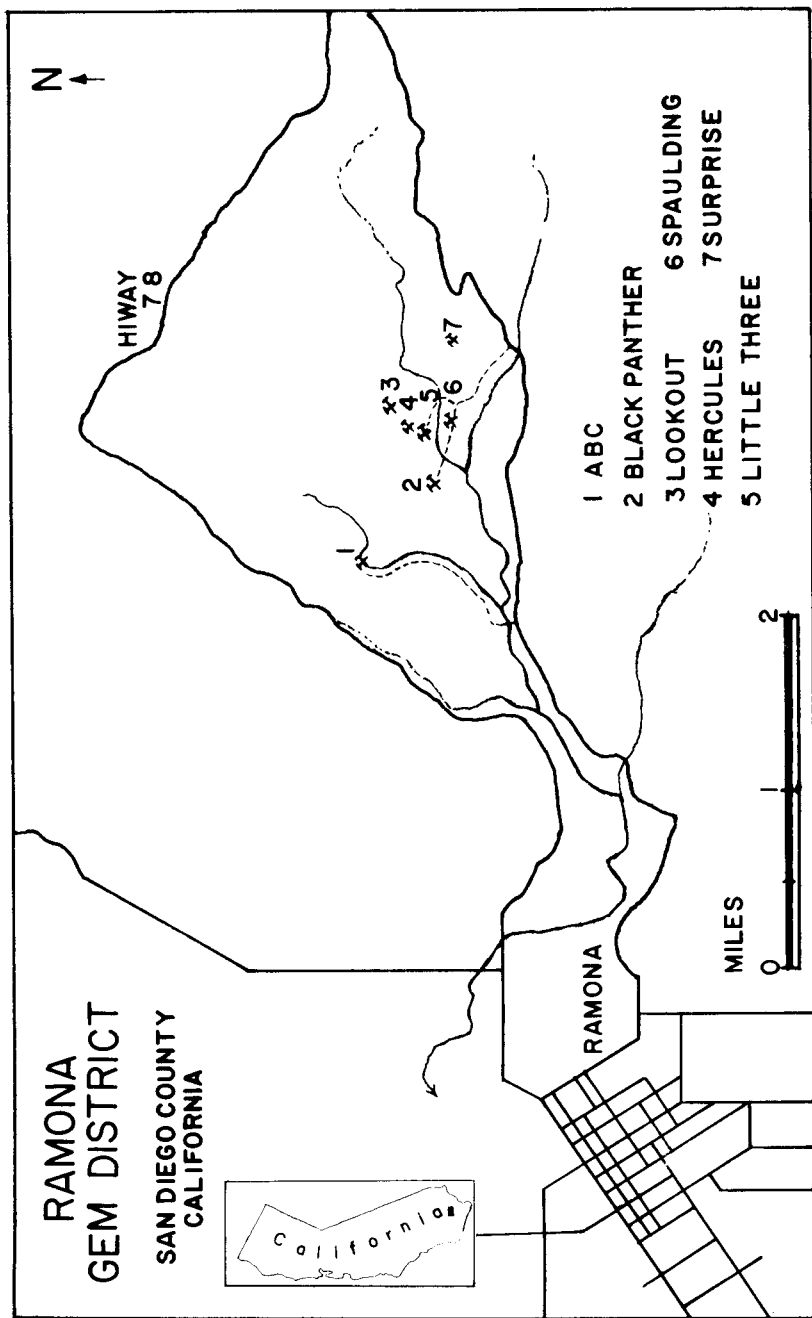
## HISTORY

Responding to the astonishing discoveries of gem tourmaline, kunzite, and beryl in the early part of this century, the Ramona pegmatite district was intensively prospected and resulted in the location of the ABC, Little Three, Surprise, Hercules, and other less important mines and prospects.

All of this took place within a space of several months in 1903; the locale was a small valley rimmed by rolling hills, about  $3\frac{1}{2}$  miles somewhat north of east from the town of Ramona. Figure 1 shows the locations of several of the more important mines in the Hatfield Creek valley. Most deposits are easily accessible by road but are privately owned and not open to general visiting.

It is a never-ending source of wonder why all of the gem-bearing pegmatites in Southern California had not been discovered long before 1900. It would seem that eroded and "spilled" pockets with glistening quartz crystals and gemstones lying on the surface of the ground should have attracted more than casual attention. Perhaps the formidable clawing brush which today is so discouraging to wanderers from the beaten path was just as repellent then, and no one in his right mind cared to clamber over the deceptively smooth chaparral-covered slopes which provide so distinctive a feature of the Southern California foothill landscape. In any event, 1903 marked the year when the Ramona hills were thoroughly explored, and any favorable sign of mineralization prospected by pit or tunnel.

Following the establishment of the gem mines, the world was soon acquainted with their production: dark olive-green tourma-



• Figure 1. Map showing locations of important mines and prospects in the Ramona pegmatite district. Based on Sheet 26650 III' AMS series V795-Ramona, California, topographical quadrangle, issued by USGS. (The rectangle shown on the inset map designates the area.)



lines, sometimes of enormous size (Kunz records one of 15 pounds from the Little Three Mine); blue, greenish, and colorless topazes; morganite beryl; many fine smoky quartz crystals rivaling those from Alpine localities; and, of course, the magnificent vivid orange spessartite garnets. The last was produced in some quantity from the Surprise Mine, the Hercules, and in notable amounts from the Little Three.

The Little Three Mine, originally a claim and now patented ground, was acquired in 1950 by Mr. Louis B. Spaulding, a resident of Ramona and a miner in years past of tungsten ores from other sections of San Diego County. His most recent production of gem-quality spessartite was brought about by a curious twist of fortune. In company with his wife, he was looking over the Little Three property at a point several hundred yards from the workings of this mine. A thin pegmatite outcropped on the crest of a low hill and, although mineralization appeared favorable, the small size of the dike was not encouraging. Meanwhile, Mrs. Spaulding had idly dislodged a slab of pegmatite with her foot. Noting the telltale orange flash of spessartite, all but hidden by the black topsoil of this area, she called her husband and they cleaned off the piece of pegmatite, exposing small but gemmy garnets studded in a matrix of cavernous feldspar. In the hope that better material existed with depth, plans were made, equipment assembled, and active opencast mining commenced a few days later using a tractor and dragline scoop. The dike was soon cleared off and broken up by light dynamite charges. A series of small pockets was revealed which contained fine gem-quality spessartites. This discovery took place in December, 1955, and for some months afterward the pit was enlarged to follow the dike as it dipped beneath the decomposed gabbro bedrock. In the summer of 1956, operations were forced to a close because the labor involved in removing the overburden (some ten feet in depth by this time)

did not pay in terms of gem material recovered.

Meanwhile, additional intensive prospecting showed traces of spessartite in the extension of the Hercules dike where it enters the Little Three property; this was uncovered in due time by the use of prybars, a task made easy by thoroughly weathered caprock. Again a series of pockets was opened showing gem garnets, crystallizations of smoky quartz, and curiously etched and corroded black tourmalines. This very small deposit was soon exhausted, and work was begun on a favorable section of a fairly large dike immediately below the dumps of the Little Three Mine. A large pocket was found here in the fall of 1956 which yielded a number of tourmaline, quartz, and topaz crystals. Finishing this latest deposit, Mr. Spaulding then diverted his attention to untouched portions of the Little Three dike, where he is now engaged in clearing off overburden and blasting sections of ledge in the hope of meeting the same mineralization which made this mine famous in the early part of the century.

## GEOLOGY OF THE RAMONA PEGMATITES

The area in which the Ramona pegmatites are intruded is underlain by a series of granitic rocks, principally gabbro and granodiorite. In the Hatfield Creek valley, the major type is a dark gray, coarsely crystalline gabbro, very hard and tough when fresh but weathering easily into reddish and yellowish soils. This easy breakdown results in characteristically rounded hills showing little bedrock. The hills are heavily covered by dense brush, sprinkled here and there with gnarled oaks and sycamores wherever underground water exists. Dense growths of brush, locally called chaparral, consisting of a fiendish assortment of tough knee- to head-high shrubs and bushes, cover all slopes; it is especially abundant and luxuriant on north slopes and in protected ravines and valleys. A prominent feature of the land-

scape is the relatively resistant dike rocks which show as thin white streaks lancing across the hills and visible through the vegetation. The most resistant of these rocks form small jagged crests which sometimes protrude above the brush, whereas the most easily cracked and weathered portions show themselves only as strings of angular blocks and slabs partly imbedded in the soil. Large rounded boulders of spheroidally weathered gabbro have fallen down from hillcrests and are found scattered about on lower slopes.

By and large, the dikes do not compare in thickness with those found elsewhere in the county; however, the larger ones are remarkably persistent in length, often being traceable for thousands of yards. Many others are much thinner and much shorter; for example, the dike on which Mr. Spaulding first mined for garnet. This dike does not exceed three feet in thickness, and its total length seems only several hundred yards. The Little Three dike, on the other hand, parades up and down a succession of hills from near the ABC Mine on the west to the Surprise on the east, a distance of almost two miles.

All of the dikes in the Hatfield Creek valley seem to belong to a common family, since outcrops trend uniformly east-west and dips are just as uniformly toward the south and all about twenty degrees. Furthermore, both the assemblages of minerals and modes of their occurrence show strong relationships in all dikes examined. Perhaps the most striking similarity is that of tourmaline, which occurs in two distinct forms in zones of pocket mineralization. In those pockets in which tourmalines have formed contemporarily with spessartite, only blacks are noted, whereas in those pockets which show more extensive hydrothermal activity, dark olive-green specimens are the rule. More will be said about this later.

The extent of the Ramona pegmatite district has not been defined, if indeed it can be. From the air, many dikes of about the same strike are to be noted for a short dis-

tance south of Hatfield Creek and for many miles to the north in the opposite direction. To the north, especially, they seem to grade insensibly into a series of dikes in the vicinity of Sutherland Dam and thence into the Mesa Grande district, a matter of some ten miles. No dikes of any consequence can be seen to the west where granodiorites prevail; but to the east, in high, rugged terrain around and beyond the San Diego River valley, numerous dikes are in evidence. However, they may be quite unrelated, since no reports are at hand regarding their composition or potential value.

#### POCKET MINERALIZATION

The typical centrally located zone, or "streak," of hydrothermal mineralization in pegmatites is also a feature of the Ramona dikes and is that which has yielded all of the gem material. Pockets along this zone are invariably flat waferlike hollows filled with a peculiar gray loess-like topsoil in which are suspended various loose or broken pocket minerals. Pink and white kaolins or montmorillonites appear to be largely absent but may have been leached out by the same water infiltrations which introduced the topsoil. It is believed that when and if pockets are uncovered which are so completely enclosed by rock that they remain in their undisturbed state, they will be found to contain considerable air space. Up to the present however, all pockets uncovered seem to be filled with topsoil.

The general configuration of pockets shows a pattern of floor deposits of colorless to white cleavelandite rosettes in radiating masses with implanted smoky to gray to colorless quartz crystals and topaz, whereas the roof deposits exhibit coarse crystals of orthoclase and microcline with large quartzes and tourmalines. In many places, this relationship may be altered by local conditions, usually depending on which portion of the feldspar-quartz core the pocket formed. Numerous side vugs are present, often filled with minor amounts of clay

minerals which have escaped the leaching action referred to before. The basement rock of pockets is very hard and firm and resists excavation, except by drilling and shooting with explosives; on the other hand, many inches of the caprock are extensively shattered and honeycombed by hydrothermal activity and can often be peeled back with nothing more than a large prybar. In thicker dikes, even the caprock may reach sufficient depth to require blasting.

Two distinct modes of pocket formation are in evidence at Ramona, the first caused by limited hydrothermal activity which has principally removed quartz from the upper half of the pegmatite and deposited or recrystallized spessartite and black tourmaline. The second mode appears far more extensive and prolonged and is marked by the appearance of colored tourmaline, glassy coarse blades of cleavelandite, numerous topazes, crystallizations of lepidolite (often very fine), excellent clear smoky quartz crystals, and the deposition of various rare accessory minerals. Perhaps the most outstanding feature, however, is the complete absence of spessartite garnet, which has either been destroyed or dissolved. That it was present once is abundantly proved by the clear imprints noted in smoky quartz crystals, which sometimes show that the fugitive garnets reached as much as three-quarters of an inch in diameter.

The first mode of pocket formation may be a side effect of the extensive activity noted in the second type; this, however, does not seem likely, since there are many places in several dikes where only a superficial honeycombing is to be noted and with extremely simple mineralization. Spessartites are found in such places along with black tourmalines, some quartz, and very minute and finely developed opaque cleavelandite blades. Each cavity is highly irregular and twists or turns with little rhyme or reason. In larger cavities adjacent to the blocky feldspar-quartz core, some fine orthoclase crystals were found; these showed full but

well-formed faces and were penetrated by gem-quality spessartite and splendid black tourmalines. The latter are more than of passing interest since they show a distinct conchoidal fracture, in direct contrast to the minutely shattered condition of most schorl found frozen in pegmatite. These could be cut into gems or perhaps sliced into suitable piezoelectric wafers. They range from about one-fourth inch in diameter to as much as one inch.

Found associated with spessartite in the first working mentioned above were some well-formed intensely black smoky quartz crystals, terminated by one set of rhombohedral faces, with the other set of faces very minor, if present at all. The garnets were found either as perfect clear crystals with glistening level faces or as etched and corroded fragments of larger crystals. Sometimes a large shattered crystal would be found which crumbled when touched. Close examination showed that solutions had traveled down each fissure and had attacked all portions, leaving behind typically frosted surfaces. Many of these fragments are beautifully colored and absolutely clear. Because of the extensive etching action, very few matrix specimens of any consequence were obtained; most were small gemmy crystals perched precariously on cleavelandite rosettes.

A curious feature of the spessartite pockets is the series of joints along which the mineralizing solutions had settled. Although the dike dips about twenty degrees, each pocket seems to be level and to be situated along a weak place which passes from the top of the dike to the bottom along a diagonal. It is as if the dike had been extensively sheared before or during hydrothermal activity. In this respect these pockets are quite different from the usual type, which stick pretty much to the median line and extend parallel to the walls.

The second mode of pocket mineralization is far more interesting mineralogically than the first, although, as Mr. Spaulding laments,

far less lucrative. Large quantities of tourmaline are found in these pockets but they seldom provide anything more than specimen material, because the dominantly olive-green colors, which verge on blackish brown, are neither pale enough nor attractive enough to make handsome gems. If fortune smiles, however, some excellent topazes can be obtained and perhaps small quantities of cuttable morganite.

As indicated previously, pockets of this type are found near the central portion of the dike and are capped by rather firm coarse-grained pegmatite consisting of feldspar, quartz, and muscovite mica, with substantial amounts of black tourmaline (schorl). Toward the center, this crystallization becomes exceedingly coarse and all minerals become larger in grain size. In the Little Three dike, where the author systematically uncovered about 25 square feet of pocket floor, large crystals of perthite feldspar were the rule, with spaces between filled with grayish sugary quartz. Some of the feldspars were penetrated by thick prisms of tourmaline, which assumed a green cast as the pocket zone was approached; when these prisms were found actually penetrating a pocket, they were transparent and gemmy. These large tourmalines always penetrate a pocket from above, since this portion of the dike contains the long crystals of schorl which serve as nuclei for the growth of large crystals. However, many small pencils and needles are also deposited on the walls, on cleavelandite, and on the floor itself.

Topazes represent a very late stage of activity and are therefore found implanted almost anywhere, even on the tourmalines.

#### A TOURMALINE POCKET

Exhausting the readily available deposits of spessartite garnet, Mr. Spaulding shifted his attention in the late fall of 1956 to a dike just below the dumps of the Little Three Mine. The outcrop of this dike runs parallel to that of the Little Three but is

about 150 feet farther south. As in others of this district, this outcrop also shows a splitting apart at the top where the less resistant mineralized zone has yielded to the elements. In some places, the slabs of the upper half are completely dislodged and have slid considerable distances from their original positions. In other places, previous miners had pried them off looking for pockets. To the east near the bed of Hatfield Creek, much of the outcrop has been prospected this way, and clean rain-washed pocket floors can still be seen exposed to view. However, the main point of interest lay further to the west, where the dike appeared to swell and where no prospecting had previously been done.

Traces of pocket cleavelandite, quartz, and green tourmaline in this portion of the dike led to the conclusion that perhaps a good pocket lay beneath a large expanse of unbroken pegmatite. Accordingly, Mr. Spaulding installed his air compressor at this site and proceeded to drill and shoot away the caprock. The latter proved to be unusually thick, some 24 inches of firm rock having to be blasted off carefully before the central mineralized zone was encountered. This was an auspicious occasion for Mr. Spaulding, since, as the last blocks were pried away, a loose black pocket substance poured forth glistening with quartz crystals and laced throughout with tourmaline needles. As it proved later, the very bottom of the pocket had been penetrated, and it was a simple task to reach up into the cavity and carefully work loose the slabs of matrix and the loose pocket debris.

When finally cleaned out, the pocket measured laterally almost six feet, rose along the dip to a height of two and one-half feet, and reached a maximum thickness of 20 inches. About 25 pounds of tourmaline, a pound or two of topaz crystals, and numerous matrix specimens of quartz and cleavelandite were recovered.

The tourmalines were found in thin pencils, many looking like thin finishing nails

with steep pyramidal terminations. The larger "Slugs," or roof crystals, were short stubby prisms, simply terminated, exceedingly dark in color, and from one to two inches in diameter and about the same in height. Most of these had broken loose during late stages of pocket formation and showed etched places on basal fractures.

The pencil crystals were unusual with respect to both the very sharp terminations and the color. Just beneath the terminations occurred an odd band of light grayish purple, which gradually changed to deep green and then to very dark brownish green as the other end of the crystal was approached. The large crystals also showed similar color variations, except that the end corresponding to the sharp terminations on the pencils was the wall end, and consequently showed only slight lightening of color. The terminal areas were intensely dark brownish green and were transparent only through thin edges. Tourmaline pencils were also found penetrating smoky quartz crystals and lodged on cleavelandite masses.

Topazes proved to be a disappointment, since neither satisfactory gem material nor good mineralogical specimens were in evidence. Much of the topaz had crystallized as small, extensively etched and corroded crystals of poor crystal form and filled with flaws. By far the largest number were about one-fourth of an inch in size.

Handsome quartz crystals were found in this pocket, but many were cracked in places which detracted somewhat from their beauty. The color was a warm brown. Crystal faces were generally very smooth and very simple in form. A number of almost complete doubly terminated crystals were found and, except for color, reminded one of "Herkimer diamonds."

#### MARKETING OF RAMONA SPESSARTITE

Out of about ten pounds of gemmy spessartite recovered in the course of mining on the Little Three property, Mr. Spaulding

estimates that about 3,000 carats proved suitable for gems. By arrangement with Mr. George Ashley of Pala, California, much of this production has been turned over to the latter for retailing. The price asked for good standard material is \$1.75 per carat, rising to \$2 per carat for exceptional pieces. The rough can generally be counted on to yield stones averaging from one-half to one and one-half carats when finished as brilliants or square step-cut gems. The largest cut stone from this batch is a 4.5-carat octagon step cut, which Mr. Ashley cut from an unusually large piece of rough. The gem is flawless, deep orange with a touch of red, and exceptionally brilliant, as all of these spessartites are. The dinginess noted in many red and brown garnets is totally absent in these stones, and it can be safely said that no finer spessartite exists anywhere. It is unfortunate that Ramona spessartites are so small. The largest flawless cut stones from earlier mining days only reached about six to eight carats. In spite of their small size, these gems are much sought after by collectors and connoisseurs because of their superb coloration, unusual flawlessness, and resulting brilliance.

#### FUTURE DEVELOPMENTS

At the time of writing, work is being done on certain lower sections of the Little Three dike which have been undisturbed by previous miners. This portion is away from the area where spessartite garnets were found, but is directly below the pocket zone which produced so many topazes and tourmalines. Indications are favorable and the near future may bring news of success and perhaps a new stock of San Diego County minerals to delight the hearts of connoisseurs everywhere. Like so many others in the county, the Ramona dikes are far from being depleted, but all of the easy work on readily accessible surface deposits has been done, and hard labor is necessary to follow mineralized streaks as they plunge beneath the surface.

# Gemmological Association Holds 'Conversazione'

by

ROBERT WEBSTER, F.G.A.

The popularity of an informal "get together" was made manifest when the Gemmological Association of Great Britain held a *conversazione*<sup>1</sup> during the evening of November 28th in the spacious Livery Hall of the Goldsmith's Company, when considerably over two hundred members and their friends attended.

To make the evening more interesting the Association put on a show of exhibits, which, for one evening only, must have taken considerable preparation. These displays were grouped into three sections. In the center of the hall was a group of tables so arranged as to illustrate the work of not only the British Association but also of similar gemmological associations in other countries. This section, therefore, had quite an international character. Each table or section of a table was arranged with the national flag surmounted on a base on which was printed the name of the country, the name of the association in that particular country, and the date of its formation. Displayed around this central motif was gemmological literature, selections of the gem materials found in that particular land, and, in some instances, special gem-testing instruments.

Unusual minerals were selected, rather than those which are more commonly used in jewelry. The wall cases contained more imposing specimens and there were four exhibits of a scientific nature. The theme of the whole show illustrated much of which the gemologist and jeweler does not habitually encounter.

On the Great Britain stand was shown the latest model of the Rayner microscope and other instruments made by the well-known firms of Steward and Rayner. Although England is not a prolific producer of gem minerals, the following specimens were shown: blue john (fluorite) from Derbyshire; turquoise from Cornwall; hematite from Cumberland; pyrites from the Leadhills district of Lanark, Scotland; jet from Whitby; serpentine from the Lizard in Cornwall, from Girvan in Ayrshire, and from near Inverness in Scotland; and agates from the Scottish Hills. Earlier and current literature completed the display.

Brazil, a country so rich in gems and which has only recently formed an association, the *Associação Brasileira de Gemologia*, was represented by a display of cut stones,

<sup>1</sup> (Italian) a social gathering for conversation about art, literature, science, etc.



• A general view of the Livery Hall of the Goldsmiths' Company on the evening of the *conversazione*.

which included not only the well-known tourmaline and quartz, but also a large yellow scapolite, an amblygonite, a phenacite and an andalusite. A number of crystals, including an excellent large quartz crystal, some small pieces of emerald, and a large amethyst-studded geode, completed the mineral display of Brazil. Copies of the Brazilian Association's publication *Gemologia* comprised the literary aspect.

Specimens of sunstone, labradorite, actinolite and a small emerald from Eidsvol, together with gem literature, told the story of Norwegian gemology.

The Swiss exhibit showed the micro-spectroscope designed by Dr. E. Gubelin, Swiss gemological literature, specimens of sphenc crystals, a danburite crystal from Canton Grison, and one of scapolite from the Ticino.

On the table flying the German flag, another land which has only recently formed its own gemological organization despite its long association with scientific and commercial gemology, were shown the following:

a German refractometer, the Fuess; rough and cut chrysoptase from Silesia; and a mussel shell with attached blister pearl from the Ilz River in Bavaria, a source of freshwater pearls which are currently being marketed. Some literature completed the exhibit.

Holland, a land which is sparse in mineral wealth and has only its diamond-cutting industry and a virile gem association to boast about, was illustrated by literature only.

The Australian exhibit, as would be expected, displayed opal, sapphire and pearl shell, the latter illustrated by two large pearl shells and a highly iridescent Paua shell (*Haliotis*). Green and brown phenacite from the Prospect area of New South Wales was shown, including a cut cabochon of the green material. Also displayed were zircons from Tasmania; garnets from New South Wales; emeralds from Cue, Western Australia; and rough and cut specimens of the basalt glass found in Queensland. Literature illustrating gemology "down under" completed the show.



• Some visitors around the American exhibit.

The United States of America, that great country so rich in mineral wealth and the country which was second to Great Britain in forming an association for students of gemology, provided a very impressive exhibit. Surmounted by the Stars and Stripes, the table displayed a wealth of literature, most of which were publications of the Gemological Institute of America. Other works displayed were Richard Pearl's *Popular Gemology*; Sperison's *The Art of the Lapidary*; and the new book by Captain John Sinkankas, U. S. Navy, entitled, *Gem cutting, a Lapidary's Manual*. Among the galaxy of specimens which filled this table to overflowing were agates from many different states of the Union; benitoite from California; amazonite from Colorado; chlorastrolite, datolite and thomsonite from Michigan; variscite from Utah; rhodonite from Idaho and California; and morganite and kunzite from the San Diego County gem pegmatites. Orbicular jasper and fossil woods containing the form of cinnabar known as myrickite were shown. The vol-

canic rock called Nevada wonderstone and the epidote rock known in the States as unakite were unusual specimens displayed. A box of some thirty different minerals fashioned by the tumbling process, which is current in the States, completed the exhibit.

In six glass-fronted and internally lighted wall cases were displayed a most interesting, colorful and beautiful assortment of crystals, ornamental minerals and fashioned pieces. Among these was a remarkable green sphene of 38.98 carats; a yellow orthoclase feldspar of 54.78 carats; and cut stones of pollucite, scapolite, sphalerite, peridot, brazilianite, benitoite and celestite (strontium sulphate), which, despite its low hardness of 3, made an attractive blue stone. Also exhibited was an unusual star beryl, a stone discussed by Dr. E. H. Rutland in the November issue of the *Gemmologist*. Two small diamonds which had their color altered by cyclotronic bombardment to green and golden brown, some large crystals and cut stones of synthetic emerald made by Carrol





• A general view of the visitors in the Livery Hall of the Worshipful Company of Goldsmiths.

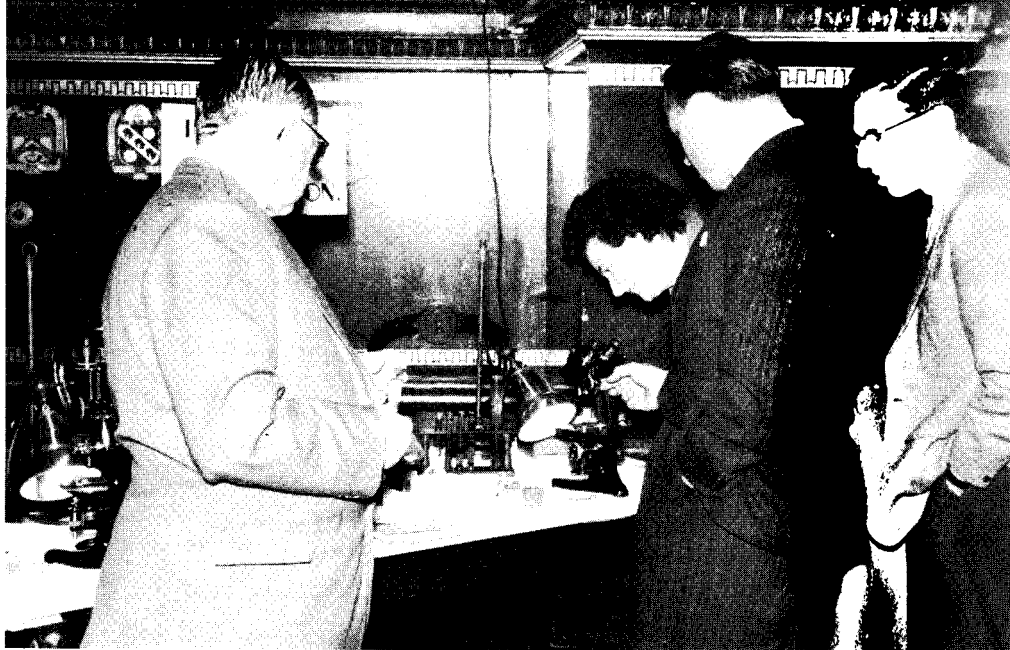
Chatham, and a strontium titanate of 1.5 carats were also exhibited. Other large stones shown were a Brazilian topaz weighing 365 carats, a particolored tourmaline cat's-eye, a number of amethysts and citrines, and a suite of fluorspars of different colors cut in the trap-cut style. Cut silica glass, moldavite, both green and pink massive grossularite garnet, fashioned pieces of blue john, and a large polished section of a jasperized tree trunk were also displayed.

Other interesting exhibits included a lion carved in serpentine; a rhodonite necklace; a silver knife and fork with serpentine handles; and a plate, the center of which was of slate inlaid with turquoise, lapis-lazuli, agate and other ornamental stones. An exhibit which everyone admired consisted of agate carvings of three lifelike penguins in which the coloring of the agate had been skillfully employed to produce the "white shirt front" and the blackish body of the birds. Inquiry gave the information that these pieces were the work of a young German hardstone carver in Idar-Oberstein.

Two large beryl crystals from a new mine in Southern Rhodesia, with five cut stones from material obtained at this mine were shown. In the same case was a large ruby crystal with a polished face which showed the silky hexagonal zoning extremely well. Other crystals displayed were those of benitoite, sphene, emerald, tourmaline, apatite, garnet, topaz and sapphire. There were also two large diamond crystals in blue ground.

A large reniform piece of malachite with a polished face vied with corals of many shades, including black. There were fluorite crystals of all colors and a remarkably large polished section of a variscite nodule. Large quartz crystals, rose quartz, crocidolite, and labradorite completed another case.

In the four corners of the Livery Hall were more technical displays. B. W. Anderson presided over an exhibit which demonstrated the immersion contrast method of refractive index determination. He showed specimens of quartz, topaz, kunzite, sapphire, and zircon immersed in monobromonaphthalene (1.66). The dark borders and



• Mr. Lee (left) and Mr. Hill show a lady visitor the formation of periodic precipitation (Liesegang Rings).

white facet edges of those stones having a greater refractive index than the liquid were in striking contrast to those stones having lower refractive indices; in these the effect was seen to be reversed, the borders being white and the facet edges black. The effect of these stones was seen through a suitably placed mirror below the immersion setup. It is understandable that this demonstration attracted much attention.

An unusual demonstration was given by H. Lee and D. A. W. Hill, who produced agatelike ring deposits by inorganic periodic precipitation. The formation of the rings in agate (Liesegang Rings) has always been the cause of controversy. Lee and Hill demonstrated the theory now most generally accepted by imitating nature and procuring results in hours that nature took millions of years to accomplish. The formation was actually seen in process under the microscope. The interest shown in this unusual demonstration was such that for some time the photographer could not get close enough to obtain a suitable picture.

The General Electric Company Research Department showed a number of large synthetic quartz crystals and an autoclave in which they are grown. A sectioned wooden model of the autoclave, complete with seed plate and feed quartz, showed, with the addition of two large photos, something of the equipment used for producing synthetic quartz in large single crystals. Synthetic barium titanate crystals and the development of "butterfly twins" in this material were exhibited. Another group of crystals showed the isomorphous overgrowths of hexagonal crystals of guanidine aluminum sulphate and guanidine vanadium sulphate. Another part of the General Electric exhibit showed the prepared powders ready for the furnace, ordinary boules and rod boules of synthetic corundum and spinel, watch jewels, balance plates, infrared windows and thread guides fabricated from these materials. Synthetic rutile boules were also exhibited.

In a darkened corner was a case containing twenty fluorescent mineral specimens under a three-bank ultraviolet lamp. Visitors

were invited to fill in sheets naming the species and localities of the specimens. The paper with the best answers received a prize. Mr. B. Silver, a young student who gained his Fellowship in the Gemmological Association in 1952, submitted the paper with the best answers.

Pictures of earlier exhibitions held by the Gemmological Association and its branches in the provinces decorated a panel at the far end of the Hall opposite the brilliantly floodlighted gold plate of the Worshipful Company of Goldsmiths. Resting on an illuminated easel was the portrait in oils of the late Dr. G. F. Herbert Smith, whose benign guidance through those long years since 1912 did so much for the continuation of the work of the Gemmological Association of Great Britain.

In an adjoining room light refreshments were provided, which were much appreciated by the members and their friends. Everyone was grateful for the use of the facilities which were so willingly granted by the Worshipful Company: the Livery Hall, the smaller conference room, and the newly reconditioned rooms of the old banqueting hall, which were so grievously damaged during the war.

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## Book Review

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*DIAMOND* by Emily Hahn. Published by Doubleday & Company, Inc., New York City, 1956. 304 pages. \$3.95.

Perhaps the most striking thing about Miss Hahn's new book is the contrast it offers to most nonfiction related to this and many other scientific and business fields — it is beautifully written. Taken largely from a series of articles appearing at intervals during 1956 in the *New Yorker*, the book jumps somewhat abruptly from one subject to another, probably because of its original preparation as a group of articles for the

magazine, but the reader's interest is maintained throughout despite this.

THE DIAMOND takes up the history of diamond mining in the Union, the rise of Rhodes and Barnato, diggers' problems, the Diamond Corporation, the significant contributions of Sir Ernest Oppenheimer, the development of diamond cutting, attempts at synthesis, the nature of "sights," Premier Mine, and the Consolidated Diamond Mines of South West Africa.

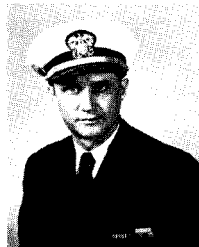
Although there is little that was hitherto undisclosed, the fascinating handling of the material makes for entertaining reading.

THE DIAMOND by Emily Hahn is a book most jewelers will want to have in their libraries. Some will see advantages in presenting it to better customers.

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### THE AUTHOR

Ensign John R. Burgoon, Jr., is presently attached to the Air Transport Squadron 22, Naval Air Station, Norfolk, Virginia. He has been in Naval Aviation for 15½ years. He became interested in gemstones while stationed in El Centro, California. While there, he spent his free time exploring the prolific pegmatites of San Diego County and learning the art of faceting gemstones. On one of his visits to the historical Himalaya Tourmaline Mine at Mesa Grande, he met a GIA student. Through this association he became interested in the scientific study of gemstones and later, while stationed at Guam, he enrolled in the GIA courses in gemology. He continued with the courses while stationed on Okinawa and completed them in Memphis, Tennessee. Research for his thesis (which is one of the requirements for the Gemologist Diploma) was carried on at Murfreesboro, Arkansas. Several trips to the diamond-bearing area were necessary to complete this task. Although Burgoon witnessed the finding of several diamonds while visiting the mining area, he was not successful. He is presently working toward a degree in education by taking correspondence and night-school work. His article, *Diamond Mining in Arkansas*, appears on page 355 of this issue.



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