Gem Stones

By Benjamin Petkof[1]

PRODUCTION of gem materials and mineral specimens was estimated at $1.4 million, an increase of 9 percent from the previous year. Production of these materials still remained largely in the hands of individual collectors.

DOMESTIC PRODUCTION

The Bureau of Mines collected production data by direct canvass of known amateur and professional gem stone producers. All producers are not known to the Bureau and the data presented are based on a partial survey.

For the third consecutive year, production of gem material and mineral specimens was reported from 45 States. California, Oregon, Texas, Arizona, Wyoming, and Nevada, the leading producing States, accounted for almost 62 percent of the total production in value.

Crystals of beryl, ranging in size from 1/16 inch in diameter and length to 2 feet in diameter and 4 feet in length, have been found in Coosa County, Ala. Much of the material is gem quality, and colors range from white to green, brown, and yellow. Most of the crystals are fractured and weathered, but fragments have been cut and polished into attractive gem stones.[2]

Emeralds of beautiful color and good quality have been found in Montana. The emeralds are very bright green and are similar to those of Chivor, Colombia. While most of the crystals are opaque, some have clear green portions.[3]

The Four Peaks amethyst mine was expected to begin production. The mine is located over a mile up on the western slope of the Four Peaks mountain range in Arizona. Mining equipment and construction material have been transported to the site by helicopter, and the amethyst crystals will be brought out in the same way.[4]

Agate.—Production of almost 106 tons of agate valued at $92,000 was reported in 23 States. Production included moss, turritella, fire, and other miscellaneous varieties of agate. Wyoming, New Mexico, Utah, and Arizona were the principal producers, in decreasing order of production.

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[1] Commodity specialist, Division of Minerals.
[2] Mining World. V. 25, No. 6, May 1963, p. 40.
[3] California Mining Journal. A.H. Welling Finds Valuable Emerald Deposits Near Superior, Montana. V. 33, No. 2, October 1963, p. 7.
[4] Mining World. V. 25, No. 3, March 1963, p. 38.

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Diamond.—Production was reported only in Arkansas. The recovery of 100 carats valued at $38,000 was reported.

Jade.—Jade production of 45,000 pounds valued at $90,000 was reported in five States. Wyoming and California accounted for 92 percent of the total production. Smaller quantities were produced in Nevada, Alaska, and North Carolina.

Mineral Specimens.—Production of various materials for mineral specimens was reported at almost 203,000 pounds valued at about $63,000. Production in varying quantities was reported from 31 States. The largest producing States, in decreasing order of rank, were California, Colorado, Michigan, Utah, and South Dakota. Production of copper mineral specimens, not included in the previously quoted total, was reported as 19,500 pounds valued at $8,800. The bulk of the production came from Michigan.

Obsidian.—Production of over 85,000 pounds valued at over $29,000 was reported in five States. Arizona, California, and Utah were the largest producers, accounting for 96 percent of total production.

Petrified Wood.—Petrified wood production of all varieties was reported as 115 tons valued at $78,000. Of this total, 1,400 pounds was petrified palm wood. The major producers of this commodity, in decreasing order, were Utah, Wyoming, and Arizona. These States were responsible for about 75 percent of total production. Eleven other States produced petrified wood.

Quartz Crystal.—Arizona and South Dakota provided 62 percent of total quartz crystal production, which was reported as 81,000 pounds valued at $30,000. Twenty other States also reported some production, but seven of these produced under 100 pounds of quartz crystal each. Approximately 4,000 pounds of the total production was of the smoky and rose quartz varieties.

Tourmaline.—About 220 pounds of tourmaline valued at almost $12,000 was produced. Half of this originated in Maine. The next largest producer was Minnesota, with lesser quantities from Alabama, California, Colorado, and South Carolina.

Turquoise.—The greatest quantity of turquoise was produced in Arizona. Wisconsin, California, Colorado, Wyoming, Nevada, and New Mexico produced lesser quantities. Total production was 14,750 pounds valued at $81,600.

Miscellaneous Gem Material.—Production of jasper was 36,600 pounds valued at $20,158, with Arizona and California producing two-thirds of the total. Opal production was about 7,400 pounds valued at almost $8,300. In addition, 12 pounds of fire opal valued at $180 was produced. New Mexico was the leading producing State with 3,100 pounds valued at $2,033. Garnet production was 4,800 pounds valued at $4,300. Coral production was primarily from Hawaii, with smaller quantities from a few other States. Total production was 9,100 pounds valued at $40,000. Peridot production occurred primarily in Arizona. About 1,500 pounds valued at $4,000 was produced.

The quantities and values of other gem and ornamental materials, for which production was reported, were amethyst, 470 pounds, $560; beryl specimens, 1,400 pounds, $1,480; feldspar gems, 7,400 pounds, $4,000; fluorite, 2,200 pounds, $800; fossils, 17,900 pounds, $8,900;

geodes, 1,500 pounds, $4,000; idocrase, 2,300 pounds, $4,700; marcasite, 620 pounds, $580; onyx, 68,500 pounds, $19,100; ornamental stone, 46,700 pounds, $10,300; rhodonite, 42,800 pounds, $11,200; sapphire, 18 pounds, $140; topaz, 470 pounds, $420.

CONSUMPTION

Consumption of gem diamond was valued at $224 million, an increase of about $32 million over 1962; imported imitation and synthetic gem stones was $5.1 million, an increase of $0.8 million over 1962; and natural and cultured pearls was $17.9 million, $1 million less than 1962.

Apparent consumption (domestic production plus imports, minus exports and reexports) of gem materials in the United States was $170 million, compared with $167 million in 1962.

PRICES

Prices ranges of cut and polished unmounted diamonds rose, compared with those of the previous year, because of increased demand. Estimated price ranges were 0.25 carat, $72 to $340; 0.5 carat, $220 to $600; 1 carat, $575 to $1,650; 2 carats, $1,380 to $5,000; 3 carats, $2,880 to $9,900.

FOREIGN TRADE

Imports.—Total precious and semiprecious gem stone imports were valued at about $256 million. About 2.8 million carats of rough

TABLE 1.—U.S. imports for consumption of precious and semiprecious stones, exclusive of industrial diamond

Stones	1962		1963	
	Quantity	Value (thousands)	Quantity	Value (thousands)
Diamonds:				
Rough or uncut, suitable for cutting into gemstones, duty-free—carats	[1] 1,421,143	[1] $102,548	1,749,641	$129,870
Cut but unset, suitable for jewelry, dutiable—carats	982,278	89,188	1,017,620	93,977
Emeralds: Cut but not set, dutiable—do	196,649	2,798	190,933	2,081
Pearls and parts, not strung or set, dutiable:				
Natural	[2]	737	[2]	479
Cultured or cultivated	[2]	18,198		17,427
Other precious and semiprecious stones:				
Rough or uncut, duty-free	[2]	1,765	[2]	1,708
Cut but not set, dutiable	[2]	[1] 5,102	[2]	5,183
Imitation, except opaque, dutiable:				
Not cut or faceted	[2]	61	[2]	28
Cut or faceted:				
Synthetic—number	1,176,058	457	754,236	398
Other	[2]	[1] 3,730	[2]	4,487
Imitation, opaque, including imitation pearls, dutiable	[2]	18	[2]	154
Marcasites: Real and imitation, dutiable	[2]	[3]	[2]	[3]
Total	[2]	[1] 224,602	[2]	255,792

[1] Revised figure.
[2] Quantity not recorded.
[3] Less than $1,000.

Source: Bureau of the Census.

(uncut) and cut gem diamonds was imported and represented almost 88 percent of total imports by value.

Rough diamonds were principally imported by quantity from the following countries: United Kingdom, 52 percent; British West Africa, 18 percent; and Republic of South Africa, 6 percent. Cut but unset diamonds, by quantity, were imported principally from Belgium-Luxembourg (51 percent) and Israel (37 percent). Average values per carat of cut but unset diamond imports were Belgium-Luxembourg, $96.78; Israel, $79.42; Netherlands, $110.06; Republic of South Africa, $174.83; United Kingdom, $163.32; West Germany, $76.11.

Over 92 percent, by weight, of the cut but unset emeralds imported were from India. Of the remainder, 7 percent was imported from Switzerland, Belgium-Luxembourg, Colombia, and France. Twelve other countries supplied varying small amounts. The average values per carat of emerald imports from principal exporting countries were India, $9.11; Switzerland, $16.21; and Belgium-Luxembourg, $15.43.

Japan supplied almost the entire quantity of imported cultured pearls. Natural pearl imports were primarily from India (66 percent), Japan (14 percent), and Switzerland (7 percent); the remainder were from France, Iran, Hong Kong, Venezuela, and West Germany.

In addition, about $6.9 million of other precious and semiprecious stones, both rough and cut but unset, were imported. However, no classification information on varieties was available.

Exports.—Precious and semiprecious gem stone exports were valued at $40.5 million, compared with $18.8 million in 1962. Doubling of exports of cut but unset diamonds accounted for the increase. Cut but unset diamonds accounted for 81 percent of total exports. The value of gem stones, other than diamond, was over $5 million.

Reexports of all varieties of gem stone were valued at $46.7 million, compared with $40.0 million in 1962. Diamonds in the rough but uncut category accounted for 84 percent of total reexports.

TABLE 2.—U.S. imports for consumption of diamond (exclusive of industrial diamond), by countries

Country	1962				1963			
	Rough or uncut		Cut but unset		Rough or uncut		Cut but unset	
	Carats	Value (thousands)	Carats	Value (thousands)	Carats	Value (thousands)	Carats	Value (thousands)
North America:								
Canada	5,128	$655	217	$16	9,110	$918	847	$66
Mexico			198	22			12	3
Total	5,128	655	415	38	9,110	918	859	69
South America:								
Brazil	996	39	1,469	121	1,911	191		
British Guiana	9,852	346	133	10	1,011	43	84	6
Columbia					124	6		
Venezuela	128,264	4,025			55,905	1,971		
Total	139,112	4,410	1,602	131	58,951	2,211	84	6
Europe:								
Austria			130	13				
Belgium-Luxembourg	39,877	2,381	478,795	45,721	33,537	3,282	522,383	50,555
France	4,902	413	14,291	1,459	7,169	633	16,746	1,775
Germany, West	2,144	59	75,301	5,394	7	(1)	46,015	3,502
Gibraltar							7	(1)
Ireland			1	(1)				
Italy			201	66			152	103
Malta and Gozo			169	16	519	14	660	56
Netherlands	22,367	1,652	23,786	2,463	26,539	1,583	19,299	2,124
Portugal			12	1			105	14
Spain			7	5				
Switzerland	503	95	526	66	37,402	1,549	501	205
U.S.S.R.			2,640	262			411	23
United Kingdom	[2] 753,533	[2] 67,176	5,901	765	906,340	86,977	4,280	699
Total	[2] 823,326	[2] 71,776	601,760	56,231	1,011,513	94,038	610,559	59,056
Asia:								
Hong Kong			46	12			227	50
India			38	50			207	16
Iran			74	6				
Israel	20,001	949	351,306	27,881	69,671	3,404	374,199	29,719
Japan			831	70	283	5	4,381	321
Lebanon							15	4
Malaya, Federation of			7	10				
Thailand					3	(1)		
Total	20,001	949	352,302	28,029	69,957	3,409	379,029	30,110
Africa:								
British West Africa and Sierra Leone	125,407	4,622			320,845	8,725		
Cameroon, Federal Republic of	2,218	28	321	38				
Congo, Republic of the, and Ruanda-Urundi	34,945	1,309			8,811	368		
Ghana	23,962	253			1,993	49		
Liberia	10,456	1,211			19,051	1,395		
Nigeria	778	190			4,329	135		
South Africa, Republic of	[2] 120,285	[2] 12,268	25,878	4,721	112,448	11,558	27,089	4,736
Western Africa, n.e.c.[3]	57,030	2,772			71,096	4,148		
Western Equatorial Africa, n.e.c.[3]	58,495	2,105			61,537	2,916		
Total	[2] 433,576	[2] 24,758	26,199	4,759	600,110	29,294	27,089	4,736
Grand total	[2] 1,421,143	[2] 162,548	982,278	89,188	1,749,641	129,870	1,017,620	93,977

[1] Less than $1,000.
[2] Revised figure.
[3] Not elsewhere classified.

Source: Bureau of the Census

WORLD REVIEW [5]

SOUTH AMERICA

Brazil.—A large emerald deposit, claimed to be the largest in South America, has been located at Polao Arcado, in the State of Bahia. Shafts have been sunk and exploitation has begun.[6] About 503,000 pounds of semiprecious gem stone material was exported during the year. The material consisted primarily of agate, with lesser amounts of amethyst, citrine, garnet, aquamarine, tourmaline, and topaz. A valuation cannot be placed on these materials due to the wide variation of Brazilian currency during the year.

Chile.—Lapis lazuli was produced by only one company during 1962. Compañía Minera Caren mined the stone from a deposit high in the Andes Mountains in Coquimbo Province. Exports of about 22,000 pounds were reported for 1962. The bulk of the exports went to the United States, with smaller quantities going to West Germany, France, Japan, and Italy.[7]

TABLE 3.—World production of diamonds, by countries

(Thousand carats)

Country	1962		1963	
	Gem	Industrial	Gem	Industrial
Africa:				
Angola	[1] 762	[1] 319	759	325
Central African Republic	80	185	121	282
Congo, Republic of the	256	14,400	296	14,468
Congo, Republic of [2]	[1] 158	[1] 2,471	341	5,343
Ghana	628	2,580	536	2,142
Guinea, Republic of	[3] 140	[3] 210	[4] 22	[4] 32
Ivory Coast	102	182	63	117
Liberia [5]	225	680	249	508
Sierra Leone	[1] 707	[1] 1,200	555	833
South Africa, Republic of:				
Pipe mines:				
Premier	425	1,260	522	1,565
De Beers Group [6]	883	750	921	754
Others	36	84	37	86
Alluvial mines	290	190	294	196
South-West Africa	800	227	1,076	119
Tanganyika	[1] 323	324	276	313
Other regions:				
Brazil [3]	175	175	175	175
British Guiana	60	40	60	40
India	1		1	
Venezuela	94	83	38	31
U.S.S.R.[3]	[1] 200	[1] 2,300	240	2,760
World total [7]	[1] [8] 6,347	[1] [8] 27,659	[8] 6,572	30,089

[1] Revised figure.
[2] Probable origin, Republic of the Congo.
[3] Estimate.
[4] Data known to be low, no sure basis for an upward revision.
[5] Exports, most production from adjacent nations.
[6] Includes some alluvial diamond from De Beers' properties.
[7] Countries producing minor quantities of gem diamonds not included.
[8] Data do not add to total because of rounding.

[5] Values in this section are U.S. dollars based on the average rate of exchange by the Federal Reserve Board unless otherwise specified.
[6] Mining Journal (London). V. 261, No. 6681, Sept. 6, 1963, p. 218.
[7] Bureau of Mines. Mineral Trade Notes. V. 57, No. 5, November 1963, p. 13.

Venezuela.—Production of gem diamond increased from 60,495 carats in 1961 to 93,970 carats in 1962. Exports of all qualities of diamond in 1962 totaled 82,189 carats, valued at $2.6 million. The major portion of exports was destined for the United States and Bermuda, with quantities consigned to Israel, the United Kingdom, and West Germany.[8] Production of gem diamond for 1963 was 38,400 carats.

EUROPE

Belgium.—Cuttable diamond imports increased 8 percent, from about 3.4 million carats in 1961 to about 3.7 million carats in 1962. Polished diamond imports decreased from 221,000 carats in 1961 to 212,000 in 1962. Israel and the Republic of South Africa were the principal suppliers. Exports during 1962 of cuttable and polished diamonds totaled 1.1 million carats and were valued at $120 million. Slightly over 500,000 carats of this material valued at about $53.8 million was sent to the United States.[9]

ASIA

Afghanistan.—The Afghan Ministry of Mines and Industries announced that about 3,600 pounds of lapis lazuli was produced in the year ending March 1962. About 1,800 pounds valued at $250,000 was exported.[10]

Burma.—The jade mining industry in the Kachin State has been nationalized by the Kachin State Affairs Council. Nationalization primarily affected Chinese nationals who own more than half of the 1,000 jade mines in the area. Chinese-owned mines have stopped operations, and the unemployed workers have been informed by the Council that they may have these mines if they work them on a collective or cooperative basis.[11]

India.—During the financial year of 1963–64, India's exports of precious stones were expected to reach a value of about $30.5 million. The Ramkheria mine in the Panna area was not in operation because of lack of equipment and was expected to be in operation in 1964. The Majhgawan, in the same area, was expected to be operative at the end of 1963. By December 1962, 1,070 carats were discovered.[12] The Indian State Geological Survey investigated diamond deposits and sampled pipe rocks of Vajrakarpur, in the Anantapur district of Andhra Pradesh.[13] Production of crude and dressed emeralds during 1962 was reported as about 306,000 and 52,700 carats, respectively, valued at about $12,000 and $37,800, respectively. India imported emeralds valued at about $2 million.

Israel.—Exports of $103 million worth of polished diamond in 1963 made Israel the world's second largest processor of diamond.[14] During 1962, about 838,000 carats of polished diamond valued at about

[8] Bureau of Mines. Mineral Trade Notes. V. 56, No. 6, June 1963, p. 13.
[9] Bureau of Mines. Mineral Trade Notes. V. 56, No. 6, June 1963, pp. 8, 11.
[10] Bureau of Mines. Mineral Trade Notes. V. 57, No. 5, November 1963, p. 13.
[11] Bureau of Mines. Mineral Trade Notes. V. 56, No. 5, May 1963, pp. 14–15.
[12] Mining Journal (London). V. 260, No. 6661, Apr. 19, 1963, p. 373.
[13] Mining Journal (London). V. 260, No. 6653, Feb. 22, 1963, p. 184.
[14] Mining Journal (London). V. 262, No. 6699, Jan. 17, 1964, p. 55.

$82.3 million were exported, compared with about 699,000 carats valued at about 26 percent less in 1961.[15]

Japan.—The Japanese cultured pearl industry has formed an organization to supervise the quality of exports. One of the aims of the 19-member group is to prevent very thinly coated pearls from reaching the consumer market.[16]

AFRICA

Angola.—A newly formed company has been granted a concession to exploit stone deposits containing precious and semiprecious stones. This company will concern itself primarily with rubies, sapphires, topazes, and aquamarines that occur in the riverbeds of southern and southeastern sections of the country. Previously, the only large-scale concessionaire, the Companhia de Diamantes, exploited only high-value precious stones.[17] Diamond production in 1963 was about 1.1 million carats, of which 70 percent was gem variety.

Central African Republic.—The Central African National Assembly enacted legislation to establish a State-owned diamond-mining firm, to be known as the Société Nationale de Recherches et d'Exploitations Minières. This legislation was expected to increase diamond production and to control the activities of non-Central African diamond buyers. Within the next 2 years this organization plans to establish several small diamond-mining centers in the southwestern section of the Nation. These centers will be staffed with 2 to 3 mining engineers and 15 to 30 laborers. Villages will be established with such facilities as retail stores and licensed buying offices. It is expected that these centers will attract the large number of "diggers" scattered throughout the area, and that licensed buying offices will purchase their production. These offices will resell to buying offices in Bangui. The Government will sell its production directly to buying offices in Bangui.

The Israel-Central African Republic diamond export monopoly was dissolved on December 31, 1963.[18]

Diamond production during 1963 was reported as 403,000 carats, of which 30 percent was gem quality.

Gabon.—A Government decree issued November 16, 1963, stopped exploitation of diamond resources by all persons, except those of Gabonese origin who are registered artisans under the direct control of the Government-owned mining company. Little interest has been shown in diamond mining owing to the small size of the deposits and exploitation difficulties.[19]

Ghana.—The Ghana Diamond Marketing Board was established January 1, 1963, for the purpose of purchasing, grading, and appraising diamonds produced within the country. Subject to the prior approval of the Minister of Finance and Trade, the Board has the power to control and fix prices paid to producers, to license agents to purchase diamonds from the Board, and to control exports of diamonds.

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[15] Mining Journal (London). V. 260, No. 6651, Feb. 8, 1963, p. 134.
[16] Jewelers' Circular-Keystone. V. 134, No. 2, November 1963, p. 121.
[17] Mining Journal (London). V. 260, No. 6669, June 14, 1963, p. 600.
[18] Bureau of Mines. Mineral Trade Notes. V. 58, No. 5, May 1964, pp. 17–18.
[19] Bureau of Mines. Mineral Trade Notes. V. 58, No. 3, March 1964, p. 49.

Previously licensed agents were to be relicensed to buy from the Board.[20] Diamond production of 2.7 million carats was reported for 1963. Twenty percent was gem quality.

Kenya.—About 48,000 pounds of semiprecious gem stone material, valued at about $4,000 was produced during 1963. The bulk of this material was rose quartz; smaller quantities of such materials as augite and corundum were also produced.

Rhodesia and Nyasaland, Federation of.—Amethysts have been discovered in the Gwaai section of Southern Rhodesia and development of the claim has begun. The stones are considered of excellent quality.[21] Gem stone production for 1963 was reported as follows: Southern Rhodesia, 4,000 pounds of jade valued at about $1,120, and 36 pounds of chrysoberyl valued at about $58; Northern Rhodesia, 34,000 pounds of amethyst valued at about $286,000. No gem stone production was reported in Nyasaland.

South Africa, Republic of.—The old De Beers mine, which was closed in 1908, has been prepared for reopening. A new shaft has been sunk to the 412-foot level and connected to the old shaft. Mining is to be done by dropping ore from upper levels through existing ore passes to the crushing plant on the 1,720-foot level, for crushing to minus 5 inches. From here the ore would be hoisted to the 412-foot level, carried to a new surface crusher by a 1,700-foot inclined conveyor, and crushed to 1.5 inches. Then the crushed material would travel by another conveyor to the central treatment plant.[22]

During 1962, the Premier diamond mine completed its $7 million plant expansion program to increase production to 2.5 million carats per year. New facilities were installed to treat 400,000 tons per month of tailings remaining from previous mining operations. These tailings contained small industrial diamonds for which there was small demand in the past.[23]

Rich diamond deposits have been found in Namaqualand, and it has been claimed that they may be larger than the Kimberly fields. The statement has been made that these deposits are the source of the diamonds found off the Namaqualand coast.[24] Production of emerald crystals was reported as 527 pounds. A like amount valued at $412,000 was exported. Production of tiger's-eye was reported as 129 tons. Exports were listed as 150 tons valued at $49,000.

South-West Africa.—The Marine Diamond Corp., Ltd., has sunk three boreholes in the offshore diamond-bearing gravel deposits located north of Plum Pudding Island. High-quality diamonds averaging in excess of one-half carat in size were found. This yield rivals that of the Chamels Reef deposit, where more than 150 carats per day, mostly of gem quality, is recovered.[25] During 11 months prior to June 1963, the Marine Diamond Corp. recovered 116,369 diamonds weighing 51,917 carats valued at $1.7 million.[26] The Diamond Mining & Utility

[20] Bureau of Mines. Mineral Trade Notes. V. 56, No. 4, April 1963, pp. 14–15.
[21] Mining Journal (London). Amethyst in Southern Rhodesia. V. 261, No. 668, Oct. 11, 1963, p. 341.
[22] Mining Engineering. Famous Diamond Mine Comes to Life Again. V. 15, No. 9, September 1963, pp. 44–45.
[23] Skillings' Mining Review. Premier Diamond Mine Expands Plant. V. 52, No. 14, Apr. 6, 1963, p. 8.
[24] Engineering and Mining Journal. V. 164, No. 3, March 1963, pp. 155, 157.
[25] Bureau of Mines. Mineral Trade Notes. V. 56, No. 3, March 1963, p. 11.
[26] Bureau of Mines. Mineral Trade Notes. V. 58, No. 4, April 1964, pp. 11–12.

Co. agreed to lease its concessions and rights, granted by the South-West African Government, to the Tidewater Oil Co. The latter company thereby acquired diamond mining rights on land and from the highwater mark to the 6-mile limit. The lease will run for 25 years and includes an option to buy the grant after 5 years.[27]

In April the South-West Africa Administration granted a marine diamond mining concession to Terra Marina, a newly formed company composed of various financial interests in the Republic of South Africa. Their concession is off the South-West Africa coast and extends from Diaz Point at Lüderitz northward to Hottentot Bay.[28] Gem diamond production decreased about 15 percent from that of 1962. Semiprecious gem stone production decreased from about 419,000 pounds in 1962 to 155,000 pounds. Production for 1963 appears in table 4.

TABLE 4.—South-West Africa: Production and exports of gem stones in 1963

Gem	Production (quantity)	Exports	
		Quantity	Value
Diamond carats	1,076,000	1,329,644	$57,800,000
Amazonite pounds	18,000		
Amethyst do	134,000	56,000	8,200
Chalcedony do	1,940		
Rose quartz do	500		
Tiger's-eye do		5,860	1,550
Tourmaline do	140	33	4,300

Tanganyika.—A total of 588,870 carats of diamonds valued at about $13.9 million were exported. This compared with 647,177 carats valued at $15.1 million in 1962.[29] About 46 pounds of rough ruby and sapphire, valued at about $46,800, were exported in 1962.[30]

OCEANIA

Australia.—The value of opal and sapphire produced in 1961 was reported as $1.9 million and $18,000, respectively.[31]

The Capricornia Mineral Development Co. Pty., Ltd., has been formed to mine crysoprase, which is available in the Marlboro ranges, near Rockhampton. This material has a marked similarity to Chinese jade. Crysoprase has been shipped to the United States, West Germany, Japan, and Hong Kong.[32] An access road has been constructed, and crysoprase veins have been exposed.[33]

French Pacific Islands.—Mother-of-pearl prices have been dependent on the economic conditions of both the United States and Europe, which are the chief markets. Prices have varied from a low of $0.25 per pound in 1951 to a high of $1 per pound in 1963. Previously, uncontrolled collection and export of shell depleted many collecting

[27] Bureau of Mines. Mineral Trade Notes. V. 57, No. 1, July 1963, p. 11.
[28] Bureau of Mines. Mineral Trade Notes. V. 57, No. 2, August 1963, p. 20.
[29] Mining Journal (London). V. 262, No. 6705, Feb. 21, 1964, p. 139.
[30] South African Mining and Engineering Journal (Johannesburg, Republic of South Africa). V. 74, pt. 1, No. 3656, Mar. 1, 1963, p. 497.
[31] Bureau of Mines. Mineral Trade Notes. V. 56, No. 6, June 1963, p. 17.
[32] World Mining. V. 17, No. 3, March 1964, p. 67.
[33] Queensland Government Mining Journal (Australia). V. 64, No. 746, December 1963, p. 797.

areas. However, rigid government controls have been applied. The Government is presently financing a program to repopulate the pearl shell beds and develop the culture of pearls. Seeding of pearls is being carried out experimentally. During 1961, 565 short tons of mother-of-pearl was exported.[34]

TECHNOLOGY

Each monthly issue of Mine and Quarry (London) beginning with October 1952 has described a mineral, giving the synonyms, nomenclature, varieties, composition, crystallography, physical and optical properties, tests, diagnosis, occurrences, and uses. In the February and May 1963 issues brazilinite and turquoise were described.

Spectrolite, the new gem form of labradorite coming from Finland, is described. The Finnish material occurs in isolated large to medium individual crystals, in contrast to the material from Labrador, which occurs in coarse-grained chunks with each crystal unit several inches across. Blue is the commonest sheen of the spectrolite, but other hues of equal intensity are common.[35] The tumbling method for evolving the irregularly shaped semiprecious stones (baroques) is reviewed.[36]

An article was written on gem mineral occurrences in Colorado that have been found and lost. Topaz, turquoise, sapphire, and jade are mentioned.[37]

Methods of developing "synthetic emeralds" were discussed, and products made by the Lechleitner method and the Chatham process were compared. The principle of the Lechleitner system, like Chatham's, is one of making an approximation of natural conditions in which a crystal is able to enlarge itself. The additional growth is crystallographically continuous.[38]

An article on turquoise reviewed the traditions of the celebrated historical mines of Persia (now Iran).[39]

The origin of Colorado gold stone was described. The product does not contain gold nor is it a stone. The process involved in producing this material is discussed.[40]

The techniques of the lapidary industry of Japan are discussed. Japanese stone carving is relatively new and expanded after German sources were cut off in 1939. The popular materials are rose quartz, rock crystal, aventurine, sodalite, lapis, tiger's-eye, gold stone, amethyst, and agate.[41]

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[34] Bureau of Mines. Mineral Trade Notes. V. 56, No. 5, May 1963, p. 15.
[35] Jewelers' Circular-Keystone. Spectrolite a New and Exciting Gem Stone. V. 133, No. 12, August 1963, pp. 138, 140, 159, 162.
[36] Rhodesian Mining and Engineering (Salisbury, Southern Rhodesia). How "Baroque" Gem Stones Are Polished. V. 27, No. 13, December 1962, p. 27.
[37] Pearl, Richard M. Colorado Minerals Lost and Found. Rocks and Minerals, v. 38, Nos. 3–4, March–April 1963, pp. 129–130.
[38] Pough, Frederick H. A Unique "Synthetic," the Linde-Lechleitner Stone. Jewelers' Circular-Keystone, v. 133, No. 11, July 1963, pp. 52, 54, 62, 64, 66.
[39] King, Frank A. Turquoise-Mining and Traditions of the Past. Canadian Min. J. (Quebec, Canada), v. 84, No. 1, January 1963, pp. 48–49.
[40] Pough, Frederick H. The True Story of Colorado Gold Stone. Jewelers' Circular-Keystone, v. 133, No. 5, February 1963, pp. 92, 98, 100, 101.
[41] Pough, Frederick H. The Lapidaries of Kofu. Jewelers' Circular-Keystone, v. 133, No. 4, January 1963, pp. 60, 62, 72–74.

Methods of irradiating diamonds with charged particles are described. A brief history of irradiation is given, problems are discussed, and results are evaluated.[42]

The practice of raising the color grade of certain diamonds to near colorless by disguising the true light-yellow or brown body color by applying a foreign substance to the surface of the stone was discussed for the first time. Guides are listed for detecting coating when examining diamonds.[43]

An article on the production of cultured pearls described the basic anatomy of the oyster, growing pearl oysters, color and luster of the pearl, chemical analysis of the pearl, and synthetic pearl essence.[44]

An unusual use of antibiotics was reported from Japan, where a scientist on the staff of the Fisheries School of Mie Prefecture described tests over 4 years in which the antibiotic chlortetracycline raised production of top-quality cultured pearls by 30 percent.[45]

A method for improving the color and quality of natural or cultured pearls was patented. The pearls are subjected to high-energy, ionizing radiation.[46]

A patent was issued in Australia on an improved method for manufacturing synthetic diamonds, wherein graphite or a carbide is dissolved in molten nickel or nickel alloy solvent to form a saturated solution.[47]

A cigarette filter tip consisting of tourmaline particles dispersed in a nontoxic carrier was patented.[48]

A French patent was granted on a method for producing blue diamonds by chemically coloring white natural diamonds.[49]

A description was given of simple tests that can be made to distinguish genuine precious and semiprecious stones from paste stones. The use of the spectroscope and specific gravity tests with heavy liquids such as bromoform, methylene iodide, and clerici's solution were discussed.[50]

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[42] Pough, Frederick H. Recent Diamond Irradiation Techniques. Jewelers' Circular-Keystone, v. 134, No. 3, December 1963, pp. 54, 56, 58, 60.
[43] Miles, Eunice Robinson. Coated Diamonds. Jewelers' Circular-Keystone, v. 133, No. 8, May 1963, pp. 66–69, 82, 84, 86, 88, 90, 92.
[44] Critides, Leon. Producing Cultured Pearls. Chemistry, v. 36, No. 11, December 1963, pp. 6–12, 31.
[45] Chemical Trade Journal and Chemical Engineer (London). Antibiotics in Pearl Production. V. 153, No. 3977, Aug. 30, 1963, p. 305.
[46] Chow, K. T. Process for Irradiating Pearls and Product Resulting Therefrom. U.S. Pat. 3,075,906, Jan. 29, 1963.
[47] Custers, J. F. H., H. B. Dyer, B. W. Senior, and P. T. Wedepohl. Australian Pat. 239,176, June 26, 1962.
[48] Jacobson, G. Cigarette Filters. U.S. Pat. 3,087,500, Apr. 30, 1963.
[49] Duchaine, M. P. J. French Pat. 1,316,489, Dec. 26, 1963.
[50] Parkinson, Kenneth. Test That Stone. Rocks and Minerals, v. 38, Nos. 3–4, March–April 1963, pp. 131–135, 216.