GEM STONES

By SIDNEY H. BALL[1]

SUMMARY OUTLINE

The jewelry industry in 1940.—Retail sales of jewelry in 1940 totaled about $416,000,000—a 15-percent increase over sales of $361,564,000 in 1939, as reported by the Bureau of the Census. They were the most satisfactory since 1929, but the quantity sold exceeded that in 1929, as jewelry prices today are below those of that year. In 1939, 14,558 retail jewelry stores were operating in the United States. The Retail Business Census shows that in 1929, $1.11 out of the consumer's $100.00 was spent for jewelry, contrasted with only $0.86 in 1939. As compared to 1939, Michigan, Washington, Oregon, and Texas showed notable advance in retail sales in 1940. The gains were due largely to the increased sale of relatively inexpensive items, and although some high-priced articles were sold a colorless stock market exercised a restricting influence, particularly in New York. The volume of Christmas trade was at least 25 percent above that in 1939. Diamonds and watches were the leading items; sales of the former were augmented by the large number of engagement and wedding rings bought, especially after the passage of the Selective Service Act.

Jewelry manufacturers were unusually busy from May on, and overtime was common. The industry experienced some labor difficulties in 1940, the principal issue being the closed shop.

Retailers evidently believe wholeheartedly in the future of their trade. Tiffany's moved, for the fifth time in the 103 years of the corporation's life, to commodious quarters at 5th Avenue and 57th Street, New York City; two other important Fifth Avenue retailers thoroughly remodeled their stores; and, late in the year, at least two internationally known French jewelry houses opened shops on Fifth Avenue.

Fashions in jewels.—Colorful jewelry in large units characterized the 1940 mode. Gold, often in two or three colors, was more popular than platinum, although the latter was used in the finer diamond mountings. Patriotic, geometric, conventionalized floral, astronomic,

[1] Figures on imports compiled by M. B. Price, of the Bureau of Mines, from records of the Bureau of Foreign and Domestic Commerce.

animalic (some few attractive), Egyptian, and East Indian motifs were seen. Styles were striking and individual. Jewelry ensembles set with similar stones continued to gain popularity, as did large pieces divisible into several ornaments. An abundance of bracelets and necklaces, hair ornaments (including tiaras), clips, rings, and earrings were worn. Wealthy refugee women wear their jewels, and American women are not to be outdone.

Large diamonds and colored gems set pavé with small diamonds were popular; but in the fall, the high price of small cut (owing to destruction of the cutting industry in the Low Countries) forced new styles requiring fewer melee. The finer gems—including the diamond (including fine yellow and some coffee-colored stones), ruby, and sapphire (not only blue but yellow)—were particularly popular, while the emerald was less so. The less-valuable colored stones—star sapphires, moonstone, and topaz, and, to a smaller extent, aquamarine and amethyst—were likewise much used. The appreciation of and demand for colored stones almost unknown to the earlier generation is evidence of the increasing knowledge of precious stones among the American people. Because of the insistent demand for diamonds, colorless stones were most popular; red, blue, green, and yellow stones followed in order.

Costume jewelry.—No costume is now considered complete without real or imitation jewelry, which is being used more and more. The black gowns so prevalent today form an excellent background for "gold" pins, clips, necklaces, and bracelets. The sales of costume jewelry in 1940 increased substantially, probably to a greater extent than sales of real jewelry. Designs are improving and either follow the lead of jewelry designers or in some instances precede them. Many foreign sources of supply were cut off by the war, but American industry has successfully made up the deficit. Plastics are effectively used, and lucite beads are a fair substitute for satin spar. The manufacture of costume jewelry centers in New York. The value at the factory of costume jewelry produced in 1939 was $33,921,990 (1937, $29,928,567), and over 12,000 people were employed in the industry.

Domestic production.—From the 1909 peak output of gem stones valued at $534,280, the domestic industry dwindled to only $3,000 in 1934. Since then production has increased markedly and in 1940 was valued at $340,000 to $750,000; the first figure is a rough estimate of the amount used in jewelry and the second an estimate of the total, including that treasured by collectors or sold to tourists, collectors, and rock gardeners. The rise is due largely to the growth of lapidary work as a hobby (particularly in the Pacific Northwest and notably in Oregon and Washington). Stones of the agate family comprise about 87 percent of the amount used in jewelry. Gems are produced largely by individuals or partnerships, and as there are no official returns exact figures are not available.

The war has shut off, at least in part, the country's normal sources of supply of colored gems; their place, to some extent, has been taken by gems of American origin.

In the Northwest, especially in Oregon (according to correspondence with H. C. Dake) mineral collectors and lapidaries, both professional and amateur, continue to increase. He estimates the value of the material (largely quartz minerals) collected and cut in 1940 as follows: Oregon (professional lapidaries—$150,000, amateurs—$225,000);

Washington, $140,000; and Idaho, $47,000—a total of $562,000. A new agate-producing district in Harney County, Oreg., an opalized-wood locality in central Washington, nephrite in place in an aplite dike near Split Rock, Fremont County, Wyo., and nephrite boulders about 48 miles southeast of Lander, Wyo., are reported. Miss M. Barrie Berryman states that there are some 50 professional and amateur lapidaries in Utah; she estimates the total value of the rough and cut gems and mineral specimens produced in the State as $25,000 in 1940 compared with $8,000 in 1939.

With the exception of quartz gemstones, turquoise leads in total value—about $20,000; Nevada ranks first in output and Colorado second. The Fox turquoise mine near Cortez, Lander County, Nev., produced 7,928 pounds of rough turquoise; of this the more desirable material was sold for $11,405. The Tonopah district and mines at Austin, Nev., also produced some turquoise, as did the turquoise mine in the San Luis Valley near Villagrove, Colo. A little is reported to have been produced in New Mexico, and some Arizona turquoise was sold, although little or no mining was done in 1940. Sales of turquoise jewelry in the southwestern curio shops were large.

Arthur L. Crawford reported that three localities in Utah (5 miles west of Fairfield, Utah County; 9½ miles south of Grantsville, Tooele County; and 25 miles north of Lucin, Box Elder County) produced variscite in 1940, and the mineral was also discovered near Promontory Point, Box Elder County.

In 1940 Montana produced about 12,350 troy ounces of sapphires (1,029 pounds) valued at about $17,000. The principal producers were the American Gem Mines at Philipsburg, owned by Charles H. Carp and J. W. Kaiser, and the Perry-Schroeder Mining Co. of Helena, dredge operators. The stones are used industrially, as few are suitable for jewelry. As difficulty is likely to arise in obtaining synthetic sapphires and rubies from Europe, Montana sapphire mining may well become an important cog in our national defense program, because jewels are essential in many instruments necessary for military purposes.

Austin F. Rogers [2] describes nephrite recently found in the western part of the Santa Lucia Range, southern Monterey County, Calif. It occurs not only in large and small boulders but also in place in serpentine in a region of Franciscan rocks. The nephrite ranges from light greenish gray to black in color, and some of it is suitable for cutting. According to reports, californite (a compact vesuvianite used as a substitute for jade) is being mined by the Curly Jack Mining Corporation on the South Fork of Indian Creek near Happy Camp, Siskiyou County, Calif.

Three operators produced tourmaline, kunzite, beryl, and rock crystal valued at about $2,400 from the well-known gem-stone deposits of San Diego County, Calif.

In 1940 a number of mineral collectors visited Topaz Mountain in the Thomas Range, Juab County, Utah, according to Miss Berryman. By blasting they collected a quantity of sherry-color topaz, which had been bleached water-white at the surface. When cut this material forms attractive gems readily sold locally.

A considerable amount of moss agate was recovered from the gravels of the Yellowstone River in southeastern Montana. This

[2] Rogers, Austin F., Nephrite Jade from Monterey County, Calif.: Bull. Geol. Soc. America, vol. 51, No. 12, pt. 2, December 1940, p. 1941.

source has long furnished beautiful moss agate for jewelry, but fine material is becoming scarce. The deposit in the Granite Hills near Split Rock, Wyo., also supplied considerable moss agate, and some was produced in other Mountain States.

A few Sioux still dig pipestone at Pipestone, Minn., and cut it into pipes or ornaments for their own use or for sale.

In the fall of 1939 Carl M. Anderson found a deposit of lapis lazuli, some of rather fine quality, at an elevation of 12,500 feet on the slope of Italian Mountain, Gunnison County, Colo. The lapis occurs as three stringers in Paleozoic metamorphic limestone intruded by diorite, which reach a maximum width of 7 or 8 inches and are traceable for about 300 feet. Harold I. Rosencrans, a Longmont jeweler, controls the deposit, cuts the lapis, and sold some in the East and set the remainder in Indian-style silver jewelry for distribution in the West.

Some gem stones were produced as a byproduct of North Carolina feldspar and mica mining; C. C. West operated a ruby property near West Mills, Macon County, and sold the product to the tourist trade. A number of lapidaries also cut for sale to tourists.

A small amount of rose quartz was produced at Scott's mine near Custer, S. Dak. The total recorded production of rose quartz in the Black Hills from 1879 to date has been valued at about $55,000. A small amount was also produced at Albany, Maine, and asteriated rose quartz in North Carolina.

Other gem stones produced in the United States in 1940 included agate (Utah, South Dakota, New Mexico); agatized wood (private lands surrounding Petrified National Monument, Ariz., New Mexico, Utah); alabaster (New Mexico, Utah, Wyoming); amazonstone (Colorado); amethyst (Red Feather Lakes, Larimer County, Colo., Georgia, Maine, North Carolina); aquamarine (Colorado, Maine, North Carolina); azurite (Bingham, Utah); chalcedony (Utah); emerald matrix (North Carolina); garnet (Colorado, New Mexico, North Carolina); golden beryl (North Carolina); jasper (California, New Mexico, North Carolina, Utah); lazulite (Clubbs Mountain, N. C.); malachite (Bingham, Utah); moonstone (North Carolina); rock crystal (Arkansas); iridescent obsidian (California); rhodonite (Utah); rutilated quartz (North Carolina); topaz (Colorado, Maine, North Carolina); pink sapphire (Georgia); and tourmaline (Maine).

Imports.—Imports of precious and imitation stones (exclusive of industrial diamonds) into the United States in 1940 totaled $37,767,705—a 6.7-percent decrease as compared with 1939. Details are shown as follows:

	Carats	*Value*
Diamonds:		
Rough or uncut (suitable for cutting into gem stones), duty free	227,886	$11,595,703
Cut but unset, suitable for jewelry, dutiable:		
Less than 10 stones per carat	54,005	5,457,151
10 or more stones per carat	267,466	16,544,568
Emeralds:		
Rough or uncut, free	14,364	6,915
Cut but unset, dutiable	16,093	394,104
Pearls and parts, not strung or set, dutiable:		
Natural		224,101
Cultured or cultivated		355,595

Other precious and semiprecious stones:	Value
Rough or uncut, free	$153,858
Cut but unset, dutiable	2,191,513
Imitation, except opaque, dutiable:	
Not cut or faceted	4,127
Cut or faceted:	
Synthetic	359,672
Other	423,344
Imitation, opaque, including imitation pearls, dutiable	32,193
Marcasites, dutiable:	
Real	6,790
Imitation	18,071
	37,767,705

As compared with 1939 imports of rough diamonds, other precious and semiprecious stones, cultured and imitation pearls, and synthetic gems increased whereas imports of cut diamonds, uncut emeralds, natural pearls, and marcasites decreased. The number of watch jewels imported in 1940 totaled 98,771,042 valued at $1,831,007 compared with 43,712,840 valued at $913,245 in 1939.

Government regulations.—Owing to the war, Government regulations affecting the jewelry trade were legion in 1940. By Presidential proclamation, effective July 5, 1940, as a result of the Sheppard-May Bill, a license was required to export industrial diamonds and quartz crystals, and on December 20, 1940, the order was amplified to include all products that contain them.

The British embargo on the export of diamonds (to prevent industrial diamonds from reaching the enemy) promulgated at the beginning of the war is effective, except for a major leak of Brazilian stones to Germany. In 1940 the order was amended several times to increase the control of industrial diamonds. As of July 1, 1940, diamonds, precious stones, and jewelry were permitted to be carried out of Great Britain by license only to prevent the export of capital. Customs officials at British ports require the presentation of a license for all jewelry worn by travelers, even wedding rings if they appear to be new. The budget of July 1940 increased the British tax on jewelry to 33⅓ percent of the wholesale value.

Canada has classified industrial diamonds and piezoelectric quartz crystals as of indirect strategic value. To keep cash within the Dominion, in December 1940 Canada prohibited the importation of jewelry and uncut diamonds from the United States and placed a 25-percent excise tax on the sale of luxury articles. Canada was formerly this country's most important foreign market for jewelry. Severe regulations exist regarding the sale of military emblems that might be mistaken for official insignia.

In May the Union of South Africa decreed that all shipments of rough diamonds can thereafter be addressed and delivered only to parties in London.

For the period July-December 1940 New Zealand cut imports of precious stones from the United Kingdom and its Crown colonies by 75 percent. The export of precious stones, unset or in jewelry, from Australia is prohibited, except by consent of the Minister for Trade and Customs.

On June 3, 1940, France decreed that cut precious stones and jewelry could not be exported from the country; previous decrees had covered the export of rough stones.

In May 1940 Germany prohibited the sale in the Reich of gold objects weighing more than 50 grams (1.6 ounces) or of more than 14 carats gold content. Early in 1940 Hebrews in Bohemia and Moravia were required to register with the Government all precious stones and articles made of precious metals. In Occupied France the German military authorities required inspection of all private safety deposit boxes and official listing before January 10, 1941, of the gold and precious stones they contained.

Early in 1940 Japan appealed to its citizens to sell or give their gold jewelry to the Government. In June the sale of watches costing more than $12 and the manufacture and sale of rings and necklaces were prohibited. Stocks of such articles in stores were to be liquidated within 3 months. The export of gold, even that in one's teeth, is reported to be dutiable upon leaving Japan.

On March 24, 1940, French Indochina required all shipments of imitation precious stones imported into the colony to show clearly the country of origin. Many of the zircons cut in Bangkok, Siam, originate in Indochina and are smuggled across the border. To control the trade, the Indochinese Government on June 12, 1940, decreed (1) that only the Kha people could dig the gems; (2) that only licensed buyers could purchase them; and, (3) that buyers and lapidaries must keep an accurate and detailed account of the stones bought and sold.

On July 22, 1940, Switzerland placed the control of industrial diamonds under its War Industries and Labor Office, to regulate sales and insure more equitable distribution of the supply on hand.

On February 8, 1941, President Getulio Vargas of Brazil issued a decree prohibiting the export of 35 minerals (including industrial diamonds and rock crystal) without an export permit, except to American nations. Exports to Japan, either for Japanese consumption or for reexport, were relatively large in 1940.

Industrial gem stones and national defense.—Certain gem stones are essential to the United States armament program. Industrial diamonds are one of the critical [3] minerals being stocked by the Government to insure rapid and efficient motor- and airplane-engine production. Lapidaries should be trained to produce the smaller-gage diamond dies. As of June 30, 1940, the Procurement Division of the United States Treasury had purchased 11,800 pounds of rock crystal for $98,875, and early in 1941 it bought Brazilian industrial diamonds valued at $100,000. Piezoelectric quartz from Brazil is necessary in the manufacture of certain types of radios, telephones, telegraph instruments, and cables. Rock crystal is also essential for the lenses and prisms widely used in optical instruments and when fused is employed in the chemical and electrical trades. Limited quantities of fine fluorspar, also utilized in optical instruments, can be obtained in the Illinois-Kentucky fluorspar district, and a synthetic substitute is said to be satisfactory. Iceland spar is essential for Nicol prisms. A deposit found recently in the Copper Mountain mining district 30 miles southwest of Taos, N. Mex., promises to replace in the American optical industry the spar formerly imported from Helgustadir, Iceland. Tourmaline is used in the tourmaline tongs (a simple form of polariscope) and might have other value in military instruments. Watch

[3] Considered "critical" by the Army and Navy Munitions Board for purposes of procurement under the Reconstruction Finance Corporation.

and instrument jewels, essential for airplane instruments and time bombs, are normally cut in Switzerland from European-made synthetic sapphire. An adequate domestic supply of raw material is available in the Montana sapphire mines, but lapidaries should be trained in this country to cut the jewels.

Effect of war on jewelry trade.—The jewelry industry continues to feel the effects of war. Destruction of the cutting industry in the Low Countries doubled or even quadrupled the price of small-cut diamonds. The price of fine large stones, however, only increased about 20 percent, inasmuch as such goods can be profitably cut in this country, England, and South Africa. For the present prices should be firm, with possible increases in large-cut stones later. The limited supply of small-cut stones in this country will result in fashion changes, and pavé settings will be replaced by "sec" mountings (large stones set with a minimum of small stones).

The British embargo on the export of uncut gem and industrial diamonds has been administered broadly; in consequence, imports into the United States have been unusually large. New York has increased in importance as a diamond center but can scarcely, as some claim, become the locale of the world cutting industry.

The fine-precious-stone industry, with its center—Paris—in the hands of the Germans, has been in chaos; imports into the United States have been more or less normal, and although prices are firm no great increase is expected, as stocks in the United States are adequate. For the duration of the war India will be a more important—and Paris a much less important—center of fine-gem trading.

Most of the less-valuable stones were cut in Germany, Czechoslovakia, and France, and before the war the United States imported synthetic stones from Germany, France, and Switzerland. The stocks of the less-valuable stones were normal when war broke, but since then they have been replenished but meagerly; in consequence, shortages of certain stones already have occurred. Stocks of synthetic stones suitable for jewelry are not large.

An alleged shortage of iridium (used as an alloy in jewelry platinum) caused a marked increase in price in 1940 (from $175 to $275 an ounce), although the price of platinum itself was stable. The war can only increase the cost of most jewelry items.

DIAMOND

Notwithstanding world conditions the diamond industry in 1940 had a relatively satisfactory year. Production increased in total weight but decreased in total value. Total sales of rough stones by the Diamond Trading Co. were about the same as in 1939, but the war has largely limited retail purchases (with the exception of clandestine investment buying) to the American continents, India, and the East Indies. The invasion of the Low Countries disrupted the cutting industry. The Germans have the men, equipment, and plants but little rough stock; Great Britain has the stocks; and Great Britain and powers friendly to it have a few cutters of large stones.

Share dealings.—The shares of diamond-mining companies, virtually all of which are listed on the London Stock Exchange, had a limited and at times a nominal market in 1940. After a short spurt quotations declined until the French debacle in June, by which time

they had been reduced almost 50 percent; prices then seesawed for 3 months and afterward rose rather sharply. During the year five representative stocks lost about 8 percent—better performance than that of most British and American stocks. At the end of the year quotations were 29 percent of their high (1927) and 285 percent of their low. Of the 11 leading diamond-mining companies, 8 paid dividends.

Market.—In 1940 the Diamond Trading Co., which controls the sale of about 95 percent of the world output of diamonds, sold rough stones valued at about £6,000,000. For the first 4 months of the year sales were large and reminiscent of the prosperous twenties. But with invasion of the Low Countries trade fell off markedly, and America remained the chief customer. Industrial diamonds were, however, sold in quantity throughout the year.

Sales of polished diamonds were also large until May, and during January and February small cut stones were in marked demand. After May, the United States was practically the only buyer of importance and since then has been building up its stock of small cut stones. Retail sales in the United States increased compared with those in 1939.

Stocks of rough stones held by the Diamond Corporation are large, although they include few fine, large gems. Stocks of rough gem-grade diamonds in the United States are believed to be adequate, but stocks of industrial grades are less so. Stocks of large cut stones are adequate; those of small cut stones are inadequate, and unless the latter can be replenished, jewelry styles must change.

Imports.—Diamond imports into the United States in 1940 by countries were as follows:

Diamonds imported into the United States in 1940, by countries

[Exclusive of industrial diamonds]

Country	Rough or uncut			Cut but not set		
	Carats	Value		Carats	Value	
		Total	Average		Total	Average
Belgium				242,326	$15,137,583	$62.47
Brazil	3,436	$322,773	$93.94	1,612	140,058	86.88
Cuba				131	10,884	83.08
France				6,487	582,519	89.80
Mexico				40	3,465	86.63
Netherlands				34,309	2,306,740	67.23
Netherlands Indies	1,789	45,423	25.39	501	18,593	37.11
Palestine				1,123	92,318	82.21
Peru				18	933	51.83
Switzerland				995	87,894	88.34
Union of South Africa	222,615	11,222,372	50.41	24,571	2,827,942	115.09
U. S. S. R.				1,017	39,986	39.32
United Kingdom				8,341	752,804	90.25
Venezuela	46	5,135	111.63			
	227,886	11,595,703	50.88	321,471	22,001,719	68.44

Cutting.—The cutting industry was normal for the first 4 months of the year, but when the Germans invaded the Low Countries in May the centers of 90 percent of the industry became wholly disorganized. America, the principal market, must now depend on the 450 cutters in the United States, 300 in South Africa, and 200 in England to supply its needs, as Brazil, Borneo, India, and Palestine

cater largely to local and Eastern markets. The cutters in the first three countries are paid such high wages that small stones cannot be cut profitably. Recent increases in America (the minimum weekly wage rose from $75 to $120) must increase prices; however, some observers claim that if the industry is mechanized further the United States can profitably cut small diamonds.

World production.—Owing to the war, actual production figures are not available but the estimates in the following table are believed to be fairly accurate. World production (gem and industrial) in 1940 is estimated to have been 14,140,200 carats (2.828 metric tons) valued at about $31,000,000—an all-time record as to quantity. Compared with 1939 total weight increased 13 percent; value decreased 24 percent. In other words, the production of bort increased markedly and that of gem stones decreased by about 22 percent. Belgian Congo was the leading world producer both in weight (77 percent) and in total value (24 percent). As only one pipe mine was operated—and that for but 8 months—the alluvial mines produced 96 percent of the world total by weight and 91 percent by value. Of the world total the British Empire produced 14 percent by weight and 37 percent by value. Industrials comprised 85 percent by weight of the world total.

The following table shows, as accurately as available statistics permit, world production for the past 5 years:

World production of diamonds, 1936–40, by countries, in metric carats

[Including industrial diamonds]

Country	1936	1937	1938	1939	1940
Africa:					
Angola	577,531	626,424	651,265	690,447	[1] 785,000
Belgian Congo	4,634,266	4,925,228	7,205,620	8,344,765	[1] 10,900,000
French Equatorial Africa	1,550	5,588	19,644	[1] 16,000	[1] 16,000
French West Africa	18,897	57,687	61,928	56,314	[1] 75,000
Gold Coast (exports)	1,414,677	1,577,661	1,296,763	1,087,652	[1] 825,000
Sierra Leone	616,200	913,401	689,621	[1] 600,000	[1] 600,000
South-West Africa	184,917	196,803	154,856	36,010	30,017
Tanganyika	2,704	3,234	3,576	3,445	[1] 2,250
Union of South Africa:					
Mines	339,719	820,284	979,460	[2] 1,089,144	[1] 351,400
Alluvial	284,204	207,359	259,148	160,684	[1] 172,000
Total Union of South Africa	623,923	[3] 1,030,434	1,238,608	[2] 1,249,828	[1] 523,400
Brazil	136,462	192,000	111,257	[1] 350,000	[1] 325,000
British Guiana	41,067	35,958	32,522	32,491	26,764
Other countries [4]	6,000	6,000	34,200	19,000	[1] 31,750
	8,258,200	9,570,400	11,499,900	12,486,000	14,140,200

[1] Estimated.
[2] Includes 1,009 metric carats recovered by debris washers.
[3] Includes 2,791 metric carats recovered from re-treatment of tailings.
[4] 1935: Borneo, India, Nigeria, and Venezuela; 1936: Borneo, India, New South Wales, Rhodesia, United States (California), and Venezuela; 1937: Borneo, India, Liberia, New South Wales, Rhodesia, and Venezuela; 1938–40: Borneo, India, New South Wales, U. S. S. R., and Venezuela.

The Belgian Congo increased its output, particularly from the Beceka mines, which produce mainly bort. Angola also increased its yield about 14 percent. The Gold Coast curtailed production drastically, and the pipe-mine output was about 37 percent of that in 1939. Venezuela—a minor producer— is increasing its output.

Age of African diamond deposits.—The more famous of the African diamond fields (South African kimberlite pipes) are of Cretaceous age. South African alluvial deposits and those of South-West Africa are

derived from the break-down of such pipes. The Tanganyika pipes are contemporaneous, as are the noncommercial Belgian Congo pipes; strangely enough, the Arkansas kimberlite intrusives are approximately of the same age.

The Belgian Congo-Angola diamonds are known to be older than the Jura-Triassic and are presumably of pre-Cambrian age. Junner [3] believes that the Gold Coast deposits are also of pre-Cambrian age, and diamonds have been recovered from the clean-up of the Ashanti-Adowsena gold mine, whose ore bodies occur in the Banket series (Tarkwaian quartzites of pre-Cambrian age). An occasional diamond is found in the gold mines on the Witwatersrand, where the gold deposits also occur in pre-Cambrian rocks. The important Sierra Leone deposits and those of the French African colonies are likewise presumably of pre-Cambrian age.

In normal years the value of the production from the Cretaceous and pre-Cambrian deposits is more or less comparable; in 1940, owing to the small amount of activity in pipe mining, the older deposits represented 96 percent by weight and 72 percent by value of that part of the world production that can be allocated to deposits of these two types.

Industrial diamonds.—In 1940 American industries, working under the stress of the defense program, consumed more diamonds than ever, probably in excess of 2,000,000 carats, and in European munition plants the increased use was equally great. In the past 30 years the use of industrial diamonds has increased eightfold, and a decade hence the diamond mines of the world may have difficulty in satisfying the world demand. Industrial diamonds are one of the critical war materials to be stocked by the Procurement Division of the Treasury. During the last 2 years the American trade has accumulated a stock of industrial stones that may be adequate for 1 year's consumption. Naturally such a small stock is wholly inadequate for a highly industrialized country lacking local sources of supply. Features of the trade in 1940 were (1) the further expansion of the use of diamond-impregnated wheels and tools with a powdered-metal bond, (2) the increased use of mechanically set drill bits studded with small stones, and (3) the tendency to replace cleavages by fine crystals in diamond dies.

Throughout 1940 the demand for industrial diamonds was strong because of the high rate of industrial activity in the United States and in Great Britain. Prices were firm, with an upward trend.

Imports of industrial diamonds into the United States during the past 5 years were as follows:

Industrial diamonds (glaziers', engravers', and miners') imported into the United States, 1936–40

Year	Carats	Value		Year	Carats	Value	
		Total	Average			Total	Average
1936	1,166,094	$4,328,603	$3.71	1939	3,568,730	$9,725,683	$2.73
1937	1,885,970	6,542,365	3.47	1940	3,809,071	11,026,563	2.89
1938	1,396,247	4,213,412	3.02				

Imports from Brazil increased markedly and caused an advance of 16 cents a carat in the average value.

[3] Junner, N. R., Origin of Gold Coast Diamonds: Gold Coast Colony Report of Geol. Survey Dept. for financial year 1937–38, p. 6.

RUBY, SAPPHIRE, AND EMERALD

Sales of rubies, sapphires, and emeralds and of less-expensive colored gems were large in 1940. Particolored sapphires were popular, and one New York jeweler combined Montana sapphires and yellow gold attractively.

After the Burma Ruby Mines, Ltd., abandoned operations in 1931 local Burmese miners continued them. The production rose markedly from 1934 to 1937 (21,622 carats of rubies valued at £2,708 and 153 carats of sapphires valued at £25 in 1934 to 157,308 carats £6,841, and 4,392 carats, £228, in 1937, respectively). There was a further increase in 1938. A few spinels are a byproduct.

In 1939 the Anakie (Queensland) industry sold sapphires valued at £326; production was somewhat greater, as appreciable quantities of fancy stones and industrial corundum were exported but not sold.

The Kashmir sapphire output was nominally 18,344 carats valued at £41 in 1937 and 4,892 carats, £11 in 1938. Owing to its high altitude this deposit (at Soomjam in the Pedar district) can be worked only when the weather is favorable.

After 25 years of Indochinese sovereignty the sapphire deposits of Pailin were reincorporated into Thailand (Siam) toward the close of 1940.

In 1940 the United States imported 16,093 carats of cut emeralds valued at $394,104 (United Kingdom 58 percent, Russia 20 percent, Colombia 13 percent, France 2 percent, and Belgium 1 percent) and 14,364 carats of rough emeralds valued at $6,915. The Chivor Emerald Mines, Ltd., Colombia, was operated under lease in 1940, and some good material is reported to have been found. Dr. Thomas Clements (see following bibliography) considers that the Muzo (Colombia) emeralds were deposited by magmatic waters at relatively low temperatures. Although the mine has been closed since January 1, 1939, Dr. Clements states that the deposit is not exhausted, and he believes that there may be other deposits in the vicinity. Government reports indicate that emerald stocks valued at about $400,000 are in the Banco de la República. Brazil exports a few light-color emeralds obtained in the States of Minas Gerais and Bahia.

LESSER GEMS

A little opal was produced at Sheep Creek Station, Queensland, in 1939, but operations at Duck Creek were at a standstill.

Burma produced 1,303 hundredweight of jadeite valued at £4,320 in 1938 and 2,952 hundredweight valued at £13,030 in 1937; the cause of the decrease was attributed to the war in China.

Production of amber in Palmnicken, Prussia, increased consistently from 1936 to 1939 (estimated exports for 1939 were 26,860 kilograms valued at 138,000 reichsmarks); most of this output was shipped to Danzig for processing and re-export. The Myitkynia district produced 38.7 hundredweight of amber valued at £668 in 1937, but no production was recorded in 1938.

A rock crystal weighing 4,400 pounds and valued at $25,000 was found at Itamarandiba, Brazil, in 1940. The Swedish Geological Survey reports the discovery of rock crystal in the Province of Jamt-

land, northern Sweden. Preliminary tests suggest that this find may supply Sweden's small demand for piezoelectric rock crystal formerly obtained from Brazil.

Kornerupine of gem quality is reported to have been identified in concentrate from gem pits at Ratnapura, Ceylon.

Dr. A. L. Parsons reports that a little iolite was produced from the Great Slave Lake region, Canada. Some attractive gems have been cut from the material.

Agalmatolite is exploited on a small scale at the large deposit near Para de Minas, Minas Gerais, Brazil; it is used for church construction, ornamental purposes, and sculpture.

In 1939 Turkey produced less meerschaum than in 1938 (335 cases compared with 385 in 1938).

In the first half of 1940 Brazil exported 1,754,745 carats of gem stones—virtually all to the United States. Bahia and Rio de Janeiro were the principal shipping points.

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