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STATISTICS, TECHNOLOGY AND TRADE

DURING

1913

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PRECIOUS STONES

By George Frederick Kunz

During the past year the sapphire has more than retained its popularity and has been the king gem for the time being. Fine emeralds, however, have held their own, and diamonds have of course maintained the place they have always occupied as standard gems, but little dependent upon the chances and changes of fashion, except as to the form of cutting.

What are known as "phenomenal gems" because they show a moving ray or rays, have enjoyed the highest favor, more especially moonstone with a bluish light, as well as the varieties of asteria, star-sapphire and star-ruby.

Rock crystal, rounded and domed, to which a dull polish has been given, or where the polish has been so dulled as to make the crystal resemble moonstone, has been much appreciated, such stones being in many cases pierced and incrusted with diamonds and other gems; often they are engraved and provided with a bordering of diamonds.

The calibre-cut onyx, used to form a dainty line or tracery, defining a line of diamonds, has been exceedingly popular.

The revival of the fashion of wearing necklaces or strings of beads has been very marked during the past year, and the taste for this form of ornament appears to be gaining ground daily. While this has contributed to restore amber to public favor, so that the price of the material has risen 25 per cent. or more within a short time, and many amber stocks have been almost depleted, the most popular beads are those of chalcedony, carnelian, lapis-lazuli, amethyst, chrysoprase, topaz, rock crystal, pink quartz, moonstone, etc.

Markets and Imports.—The London market[1] for rough diamonds, after a period of retrocession in the latter part of 1913, showed marked signs of recovery in January, 1914. Generous buying, largely by American interests, had cut down the accumulated stocks of cut diamonds in Amsterdam and Antwerp, and encouraged freer purchases of the rough materials. A prudent marketing of this by the diamond-mining interests has also greatly contributed to steadying the market. There has been a disposition to offer only good assortments for sale, and a continuance of this policy will, it is believed, warrant a raise in price, an increase of returns secured in this way being regarded as much preferable to that obtained by asking

[1] Financial News of London, Feb. 14, 1914.

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and obtaining the same price for a poorer assortment of diamonds. The necessity for careful handling of the diamond market is apparent in view of an estimated production of $60,000,000 worth of African diamonds from the African fields in 1913, this comprising the product of all the African mines, including those of the German Protectorate.

The diamond trade of Amsterdam with the United States fluctuated in volume during the year 1913 in response to the new tariff agitation and the uncertainty as to the date at which the almost inevitable higher rates would go into operation. On the whole the effect was temporarily favorable as to exports, to a moderate degree, the figures for cut stones being $10,085,700 for 1913 as compared with $9,790,694 for 1912, an increase of nearly $300,000. The rough-diamond exports showed a slight falling off, declining from $985,161 in 1912 to $854,595 in 1913. Of course the special conditions of the trade were reflected in the diamond labor market, the eventual result being on the whole somewhat unfavorable for the local diamond-cutters. However, the check put upon the continual advance in the scale of wages that has been attained by the Amsterdam Diamond Workers' Union during the past 10 years, operates to make it easier for the Dutch manufacturers to compete with their dangerous and enterprising Belgian rivals. The unemployed workers in Amsterdam in the month of December, 1913, are said to have numbered 4600, or about 60 per cent. of the trade; however, as most of them received high wages for the nine prosperous months of the year at least, their situation was probably not as bad as it might seem to be; the highest number of unemployed at any time during 1912 was 3400. On the whole prospects are considered good for 1914, in spite of the higher tariff. The market for rough stones which was rather demoralized by a surplus of German diamonds, expects relief from a proposed restriction of the quantity of these diamonds to be marketed, so as to keep prices steadier and impart greater confidence to buyers.[1]

The exceptionally heavy imports of diamonds into the United States in 1913 were reflected in the Antwerp trade as is shown by the following figures for the years 1910-1913.

	Cut Diamonds.	Rough Diamonds.	Total.
1910	$10,061,843	$795,195	$10,857,038
1911	10,009,324	1,348,151	11,357,475
1912	9,665,027	1,238,867	10,903,894
1913	11,019,180	2,355,294	13,374,474

As will be noted the increase is even more marked in the case of uncut than in that of cut diamonds. The Antwerp market is said

[1] D. P. De Young, *Daily Consular and Trade Reports*, Feb. 12, 1914, pp. 564, 565.

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to have taken more than 100,000 carats each month of 1913 from the German African fields, practically the entire output. These very small diamonds, known as mêlés, came in so fast that the diamond cutters could scarcely keep up with the shipments. The average price secured by the German Diamond Regie was $10.94 a carat, and as 760,000 carats' weight of these stones came to Antwerp during the first half of 1913, the cost of this rough material received during that period was about $8,500,000. Of the different German mining companies, the largest share was contributed by the Pomona Co., which furnished 316,423 carats' weight in 6 months' time. The necessity for regulating and limiting the supply of these small stones is easily apparent in view of the statement that for the entire year 1913, diamonds to the weight of 1,440,000 carats were sent to Europe from the German fields. The De Beers Co. has so far carefully guarded the interests of their customers in the smaller class of goods by strictly limiting the amount to be marketed by the Syndicate in London, but all efforts in this direction would have been unavailing and might have had to be abandoned if some concurrent action on the part of the German diamond distributors had not been attainable.

The slight lead secured by Antwerp over Amsterdam in the diamond industry some 5 years ago and maintained since then, was somewhat accentuated last year, as is indicated by the following figures, giving the diamond exports to the United States from these two ports for the years 1905-1913:[1]

	Amsterdam.	Antwerp.
1905	$10,425,814	$6,465,464
1906	12,435,161	6,448,894
1907	7,905,852	6,283,576
1908	4,571,804	4,408,366
1909	12,441,243	12,914,793
1910	10,655,753	10,857,038
1911	10,080,851	11,357,475
1912	10,645,289	10,903,894
1913	11,070,862	13,374,474

As forecasted in our last report, the importation of diamonds was phenomenal during 1913, this being due, in accordance with our anticipations, to the expected advance in duties from 10 per cent. to 20 per cent. *ad valorem* on the cut stones, and from 3 per cent. to 10 per cent. on uncut diamonds; these new and higher rates have been imposed since 1913. The large increase in the stocks of diamonds held by dealers caused by these unusually heavy imports very naturally resulted in a curtailment of

[1] Henry W. Diederich, *Daily Consular and Trade Reports*, March 28, 1914, p. 1171.

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imports in the opening months of 1914, although financial stagnation has augmented this.

The general trend of the importation of diamonds and other precious stones into the United States during the past 4 years (1910-1913) can be best understood by a comparison of the official figures for this period.

IMPORTS OF PRECIOUS STONES FOR THE YEARS 1910, 1911, 1912, 1913.

	1910.	1911.	1912.	1913.
Diamonds, uncut, including miners', glaziers', and engravers', not set. Free	$9,204,134	$9,854,152	$9,863,770	$11,616,286
Diamonds, uncut. Dut.	.....	.....	.....	956,576
Diamonds, cut but not set. Dut.	25,672,639	25,705,563	[22,876,042	24,786,133
Pearls and parts of, not strung or set. Dut.	464,712	1,387,689	[5,139,406	5,004,489
Other precious stones, uncut. Free	222,513	[[109,241	[115,812	47,716
Other precious stones, uncut. Dut.	.....	.....	.....	9,459
Other precious and semi-precious stones, cut, but not set. Dut.	6,751,832	4,519,263	3,342,219	2,740,804
Imitation precious stones. Dut.	.....	587,256	1,215,471	1,299,145
	$42,315,830	$42,163,164	$42,552,720	$46,460,608

IMPORTS OF DIAMONDS AND OTHER PRECIOUS STONES, AND OF PEARLS INTO THE UNITED STATES FROM 1867 TO 1908.

Diamonds: glaziers', miners', and engravers', not set	$3,277,209
Diamond dust	6,787,740
Diamonds, rough or uncut	83,994,001
Diamonds, set	53,969
Diamonds, cut, but not set	152,784,223
Diamonds and other stones, not set	211,556,278
Pearls	20,120,798
Total	$478,574,218
Imports from 1909 to 1913	217,062,878
Grand total	$695,637,096

Of these imports, totaling nearly $700,000,000, it can safely be said that the value of the diamonds for ornamental purposes represents almost $600,000,000 and that of the pearls from $30,000,000 to $35,000,000.

On July 1, 1914, the international metric carat of 200 milligrams will have been in use officially and in the trade generally for one year's time. It has amply proved its usefulness in the following ways: Simplicity in weighing, facility in calculation, simple denominations, and correctness of entries in stock books, and it would be impossible to make the dealers return to the older and more cumbersome carat.

Some brief notes as to the general production of precious stones in the United States may be offered here. A few diamonds have been mined in

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Arkansas, in experimental development, but not enough to call them a commercial production. Montana sapphires have been mined and sold in greater quantities than ever before, this result being due to the fact that the sapphire has enjoyed more popular favor than any other precious stone; many of the Montana sapphires of a carat or less in weight, rarely more, retain their blue color by artificial light, whereas many of the Asiatic sapphires assume a too dark hue under these conditions. Rubies are not found in the United States, neither is alexandrite nor transparent chrysoberyl. Topaz, white and of pale hue, has been found at Streator, Texas; but few, however, are cut into gems, the best specimens being generally sold for mineralogical collections.

Several mines in San Diego Co., California, and in adjacent counties in that state, have produced magnificent tourmaline crystals, constituting superb red, green and yellow gems, and a quantity of fine large kunzite crystals have also been brought to light in San Diego Co., near Pala. Garnets, mostly of gem quality, have been found in Arizona and New Mexico, and also peridots, but in sparing quantities. Turquoise, known to occur in so many localities, has been but little mined, and few gems in the finer blue colors have been sold recently, the sales comprising mainly the poorer and cheaper varieties, often worked up into beads.

A great variety of the lesser gems—moss-agate, chrysoprase, the various colored agates, and the beach pebbles—have furnished considerable work to the lapidary. These beach pebbles have often been sold, not for what they really are, but under some ideal name, such as moonstone, or else have been endowed by the local lapidaries with some altogether fanciful name, having no place either in scientific nomenclature or in gem lore.

Taken altogether the value of the precious stones produce in the United States scarcely amounts to more than 1 per cent. of the total value of the gems sold in our country, but none the less they are both scientifically and artistically interesting.

For full data on the subject of Precious Stones in the United States, see the articles in the reports of the Department of Mining Statistics of the United States Geological Survey, issued annually. The articles on Precious Stones were written by George Frederick Kunz from 1882 to 1905, and later by Douglas Sterrett from 1906 to 1913.

The following are other publications of George Frederick Kunz:

United States Census Reports, 10th and 11th, 1890 and 1900.
Gems and Precious Stones of North America, New York, 1889–1892, pp. xii, 363.
The Gems and Jewelers' Minerals of California.
The Precious Stones of North Carolina.

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Diamonds

Africa.—At the twenty-fifth annual meeting of the De Beers Consolidated Mines, the chairman, Mr. Francis Oats, called attention to the large increase in African diamond production in the past year. While the output of South Africa, including the German fields, for 1912 (to June 30), was 5,642,230 carats, during the year ending June 30, 1913, the same region produced 6,483,000 carats of diamonds, an increase of 840,770 carats. The amount paid by the purchasers for the diamonds marketed in 1912 to 1913 was £13,400,000 against but £10,169,000 in 1911–12, a difference of £3,231,000, showing that considerably higher prices were realized in addition to the larger quantity; the augmentation of value for the De Beers product was set by the chairman at 10 per cent. He makes a strong appeal to the producers of the smaller diamonds so profusely marketed during the past year, to exercise a salutary self-control and not to overstock the market with this inferior class of goods and risk a consequent disturbance of prices, which might work great injury to them, for as surface deposits become exhausted and deep mining becomes necessary the cost of production is greatly increased, and hence the producers of small diamonds would be in a very disadvantageous position were the prices for this inferior class of stones not maintained. The conservative policy of the De Beers Co. is strikingly exemplified by the fact that since 1908 the De Beers mine has not been worked, although as good a profit could have been realized here as in some of the other mines exploited by the company.

The financial operations of the De Beers Consolidated Mines, Ltd., for the 12 months ending June 30, 1913, show a distinct and marked advance as compared with those of previous years.[1] The receipts from diamonds sold, plus the increase of stocks at cost value, amounted to £6,297,782; and the total resources of the company for the year amounted to £7,248,239. Mining expenses were £2,080,622, for depreciations £706,035 was deducted, £235,932 represented interest and sinking-fund charges, and the Mining Profits Tax of the Union of South Africa absorbed £426,465 more. After deducting all these sums there remained £3,799,184, out of which the preference shareholders received dividends amounting to £800,000 and the deferred shareholders dividends of £1,500,000 and a bonus of £250,000. This was 20 per cent. on preference stock and 35 per cent. on deferred stock. To the General Reserve Fund £140,060 was credited. Diamonds unsold, at cost value, constituted a "Suspense Profit" of £595,601. As a result of the liberal dividends (amounting in all to

[1] Report of the DeBeers Consolidated Mines, Ltd., Alphaeus J. Williams, Manager.

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£2,255,000), etc., the balance carried forward to next year is £513,521 against £1,042,399 brought forward from the previous year. However, the chairman of the company calls attention to the fact that last year's balance included £471,000 of unsold diamonds, while in this year's statement this item constitutes a special "Suspense Profit," amounting to £595,601, as we have noted; there would thus be an apparent increase of £66,000 over last year.

The average yields of the different mines, as well as the value per carat of the diamonds produced and the value per load of the blue ground extracted were as follows, the data for 1911 and 1912 being added for comparison:

De Beers and Kimberley.	1911.	1912.	1913.
Average yield in carats	0.28	0.31	0.29
Value per carat	51s. 6.29d.	53s. 11.47d.	67s. 3.74d.
Value per load	14s. 5.12d.	16s. 8.716d.	19s. 6.24d.
Wesselton Mine:			
Average yield in carats	0.27	0.29	0.27
Value per carat	37s. 9.6d.	45s. 3.12d.	51s. 2.88d.
Value per load	10s. 2.47d.	13s. 1.504d.	13s. 10.02d.
Bultfontein Mine:			
Average yield in carats	0.38	0.41	0.42
Value per carat	35s. 0.52d.	40s. 8.243d.	45s. 9.29d.
Value per load	13s. 3.79d.	16s. 8.179d.	19s. 2.70d.
Dutoitspan Mine:			
Average yield in carats	0.21	0.23	0.23
Value per carat	73s. 6.5d.	83s. 0.132d.	93s. 0.45d.
Value per load	15s. 5.325d.	19s. 1.11d.	21s. 4.78d.

As will be noted, the yield has remained essentially unchanged, which is a good augury for the future of these mines, especially as the constant progressive increase in the value of diamonds makes the profit greater each year. This will be rendered more apparent by the following data:

DE BEERS AND KIMBERLEY MINES.

	Cost of Production per Load.	Value per Load.	Profit per Load.
1911	8s. 7.67d.	14s. 5.12d.	5s. 9.45d.
1912	13s. 6.78d.	16s. 8.716d.	3s. 1.936d.
1913	11s. 0.67d.	19s. 6.24d.	8s. 5.57d.
	WESSELTON MINE.		
1911	4s. 9.09d.	10s. 2.47d.	5s. 5.38d.
1912	4s. 7.576d.	13s. 1.504d.	8s. 5.928d.
1913	4s. 4.45d.	13s. 10.02d.	9s. 5.57d.
	BULTFONTEIN MINE.		
1911	3s. 11.45d.	13s. 3.79d.	9s. 4.34d.
1912	3s. 11.357d.	16s. 8.179d.	12s. 8.822d.
1913	4s. 1.28d.	19s. 2.7d.	15s. 1.42d.
	DUTOITSPAN MINE.		
1911	4s. 7.09d.	15s. 5.325d.	10s. 10.235d.
1912	3s. 10.665d.	19s. 1.11d.	15s. 2.445d.
1913	4s. 2.09d.	21s. 4.78d.	17s. 2.69d.

The number of loads of blue ground hoisted, the number washed, the total number of carats of diamonds secured, the number of carats per 100 loads, and the selling price per carat for the different mines were as follows:

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DE BEERS AND KIMBERLEY MINES.

	Loads of Blue Ground Hoisted.	Loads of Blue Ground Washed.	Carats of Diamonds Found.	Yield per 100 Loads.	Selling Value per Carat.
1911	445,169	1,230,491	350,662 1/2	28	51s. 6.29d.
1912	323,621	378,614	119,013	31	53s. 11.47d.
1913	351,347	419,881	120,514 3/4	29	67s. 3.74d.
WESSELTON MINE.					
1911	2,422,487	1,423,117	390,192 1/2	27	37s. 9.6d.
1912	2,573,398	2,020,291	581,973 1/2	29	45s. 3.12d.
1913	2,226,157	2,143,232	576,458	27	51s. 2.88d.
BULTFONTEIN MINE.					
1911	2,457,412	1,866,212	700,398 3/4	38	35s. 0.52d.
1912	2,334,720	2,025,450	834,760 1/2	41	40s. 8.24d.
1913	2,313,477	2,096,378	874,430 1/4	42	45s. 9.29d.
DUTOITSPAN MINE.					
1911	2,780,070	2,335,240	482,971 1/2	21	73s. 6.5d.
1912	2,718,703	1,845,796	428,213 1/2	23	83s. 0.132d.
1913	2,491,235	2,330,234	540,033	23	93s. 0.45d.
GRAND TOTALS FOR ALL MINES.					
1911	8,105,138	6,855,060	1,924,225 1/4	.....	.....
1912	7,950,442	6,270,151	1,963,960 1/2	.....	.....
1913	7,382,216	6,989,725	2,111,436	.....	.....

The careful exploitation of these mines is strikingly exemplified by the results of their working, the production of diamond material being fairly constant; indeed the increase in the past year might be accounted for by an expectation of the exceptional demand sure to come from the United States immediately prior to the establishment of the new tariff rates which a changed administration would be almost certain to impose.

The blue ground in sight in the different mines on June 30, 1913, is given as follows:

Mines.	Loads.
De Beers	2,750,000
Kimberley	2,000,000
Wesselton	18,000,000
Bultfontein	12,000,000
Dutoitspan	15,000,000
	49,750,000

Estimating the value of this according to actual working results in each one of these mines the following would be the *profits* to be realized from this blue ground in each mine, deducting cost of hoisting and washing from the selling price, the figures for 1913 being used.

De Beers } Kimberley }	£1,900,000
Wesselton	8,517,750
Bultfontein	9,071,000
Dutoitspan	12,918,215
	£32,406,965

At $4.87 for the pound sterling this would be $157,810,191.55. It of course only represents a fraction of the potential resources of these mines.

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The depths of the various shafts in the mines on June 30, 1913, were:

De Beers:	
Rock shaft	2466 ft.
No. 1 shaft	1670 ft.
Kimberley:	
Main rock shaft	3601 ft.
Atkins shaft	1009 ft.
Wesselton:	
No. 1 main rock shaft	1119 ft.
No. 2 main rock shaft	1425 ft.
Bultfontein:	
No. 1 main rock shaft	1383 ft.
No. 2 main rock shaft	768 ft.

In Wesselton mine, main rock shaft No. 2 was sunk 437 ft. during the year, and the depth of main rock shaft No. 1 in the Bultfontein mine was increased by 383 ft. during the same period; the depths of the other shafts remain as before.

The Premier mine was profitably and actively worked during the year ending October 31, 1913, as appears from the statements in the Eleventh Annual Report issued on that date. The total production of diamonds for this period reached 2,107,983 carats, the greatest quantity ever extracted from this mine in a single year, and an increase of 115,509 carats over the figures for 1912. The higher price of diamonds enabled the company to obtain £2,336,828 for the year's output, being £331,885 more than in 1912. After the deduction of mining expenses, totaling £1,197,597 and of £136,133 for office expenses, etc., there was left a balance of £1,003,098 to be carried to Expenditure and Revenue Account. The sum of £402,806, suspended profit on October 31, 1912, added to this, gave £1,405,904, of which £461,802 represents diamond stock still unrealized, leaving £944,102 immediately available. Of this, £98,079 was assigned to general equipment, and of the balance, £846,023, treated as realized profits, 60 per cent. (£507,614) went to the Government of the Union of South Africa, leaving £338,409 (40 per cent.) as the shareholders' portion.

This sum added to a previous balance of £100,118 and to £78,040 of sundry revenue made £516,567 for the Shareholders' Appropriation Account, out of which £100,000 was paid on the Preferred Stock in two semi-annual dividends of 125 per cent. each, and £300,000 on the Deferred Shares, in two dividends of 350 per cent. and 400 per cent. respectively, or 750 per cent. for the year. The balance to be carried over to the ensuing year was £116,567.

A fairly regular progressive increase in the profit realized on the blue ground taken from the Premier mine during the past 5 years is shown by the following figures, in each case for the year ending October 31:

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	Yield in Carats per Load.	Value per Load.	Cost of Production per Load.	Profit per Load.
1909	0.249	3s. 1.43d.	1s. 11.42d.	1s. 2.01d.
1910	0.230	3s. 2.49d.	2s. 0.56d.	1s. 1.93d.
1911	0.213	3s. 5.34d.	2s. 2.02d.	1s. 3.32d.
1912	0.205	4s. 1.57d.	2s. 4.79d.	1s. 8.78d.
1913	0.202	4s. 5.74d.	2s. 6.67d.	1s. 11.07d.

This shows that in spite of a constantly though slowly decreasing yield of diamond material per load, and a slight increase of production cost from year to year, the profit per load is more than nine pence greater in 1913 than it was in 1909, equivalent to over £390,000 on the number of loads washed.

During the past year 10,434,680 loads were washed and, as we have stated, 2,107,983 carats of diamonds were recovered. The 310-ft. level was opened up and worked to some extent, but there is still available above this level approximately 25,000,000 loads of blue ground. Such is the size of this mine that the large amount of material extracted in 1913 deepened it only 31 ft., and the strong quartzite composition of the sides of the mine seems to insure open-cast working for many years to come.

The cost of production will probably be materially reduced in the coming year by the continuous use of the newly installed machine drills and other mechanical appliances. The power needed for the operation of the drills was not available before July, 1913, and the change renders possible a saving of 2000 native laborers. While the average cost of production per load for the year was, as we have seen, 2s. 6.67d., the average cost for the 4 months, July to October, since the new drills have been in operation, is but 2s. 1.54d. Indeed, the Chairman asserts that the trifling increase in cost this year over last year is principally due to the liberal allotment by the company of £85,000 to start a Pension Fund for its employees. Besides this initial gift the company agrees to give £4 for every £1 given by the employees themselves toward the maintenance of the fund.

	No. of Loads Washed.	No. of Carats of Diamonds Found.	Value of Diamonds.
1909	7,517,793	1,872,136 1/2	£1,172,378 7s. 2d.
1910	9,331,882	2,145,832 3/4	1,496,641 5 5
1911	8,325,272	1,774,206	1,433,970 6 9
1912	9,707,098	1,992,474	2,004,943 3 5
1913	10,434,680	2,107,983	2,336,828 15 1
Total	43,316,725	9,892,632 1/4	£8,444,761 17s. 10d.
1903–1908	21,990,251	6,563,071 3/4	6,515,242 13 9
Grand total	65,306,976	16,455,704	£14,960,004 11s. 7d.

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The number of loads washed, the number of carats of diamonds recovered and the value of these diamonds are here given for the 5 years (ending October 31) 1909–1913, and from the commencement of work in the mine in 1903:

While the daily average number of loads hauled was 35,462, on a single day, May 19, 1913, as many as 47,098 loads were hauled. The record 6-day week for the year registered the hauling of 242,660 loads; the figures for the record month, July, 1913, passing the million mark by 77,216 loads.

The temporary chairman, Mr. Imroth, in his address to the Board of Directors at the General Meeting held February 13, 1914, in Johannesburg, does not hesitate to express his views very strongly on the advisability, or rather the necessity, of concerted action on the part of all the African diamond interests, if the diamond market is to be consistently sustained and preserved from demoralizing variations in price. He regards the African diamantiferous deposits as "a national asset," and believes that if properly conserved, the world's continually, though perhaps irregularly, increasing demand for this supreme article of luxury will render this asset permanently valuable.

The alluvial diamond deposits of the southwestern Transvaal were profitably worked during 1913, the value of the product for the first 6 months of the year being £278,410 while for the whole of 1911 the output was only £200,000. Although the diggings, taken as a whole, have been so profitable, out of the very large number of individual diggers but a few have been favored by fortune. Areas rich in diamonds occur only here and there, and are often soon exhausted. As a result of the great uncertainties of this kind of mining, a large part of those attracted to this region have been forced to abandon the undertaking, and in several cases those who had been lucky enough to realize satisfactory profits have lost all that they had gained, by investing in new areas which turned out badly; this was more especially the case at Mooifontein, where the richest deposits seem to have been exhausted. Bloemhof, on the other hand, has been more productive, individual diggings in this region having registered a larger output than any others of the southwestern Transvaal. Koppiesvlei Farm, London, and the Eastleigh area follow in point of productivity. The output for June, 1913, will illustrate the relative positions of these areas:

	Carats.	Values.
Bloemhof	1585	£8386
Koppiesvlei	1130 1/4	7176
London	716 1/4	4622
Eastleigh	505 1/4	3611

Other diggings, twenty-nine in number, show returns ranging from 391 1/2 carats of diamonds worth £2479 down to only 1/2 carat worth

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£2. The total output for the month was 7252 1/8 carats valued at £43,736. The average carat value of these alluvial diamonds is quite high, being over £6. Bloemhof produced a diamond weighing 32 1/2 carats and valued at £390, a stone of the same weight, valued at £245, was credited to Avondster, and a 24 1/4-carat stone from Panfontein was worth £360. The largest single diamond found came from Koppiesvlei; this weighed 64 1/2 carats and was priced at £430, a very low valuation, indicating that the crystal was not of especially good quality.

The farm Koppiesfontein and a comparatively new district, Schweizer-Reneke, are regarded as very promising; among the first diamonds found in the first-named field was one of 30 carats, and a local syndicate with a capital of £16,000 has been organized for the acquisition of lands in the Schneizer Reneke district.[1]

In the Klerksdorp district of the Transvaal, at De Beers Rush, the finding of a stretch of diamantiferous soil is reported. One stone of 10 1/2 carats has been recovered here and many other smaller ones from 2 1/2 carats down were taken from the wash, which gives good promise of proving profitably workable. Around Bloemhof there are said to be considerable areas of diamond-bearing ground as yet undisturbed.

Two large diamonds have recently been found in the South African alluvial deposits, one of these, of an amber hue and weighing 178 1/2 carats, came from Droegeveld. The finder brought it to London for sale, but not being able to secure his price, he boldly decided to take his chances in having it cut in Amsterdam on his own account. The result is a brilliant of good appearance, weighing 60 carats, the loss in weight being about that usually expected. The other alluvial diamond is somewhat larger; it comes from the Pniel diggings and weighs over 229 carats. The crystal is of octahedral form and is slightly yellowish in hue. The price realized for it was £2300. A considerable influx of diggers to this locality is certain to follow the reception of the news of this lucky find.

A small number of diamonds are exported from British Rhodesia (both southern and northern), the value of these exports for 1911 being $5518, while the figures for 1912, $9981, indicate a considerable increase in quantity, even allowing for the higher price of diamonds.[2]

The diamond industry in German Southwest Africa has been both regulated and stimulated by the reform in the matter of taxation instituted at the end of 1912. Before this time, from 46 1/6 per cent. to 55 11/12 per cent. of the gross value of the diamonds produced was claimed by the Government, and to this must be added a further charge of 5 per cent. by the monopoly controlling the sale of the diamonds. Thus only

[1] *So. Afr. Min. Jour.*, July 26, 1913, pp. 568–570.
[2] *Daily Consular and Trade Reports*, June 28, 1913.

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the very productive diamond fields could be worked with any possible chance of profit, as in other cases the expenses of production plus the tax would leave no margin of profit, or might even mean a considerable loss. Indeed, a single diamond-mining company is stated to have closed its operations for 1911 with a deficit, after having paid 1,000,000 marks in taxes. The amended ordinance was passed Dec. 30, 1912, and provides for a tax of 66 per cent. on the gross value of the diamonds *less* 70 per cent. of the cost of production. By this means, the percentage of net profits taken by the Government diminishes in proportion to the relative reduction of these profits, and should the cost of production mount as high as 95 per cent. of the selling price, no tax would be imposed, and the remaining 5 per cent. could at least be regarded as clear profit. As, however, this new measure, while favoring those who work the poorer fields, would operate to raise the impost upon the product of the richer fields, the individual companies have been accorded the privilege of choosing which of the two systems should be applied in any particular case.[1]

Another drawback to more active diamond-mining in the German Protectorate was the exceptional scarcity of labor that prevailed in 1912. From Ovambaland, the chief source of supply, but 2346 laborers could be obtained in that year, while 4232 was the complement required. The long and arduous journey to the mines on the one hand, and especially good harvests in this region on the other hand, were conditions conspiring to reduce the available supply of native workers. To obviate the first-mentioned and persistent obstacle, the Chamber of Mines has proposed the construction of a railway line connecting Otjivarongo with Ovambaland and the occupation and administration of this latter region so as to ensure the maintenance of law and order there. So far, however, the measures taken can only be looked upon as palliatives, and efforts to get laborers from India and China, or from any of the German colonies, have been unsuccessful. Still the situation has been improved to a certain extent by the reduction in taxes, this having made it possible for the mine-owners to pay wages high enough to procure a supply of colored laborers from the Cape.[2]

The diamond monopoly as heretofore existing has been modified by the provision that the mine-owners shall be permitted to buy and hold stock in the monopoly, new shares having been issued for this purpose, thus giving the mining companies a direct voice in the matter of selling their product; it is expected that this will result in the encouragement of competitive buying. At the same time the charge of 5 per cent. formerly

[1] Diplomatic and Consular Reports [British] No. 5141, Annual Series, Germany. London, 1913, p. 11.
[2] *Idem.* p. 12.

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imposed has been reduced to 2 per cent. The burden of some of the diamond-miners has also been lightened by a sweeping reduction in the cost of claim licenses from 30 marks to 1 mark 50 pfennigs; this only affecting a few claims south of 26° S. Lat., but covering all claims north of that line.[1]

The introduction of these reforms, or the assurance that they were about to be introduced had an immediate effect on the local diamond-producing industry, the production for September, 1912, being 102,600 carats, while before this date the average figures were from 60,000 to 70,000 carats per month; this higher level has been since maintained. Part at least of the rapid and notable increase in September, 1912, was due to the regular working of the Pomona mine, where the settlement of a dispute as to the ownership of the fields inaugurated a period of active exploitation. It is in the vicinity of Pomona that the largest German diamonds have been found, the largest stone that has been met with up to date in these fields being a crystal weighing between 33 and 34 carats found just beyond the Pomona boundary. This stone, which is of excellent color, appears to be part of a larger crystal.[2] The following figures give the annual production of these fields and the value of the product in marks.[3]

	Carats.	Value in Marks.
1908	39,375	51,180
1909	483,268	15,435,522
1910	867,296	26,860,074
1911	747,152	23,034,148
1912 (9 mos.)	629,130	19,399,000
(3 mos. approx.)	363,250	

This would give a total of about 1,000,000 carats for 1912. The most accurate and definite figures are those furnished in the reports of the diamond monopoly ("Diamant Regie"). According to the report for the year ending Feb. 28, 1913, the weight of diamonds sold by the monopoly was 902,157 carats against 816,296 in the previous year, the amount realized being 26,490,000 marks; the corresponding figures for the year 1911–1912 were 20,898,000 marks. At the same time there was an increase in the carat value of the material from 25 marks 6 pf. in 1911–1912 to 29 marks 3 pf. in 1912–1913. The increase in the average size of the diamonds was a main factor in producing the higher price, and was due to the generally larger size of the diamonds from the Pomona district.

Recent investigations have shown that the depth of the diamantiferous gravel is much greater at some points than was heretofore believed, and in soft calcareous stone deposited in the gneiss bed-rock a few diamonds have been found. In some cases the diamond-bearing gravel is

[1] Diplomatic and Consular Reports [British] No. 5141, Annual Series, Germany, London, 1913, pp. 12, 13.
[2] *Idem*, p. 15.
[3] *Idem.*, p. 14.

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buried beneath a superincumbent layer of gravel not containing diamond material, and the profitable working of such areas is something of a problem under present conditions. The hoped-for discoveries in the Gibeon district have not been realized.[1]

The Colonial Mining Co., Ltd., operates over a territory having a total area of 7305 hectares, divided into a northern and a southern complex. In 1913, 1721 persons were employed by the company (163 whites and 1558 African natives), in their own immediate fields and in those of the Diamant-Pacht-Gesellschaft, a company which secured a lease of the German fiscal diamond claims. In 1913, the Colonial Co. took from all their fields 450,827 carats of diamonds. In 1912, the production was somewhat greater, amounting to 527,223 carats, which sold for 14,610,360 marks, and gave, after deducting working expenses, taxes and export dues, net profits of 4,382,493 marks, of which sum 428,953 marks goes to the credit of the Diamant-Pacht-Gesellschaft.[2]

Another important company the Colmanskop Diamond Mines, Ltd., is an English corporation, having its seat in Capetown. This was the first company in this region to install machinery in all parts of its field, thus ensuring a more systematic and productive exploitation. In 1914 the exclusive employment of electricity as the motive power is contemplated, so as to fully utilize the already existing electrical plant. The production here for 1913 was 106,878 3/4 carats, as compared with 122,525 carats in 1912, and 147,234 3/4 carats in 1911, the considerable decrease in 1913 being due in great part to the difficulty experienced in obtaining the services of native laborers. Still, owing to the higher price of diamonds, the financial returns were not reduced. The dividends paid by this company on its shares have fluctuated notably since its foundation, the exact figures being as follows: 1909, 55 per cent., 1910, 45 per cent.; 1911, 22.5 per cent.; 1912, 30 per cent.; 1913, 30 per cent. For 1914, the company's activity is seriously menaced by the smallness of the share of the officially restricted output that has been allotted to it, so that the director does not express himself very confidently as to the operations here for the present.[3]

The German Diamond Co., Ltd., controls 35,694 hectares. The company has systematically pursued investigations as to the origin of the diamonds, and although it has not been possible to attain definite results in this research, the investigation has contributed much valuable information to the study of the matter. The diamond production of this company, since operations began in 1909, is as follows:

[1] Diplomatic and Consular Reports [British] No. 5141, Annual Series, Germany, London, 1913, p. 15.
[2] "Die deutschen Diamanten und ihre Gewinnung," eine Erinnerungsschrift zur Landesausstellung Windhuk, 1914, pp. 42–48.
[3] *Ibid.*, pp. 49–57.

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Years.	Carats of Diamonds.
1909	69,207
1910	135,038
1911	130,291
1912	158,158
1913	172,710
Total	665,404

The number of workers has steadily increased, from 233 in 1909 to 1209 in 1913 (92 whites and 1117 African natives).

While the amount realized for the diamond output of the company was considerable, so large a share was absorbed by working expenses and taxes, etc., that the net results were not very satisfactory:

	Gross Returns in Marks.	Net Returns in Marks.
1909	2,779,283	456,405
1910	4,278,770	115,837
1911	3,936,350	−112,387[1]
1912	5,045,664	648,675
Total	16,040,067	1,108,530

From this total of net returns must further be deducted the sum of 114,077 marks, constituting an additional impost provided in an agreement of May 7, 1910. Thus the actual net returns for the 4 years 1909–1912, really amounted to a trifle less than a million marks, or only 6 1/4 per cent. of the gross receipts for the period in question.[2]

The second year's business of the Pomona Co. has been quite satisfactory. Of 617,038 carats of diamonds produced, 512,383 carats have been disposed of, realizing $6,770,775; after deducting taxes and expenses, $4,795,600 remains for net profits. The selling price, $13.20 per carat, as compared with $10.50 per carat for the previous year, makes a good showing, due in part to the higher value of diamonds and in part to the larger average size of the stones, this having been 23/64 carat in 1913 against 18/64 carat in 1912. Of the total product 104,872 carats remain unsold and will be credited in the next statement at cost price. It is expected that a dividend of 175 per cent. will be declared by the company on the year's business, although the expenses were increased by $1,125,000 because of the higher net tax. Probably the current year will not make as favorable a showing, as the enforced reduction in sales cannot be offset by a corresponding decrease in expenses.

The last assignment of German Southwest African diamonds was made to the London Diamond Syndicate, instead of to the Antwerp Syndicate which has handled these diamonds heretofore. This action signalizes an important change in the policy of the German Diamond Regie, and carries out the now prevailing desire to insure such a control of the diamond market, more especially in the case of the smaller stones,

[1] Deficit.
[2] "Die deutschen Diamanten und ihre Gewinnung;" eine Erinnerungsschrift zur Landesausstellung Windhuk, 1914, pp. 70–77.

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that prices will be steadied and competition of an undesirable kind eliminated as far as possible. All who are familiar with the normal course of business know that while competition within certain reasonable limits is rather to be invited than avoided, any competition arising from inability or unwillingness to retain a product until it can be absorbed by a normal demand is certain to cause temporary, and perhaps even to occasion permanent injury to the trade in the commodity in question.

The accumulative sales of diamonds taken from the shores of German Southwest Africa for 1913 amounted to 900,000 carats and brought in $5,000,000.

The German Colonial Office has decreed a notable restriction of the Southwest African diamond output, cutting this down by about one-third. For 1914, the production is to be limited to 1,038,000 carats, apportioned as follows among the different companies:

Company.	Carats.
Colonial Mining Pomona	350,000
Colonial Mining Co., Ltd	245,000
Diamond Lease Co	109,000
German Diamond Co., Ltd	118,500
Kolmanskop	89,500
United Diamond Mines, Lüderitsbucht	50,000
Weiss de Meillon	18,500
Various smaller companies	57,500
	1,038,000

This course is to be followed in succeeding years, the permissible production being determined each year according to the generally prevailing market conditions. To each company is given the privilege of partially or entirely transferring its right of production to any other company, the essential point with the German administration being a curtailment and regulation of the total output, its distribution among the different mining concerns being a matter of indifference.[1]

In a recently published study of the geological conditions of the Lüderitzbucht diamond fields, Dr. H. Lotz, after passing in review various theories that have been advanced to explain their source, finds himself obliged to confess that the problem is still unsolved. The fact that the diamonds here are almost always associated with agate pebbles is taken to indicate a common origin. They both frequently occur in marine deposits of Tertiary age, on extensive terraces not far above sea-level. In this connection it may be mentioned that careful observations have revealed that the entire coast is gradually rising. The theory formerly maintained, that the diamonds came from cretaceous sediments, is regarded as lacking sufficient proof; the fossils belong to the Miocene period.[2]

[1] *The Jewelers' Circular Weekly*, Jan. 21, 1914, p. 57.
[2] H. Lotz, J. Böhm and W. Weissermel, "Geologische und paläontologische Beiträge zur Kenntniss der Lüderitsbuchter Diamantablagerungen," *Beiträge zur geologischen Erforschung der deutschen Schutzgebiete*, Part V, Berlin, 1913.

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A productive and promising diamond field is now being worked in the Belgian Congo, by the "Société Internationale Forestière et Minière du Congo," a Belgian-American corporation in which Thomas F. Ryan and Guggenheim Bros. are prominently interested. To this company has been accorded the right to work a large alluvial diamond field in the southwestern part of the Belgian Congo, this field embracing the middle reaches of the Kassai river, and its chief western affluents including the Tshikapa and the Longatchimo. Diamonds were already discovered here in 1907, but effective prospecting was hindered by the hostile attitude of some of the native tribes of the region. In 1911, however, prospecting was resumed, and by June, 1913, active mining work was in progress, though only rude mechanical appliances were used. Nevertheless, during the last 6 months of 1913 about 15,000 carats of diamonds were obtained, and it is confidently expected that the returns for 1914 will be considerably greater. Although the stones are generally quite small, averaging scarcely more than 1/10 carat in weight, they are of excellent quality; the largest so far found weighs 15 carats.

Up to the present time mining operations have been confined to the gravels of small streams or to so-called "pay channels" in terraces along the larger rivers, but ancient and elevated terraces are also known to be diamantiferous, and presumably also a conglomerate horizon in the Jura Triassic sandstones, which in this country overlie unconformably certain supposed pre-Columbian schists and granitoid rocks. The discovery and partial exploitation of some pipes, apparently of kimberlite, is reported from the Katanga region. A few diamonds have been obtained in this way as well as from alluvial deposits in two other localities in the Katanga. Three or more of the gold placers in the northwestern part of the Congo have also yielded diamonds.[1]

The first public sale of Congo diamonds was held in Brussels at the beginning of this year (1914). As many as thirty firms of dealers were represented. Diamonds from the Kassai to the weight of 6795 carats were offered and this entire consignment, the property of the Société Internationale Forestière et Minière du Congo, was acquired by a single purchaser for the sum of 203,985 francs, equivalent to 30 francs per carat.

The extent of the territory in the Belgian Congo controlled by the Belgian-American Co. is very considerable, embracing 10,570 square miles. In addition to diamonds, gold, platinum, silver, copper, iron, petroleum, bitumen and sulphur are to be found here. The services of fifteen American engineers and prospectors are being utilized for the dia-

[1] This information in regard to Congo diamonds has been courteously communicated to the writer by Dr. S. N. Ball.

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mond mining and development, and the eventual success of the undertaking will be much favored if the Belgian Government intends to waive its right to control the exportation and sale of the diamonds as has been reported. In view of the likelihood that similar deposits are to be met with across the Portuguese frontier in Angola, an affiliated company has been founded in Lisbon, with a capital of $289,500. This Portuguese branch company is called the "Companhia de Pesquisas Mineiras em Angola."[1]

The discovery of diamonds in the gravels of Mutendele creek in 1907 and, some 95 miles away, of "pipes" of kimberlite traversing the Kundulungu (Permo-carboniferous) red sandstone, was made through the efforts of the Kundulungu-Luabala Co., organized for diamond prospecting in the Katanga region of the Belgian Congo. The largest of the "pipes," that at Luanza, was tested to a small extent in 1912, and stones said to equal in quality those of the German Southwest African deposits were obtained. These kimberlite pipes are asserted to be quite similar to those of South Africa. That at Luanza is of elliptical form, measuring 300 meters and 500 meters along its minor and major axis respectively. Pits sunk here, after passing through from 3 to 6 1/2 ft. of clay with quartz pebbles, and from 6 to 20 ft. of detrital or alluvial clay, encounter a "yellow ground," consisting of chromite, amphibole, olivine, garnet (almandine or spessartine), and quartz. It has been suggested that the amphibole (not present at Kimberley) may be an erroneous determination of a pyroxene (omphacite). Only a much more consecutive and extensive exploitation than has as yet been even attempted will show whether these kimberlite formations contain diamonds in sufficient quantity to make mining operations financially successful. Alluvial deposits, a few of which yield enough diamonds to make fair returns to the diggers, are to be found in the southwestern part of the Belgian Congo.[2]

Asia.—In India, diamond mining has long been practically abandoned, although now and again the incidental finding of a fine stone is reported. Recent statistical returns published by the Government of India give the total annual diamond output as only 150 carats. An attempt was made some 20 years ago to open up the old Parteal mine, whence the famous Regent Diamond is said to have come. The operations were conducted by the Deccan Mining Co., a corporation to which the Nizam of Hyderabad accorded a concession covering all mining operations in his territory. Machinery of the South African type was installed and work was carried on more or less actively for 10 years, the old diggings being

[1] Ross J. Hazeltine, *Daily Consular and Trade Reports*, October 8, 1913, p. 159.
[2] "Discovery of Diamonds," *Mining and Science*, April 19, 1913.

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favored, as they were found to be more remunerative than new ones experimentally tested here and there. The enterprise was not substantially successful and the work was finally abandoned, the machinery being taken away.[1]

Australia.—The Copeton diamond workings in Australia are said to be carried on quite actively at present, a result favored by the increased value of diamonds and also by the profit realizable from a sale of the tin oxide inclusions in the diamantiferous deposits. The statement has been made that these Australian diamonds, which closely resemble those from Brazil, are to a considerable extent sold as products of that country.[2]

The largest gem diamond from the Copeton field is stated to have weighed over 6 carats; as a rule, however, the diamonds are small, averaging perhaps three to the carat. From the detritus of the Round Mount mine, 120 diamonds are said to have been taken in a single week toward the end of 1913. These were sold at the rate of 22s. 6d. per carat, a price indicating that the stones were of good average quality.[3]

A test of the value of the diamond wash in the Alfredomia mine, one of those in the Copeton district, Australia, was recently made by a representative of the Australische Diamant Syndicaat of Amsterdam and Antwerp. From 200 loads of wash-dirt that were treated in a rotary puddling-machine, diamonds to the number of 770 were secured, their total weight being 177 carats. Here, as elsewhere in these Copeton fields, the tin oxide recoverable from the alluvial detritus constitutes a considerable addition to the profits of the operations.[4]

Europe.—The discovery of microscopic diamonds in France has recently been reported. They are said to have been found in a deposit of "blue-ground" resembling that of South Africa, this appearing in the midst of decomposed graphitic schists. The locality is between Bellac (Haute-Vienne) and Confolens (Charente).[5]

North America.—The first really effective attempt to work one of the diamond areas of Arkansas was made in 1913, when the Ozark Mining Co., which had put up a first-class washing plant with a capacity of 100 loads for a 10-hr. day, was operated for about 3 months in washing kimberlite from the first "pipe" discovered in this region. Some 5000 loads are said to have been washed, but unfortunately no definite report as to the number and weight of the diamonds recovered is accessible. Seven or eight hundred stones are said to have been found; it is readily apparent that if the average weight was a half-carat, or

[1] Charles S. Grossman, "Golconda and the Golconda Mines," *Jewelers' Circular Weekly*, March 11, 1914, pp. 59, 61.
[2] *Austral. Min. Stand.*, Dec. 3, 1913. *Eng. Min. Jour.*, Feb 14, 1914, p. 381.
[3] *Austral. Min. Stand.*, Dec. 4, 1913.
[4] *Austral. Min. Stand.*, Feb. 6, 1913.
[5] *Echo des Mines.*

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perhaps even as low as a quarter-carat, the returns per load washed would be very small. The excavations made in bringing out the material rendered it possible to form the opinion that the kimberlite is deeper than was supposed at the outset. The Kimberlite Diamond Mining and Washing Co. has erected a small plant on Prairie creek, and has made tests of its capacity; eventually it will treat from 50 to 100 loads per day. While no work is reported as having been done by the Arkansas Diamond Co. during 1913, greater activity is looked for in 1914 as a result of a reorganization of this company. To facilitate the distribution of its expected products, the Kimberlite Diamond Mining and Washing Co. has built a mile of tram line from the mine to the mill.[1]

An occurrence of microscopic diamonds in Ontario, in connection with chrome iron ore, in a basic, peridotitic rock, weathering easily to serpentine, and closely resembling that whence came the similar diamonds from Olivine Mountain, British Columbia, has been recently reported by Dr. W. G. Miller, Provincial Geologist of Ontario. A sample from Reaume township, about 20 miles north of Porcupine Lake, was submitted by him for examination to Mr. R. A. A. Johnston of the Geological Survey, Ottawa, and numerous very minute microscopical diamonds were found therein. The existence of diamonds in Ontario has long been postulated, from the apparently good evidence furnished by a few that have been found in the glacial drift of Wisconsin; unfortunately, however, the exceedingly minute particles now discovered, though undoubtedly diamonds, have absolutely no commercial value, and do not afford any indication of the presence of larger crystals. Hence, while very interesting from a purely scientific viewpoint, we still have to wait for a discovery of valuable diamonds here or elsewhere in Canada.

South America.—If the project of the Governor of British Guiana, Sir Walter Egerton, for the construction of a railroad line extending from the coast to the Brazilian frontier, a distance of some 340 miles, should be successfully carried out, the diamond resources of this region will undoubtedly be much more effectively exploited than has heretofore been the case. As noted in our last report,[2] the total production of diamonds in British Guiana from April 1, 1900 to June 30, 1912 was 1,006,557 stones having a total weight of 74,203 carats (76,170 metric carats), giving an average of less than 0.08 of a metric carat for each diamond. Thus the stones recovered are prevailingly small; nevertheless the fact that the diamond exports for the year 1911–1912 were valued at $56,505, may be taken to indicate that under improved conditions this field would become a good producer.

[1] John T. Fuller, "The Arkansas Diamond Field in 1913," *Eng. Min. Jour.*, Sept. 13, 1913.
[2] MINERAL INDUSTRY, Vol. XXI, 1913.

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A diamond occurrence in Brazil, bearing a striking resemblance to those of South Africa, is presented by the Agua Suja diamond diggings in the upper reaches of the Bagagem valley, State of Minas Geraes. Here the conditions have been considered to indicate that we have to do with a local deposit, not with washings from distant points as in the greater number of the Brazilian diamond occurrences. While granite and schist constitute the rock of the surrounding country, the diamantiferous bed is here composed of a bouldery conglomerate, containing over 90 per cent. of basic igneous rocks, locally found intrusive in the granitic formations, the diamonds appearing in the greasy red clay cementing the boulders, this clay also containing pyrope garnet and perofskite in considerable quantity, some limonite and a little olivine. As the action of fluvial forces seems to be excluded in this small valley 400 ft. higher than the Bagagem river, the diamantiferous material is believed to have resulted from eruptive disintegration of basic igneous rocks, and the consequent intrusion of the diamonds and their associated minerals into the cementing substance. Hydrothermal action is believed to have been the determining cause of these deposits, which offer the closest analogy to the South African occurrence of diamonds in connection with a kimberlite pipe that has so far been noted in Brazil.[1]

From Brazil have come reports of a rather indefinite character to the effect that a revival of diamond exploitation there is about to be realized. The Paraguassa region is said to be the scene of considerable activity on the part of certain interests, the preliminary operations involving modification of river courses, draining of jungles and the planning or construction of hydraulic works. The stagnation of the diamond-mining industry in Brazil is attributed, in part at least, to the unduly high taxes imposed by the Government, and some relaxation in this respect is hoped for. Another drawback has been the somewhat lessening demand for carbonado, the form of diamond that has been chiefly exported from Brazil of recent years. A cause for this has been found in the increased utilization of improved steel for the equipment of drills for work where formerly carbonado was the material almost exclusively used.

Amber

The amber from the Palmnicken[2] deposits near Königsberg in east Prussia is found in a "blue ground" having in places a thickness of 7 meters. These deposits constitute the main source of the amber of

[1] David Draper, "Analogies between the diamond deposits of Brazil and South Africa," *Min. Mag.*, Dec., 1913, pp. 435, 436.

[2] Extraccion y preparacion del ambar amarillo en Palmnicken (Prusia); *Revista Minera*, Nov. 16, 1913, p. 552.

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commerce. The extraction is essentially a state monopoly, as a special authorization is requisite for the operation, although the state is not empowered to pursue mining operations on its own account without the consent of the proprietors of the field. The greater part of the material comes from the "Royal Amber Works" mine "Anna," situated some hundred meters from the Baltic coast. As the excavations are shallow, not exceeding 25 meters in depth, the "blue ground" can be taken out quite rapidly. The amber-contents of a cubic meter of the ground ranges from 10 to 18 kg. The ground on extraction is dumped from the cars into are ceptacle holding 150 cubic meters, the bottom having perforations through which the smaller particles can pass, only retaining the larger pieces of amber. The material is then successively passed through finer sieves so as to secure a graded series of the amber particles. The larger pieces of amber are washed for 10 hours with water and sand to remove adherent substances. The fragments of good quality measuring from 1 mm. to 12 mm. are utilized for the manufacture of pressed amber, and the poorer material is distilled to secure amber varnish, by-products being oil of amber and succinic acid. The industry gives employment to 1000 workers, male and female, in the mines, etc., and to 500 additional workers occupied in their homes in Königsberg and Palmnicken. The miners get about $1.25 per day, the average wages for all being, however, only about 80 cents a day.

Sales for 1911 are reported as follows:

	Kilograms.	Average price per Kilogram.
Raw amber	66,700	$5.77
Pressed amber	23,500	22.17
Colofonia	158,200	0.37
Acid	1,300	3.80
Oil	31,700	0.047

Various explanations have been offered to account for the progressive diminution in the amount of amber obtainable from the "blue ground." The average amber yield of a cartload of this soil has decreased from 739 grm. in 1900 to only 492 grm. in 1911, and mining operations covering 1 hectare of ground produced in 1900, 111,283 grm., while in 1911 the same area yielded but 73,430 grm. In some instances the supply is believed to have been diminished by the modified action of currents, another general cause being found in the gradual levelling of the coast so that the single pieces of amber are not so readily landed by the waves as was formerly the case.[1]

That the amber deposits of east Prussia are older than the "blue ground" in which they are found, is the opinion expressed by Dr. F.

[1] *Jewelers' Circular Weekly*, March 4, 1914, p. 51.

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Kaunhowen; the "blue ground" is assigned by him to the lower Oligocene age.[1]

Some good specimens of amber have been collected by fishermen on the Sicilian coast near the city of Catania. This material is believed to have originated ages ago from the hardened gum of trees along the banks of the Simeto river. The river carried down the gum to the sea and during and after stormy weather the amber is cast up on the beach. Some pieces of this amber show very interesting and pretty inclusions of insects, plant growths, etc.[2]

Emerald

Australian opals have for some time past been favored gems, and now there seems to be a possibility that a supply of fine emeralds may be provided by this flourishing British Colony. As has often been the case with gem-stones, the first emeralds here were found by prospectors in search of deposits of metal, the discovery having been made in 1909 at Poonah, in the Murchison gold field, in western Australia. These emeralds occur along a creek not far from some alluvial tin workings, where the stream had cut its way through a ridge of greenstone, and the green beryls were to be found scattered on the surface of this ridge. Most of the crystals are rather small, the largest reported being about an inch long and a half inch thick; they are evidently not *in situ* but the parent rock is thought to be not very far distant, judging from the comparative perfection of the crystalline faces. The prevailing opinion sees their source in the underlying mica schist, from which they are believed to have been first freed by weathering and then carried off by the action of rain and wind.[3]

The annual exploitation tax on the Emerald Mines of Colombia, amounting to $60,000, has been changed to an impost of 10 per cent. on the gross sales of the emeralds extracted.[4]

Garnet

A new bed of fine garnets of a dark puce color was found about 1906 in Ceylon, at Pellawella, in the Southern Province. A more important new discovery of precious stone material on this island is that of a deposit of exceedingly fine moonstones, having a blue and white sheen. This is a great piece of good fortune for the Ceylonese trade in this beautiful

[1] F. Kaunhowen, "Der Bernstein in Ostpreussen," *Jahrb. Kgl. Preuss. Geolog. Landesanstall*, XXXIV, Pt. II, Heft 1, pp. 1–80 (1913).
[2] Communicated by Robert Yates Barkley, American Vice Consul (in charge), Catania, Italy.
[3] *Min. Jour.*, March 29, 1913, p. 304.
[4] *Bulletin of the Pan-American Union*, XXXVI, 456 (1913).

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gem, as the older mines at Kandy and Wagawella are almost worked out. These Ceylonese moonstones are cut and polished at the great gem-cutting works at Idar, Germany.[1]

See also GARNET in the chapter on ABRASIVES.

JADE

The Burmese jadeite mines at Seik-moo and Hweka are said to have been worked with interruptions from 1790 to the present time, the Burmese Government having established a station for the handling of this product at Mogok in 1806. At one time, between 1831 and 1840, as many as 1400 workers are said to have been employed, and although the industry has suffered many setbacks since then, the establishment of the British protectorate in 1889 has given it a firmer basis.[2]

An enormous block of New Zealand jade (*punamu*, or "greenstone") said to weigh as much as 2 tons and measuring 7 ft. in length, 4 ft. in width and 3 ft. in height, has been transported to Germany via Sydney, Australia. The quarry of the New Zealand Greenstone Co., at Greymouth, New Zealand, is the source of this exceptionally large mass of jade, which has been valued at £700.

LAPIS-LAZULI

Deposits of lapis-lazuli are so rare in the United States that the discovery of this mineral in San Antonio Cañon, southern California, some twenty miles south of San Bernardino, is of interest, although the material to be collected is unfortunately of poor quality. Some years ago the existence of a blue rock was noted here, and tests made of specimens by John T. Reed, a chemist and assayer of San Bernardino, determined the presence of lapis-lazuli. More recently Prof. Lauterbach of the University of California and R. M. Wilke, a mineralogist of Palo Alto, Cal., while visiting San Antonio Cañon, picked up specimens of the blue rock. Toward the end of 1913 a systematic search for this deposit was instituted by Mr. Gordon Surr and two of his friends, but they were not successful in finding lapis-lazuli *in situ*, although loose pieces were collected from a stream bed in the immediate neighborhood of the spot which had been tested several years before. As we have noted, the material is of poor quality, and is described as being apparently "a dark-gray quartzite streaked with parallel, pale to deep blue bands, from an eighth to over half an inch wide; the blue material and the other parts of the rock show abundant fine grains of pyrite."[3]

[1] C. K. Moser, *Daily Consular and Trade Reports*, Aug. 14, 1913, p. 822.
[2] Maxwell K. Moorhead, *Daily Consular and Trade Reports*, May 13, 1914, pp. 845, 846.
[3] Gordon Surr, "Lapis-lazuli in Southern California," *Min. Eng. World*, Dec. 27, 1913, pp. 1153, 1154.

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Opal

A discovery of opal is reported from New Mexico. The deposit is situated about 12 miles to the eastward of Silver City, and is near the station Bayard on the Santa Rita branch of the Sante Fé Railroad. The opal supply has been obtained at slight depths or from the surface, and while the stones so far secured are of good quality, the belief is expressed that at greater depths finer material will be met with. The 25-ft. shaft that has been sunk traverses talc. The local conditions as to water supply, wood, etc., are good; opals from this source have been cut and mounted in Los Angeles, Cal.

Pearls

Pearls constituted 87 per cent. of the exports for 1911–1912 from the Bahrein Islands, but many of these had already been imported from the other fishing-banks of the Persian Gulf and were re-exported from Bahrein, which has largely taken the place formerly occupied by Bombay as a center of the pearl trade. There is stated to have been a recent local rise of from 30 to 40 per cent. in the price of pearls at Bahrein, and the assertion is also made that they now bring there nearly ten times the price that could be obtained for them 20 years ago. The value of the pearls sold finally in Bahrein in 1911–1912 and exported by the purchasers has been placed at 15,000,000 rupees ($4,875,000), the share of European merchants being some 4,000,000 rupees ($1,300,000), the remainder having been acquired by Arabs and Hindus for future re-sale in Bombay. This represented about half the value of the total exports, the other half being sent by local Arab dealers directly to Bombay for sale there. Representatives of a French firm, of a London firm and of a Bombay firm are stated to have operated in Bahrein during the year.[1]

The value of the imports of pearls to the Bahrein Islands from various countries during the years 1099-1910, 1910–1911, 1911–1912 were as follows. Rupees reduced to dollars (1 rupee = 32.5 cents).

Country.	1909–1910.	1910–1911.	1911–1912.
Turkish Austria	$162,500	$443,625	$1,300,000
Koweit	487,500	765,125	1,300,000
Katar	1,365,000	297,375	975,000
Persia	32,500	60,125	97,500
India	.....	97,500	59,637
Trucial Oman	.....	268,125	650,000
Total	$2,047,500	$1,931,875	$4,382,137

[1] Diplomatic and Consular Reports [British], No. 5052 Annual Series, Persian Gulf, London, 1913, p. 14.

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The value of the exports for the same period and the countries of destination were:

Country.	1909–1910.	1910–1911.	1911–1912.
India	$2,271,750	$4,450,875	$9,724,000
Persia	.....	23,725	.....
France	.....	52,000	.....
Total	$2,271,750	$4,526,600	$9,724,000

Pearls of considerable value continue to be found from time to time in the Australian pearl-fisheries, and although the fortunate diver often fails to get any just proportion of the true value of his pearl, he sometimes realizes a sum that means much to him. As an extreme instance of the unjust advantage taken of the diver by shrewd bargain-hunters, may be noted the case of a West Australian pearl which eventually sold for £10,000, but for which the original finder only received £10. However, not many of the Australian pearls are worth more than from £700 to £1,000.

The attempt to employ white divers for pearling on the Australian coast seems to have conclusively shown that they are unable to compete with Asiatics either in cheapness or efficiency. While an Asiatic is satisfied with wages of from $10 to $15 a month, to which is added a commission on the amount of shell raised, a white man will expect $70 a month, plus a similar commission, although the Asiatic will bring up between 4 and 5 tons' weight of shell in a year and the white man not more than a single ton in the same period. To this must be added the great difference in the cost of subsistence, this being three times as great for the white man as it is for the Asiatic. Moreover white men appear to be physically incapable of sustaining the shocks and strain of continuously repeated divings.

Persistant and successful efforts have been made to increase the numbers of the pearly fresh-water mussels whose shells supply the material for our very extensive button-making industry. The occasional finding of fresh-water gem-pearls in these mussels is a windfall thankfully welcomed by the lucky finder, but their chief and permanent value is for the industry in question. The well-equipped Government fish-culture station at Fairport, Iowa, has been a center of activity in this direction, field parties sent from there having operated locally at fifteen different places in the Mississippi valley, ten of these being on the Mississippi river. The work covered points in Iowa, Minnesota, Wisconsin, Illinois, Indiana and Arkansas. In all 150,000,000 young mussels were placed, 57,000,000 being placed in Lake Pepin and 25,000,000

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in the vicinity of Freeport. An extension of these operations to points on the Illinois river and to many lakes and streams in Minnesota, thus opening up new sources of supply for the button-making industry, has been suggested by an investigation of the conditions in those localities.[1]

The course of business during 1913 in the pearl-market was essentially the same as in the diamond-market, the activity of the greater part of the year being followed by a decided reaction toward its close. This comparative depression continued through January, 1914, but since then there has been a healthy recovery, due to the constant demand for pearls and to the gradual depletion of stocks. Paris houses note an active demand from Austria, Germany and Russia. There has been no decline in price from the high figures that have ruled for some time.

Sapphire

The Amakie sapphire deposits of Queensland, Australia, are of considerable extent, covering an area of some 30 square miles.[2] The "wash" in which the sapphire material is usually found is sometimes superficial, as in the valley bottom of the Black Soil claim, while in other places it is covered by an overburden of several feet, in which, however, gem-material is occasionally present. The sapphires are as a rule of low grade but sometimes large stones of fair quality are brought to light; two weighing 128 metric carats and 218 metric carats respectively have been found west of the Grave Hill washings. The Queensland claim alone has produced $43,000 worth of sapphire in the past 3 years; here the "wash" is 5 ft. thick and the average yield per load is 4 oz. of "blues." In the Renard claim, the richest in these fields, dark violet stones of large size have been found, ranging in weight up to 3 oz.; "fancy stones" of good size came from the Iguana Flat claim. Improved washing processes have been introduced of late years, rotary machines being used for sifting out the gem material. The total value of the production for 1912 was $192,000; the price is determined essentially by the German demand, the stones being cut in the German gem-cutting works and most of them sold in various parts of Russia. Average prices for the rough material have been quoted as follows:

"Fancy stones"	$25 to $480	per ounce
Largest "blues"	$28.80	per ounce
Large "blues"	$12 to $16.80	per ounce
"Parcel blues"	$8.40	per ounce
Small "blues"	$1.80	per ounce
Machine stones	$0.75 to $0.80	per ounce

[1] Annual Report, Commissioner of Fisheries, 1913; Washington, 1914, p. 28.
[2] Lionel C. Ball, "The Amakie Sapphire Fields of Queensland," *Min. Sci. Pr.*, July 26, 1913, pp. 151, 152; abstract from *Queensl. Min. Jour.*

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TOURMALINE

On the Syssert mining property, south of Ekaterinburg, in the southern Urals, a tourmaline deposit has been discovered presenting some unusual conditions. The rock here, on the boundary of the European and Asiatic watersheds, is preponderantly of granites and serpentines. It is in a serpentine, and not far removed from its point of contact with a calcareous rock of the Lower Devonian period that the tourmaline has been found. The specimens are optically negative, and show an intense dichroism, dark brownish green and pale brownish yellow. The presence of tourmaline in a serpentine, close to its immediate contact with a calcareous formation, is very significant. It shows that the magma producing the basic rocks whence the serpentine is derived, must be accompanied by mineralizers analogous to those so abundantly present in the acid rocks, and it is held that these tourmalines were formed by the fumaroles of the mineralizers.[1]

TURQUOISE

Much valuable information regarding the present use of turquoise in the Orient and the commerce in this very attractive stone in certain eastern lands is given in a recently published monograph on the turquoise by Dr. Berthold Laufer.[2] In it all that can be gathered from ancient, medieval and modern records as to the history of the gem is very fully presented. Of the modern eastern trade in this stone, that of China radiates from two principal distributing centers, Mongolia deriving its supply from Peking, while Tibet, a country in which turquoise is a great favorite, is supplied from Si-ngan, where some half-dozen traders, settled in the same street, work up the raw material into beads and perforated flat stones. As a rule the turquoise material in Si-ngan is sold by weight, a catty, about 1 1/3 lb., bringing from $3.50 to $5.60, but very finely polished beads, or specimens of superior quality, are priced by themselves, having what is termed a "fancy value."[3]

[1] L. Duparc and H. Sigg, "Sur un gisement de tourmaline dans un serpentine de l'Oural," *Bull. Soc. Franc. de Mineral.*, XXXVII, 14–19 (1914).
[2] Berthold Laufer, "Notes on Turquoise in the East," Field Museum of Natural History, Publication 169, Anthropological Series, Vol. XIII, No. 1, Chicago, July, 1913.
[3] *Op. cit.*, p. 63.

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