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# GEMS AND PRECIOUS STONES.

By B. H. STODDARD.

## PRODUCTION.

*Value of precious stones produced in the United States, 1917-1921.*

Variety.	1917	1918	1919	1920	1921
Agalmatolite.....				(a)	
Andalusite.....	(a)	(a)			\$10
Beryl.....	\$2,178	\$1,906	(a)	\$3,440	1,090
Calamine.....		(a)			
Chlorastrolite.....	45	146	\$53	(a)	100
Copper-ore gems.....	2,857	2,299	(a)	(a)	8,775
Corundum (sapphire).....	54,204	42,414	40,304	214,705	482,745
Dafolite.....	(a)	(a)	(a)	(a)	
Diamond.....	4,175	1,910	(a)	(a)	(b)
Epidote.....	(a)	(a)		(a)	
Feldspar.....	(a)	(a)	(a)	520	155
Fluorite.....		(a)			
Fossil coral.....			(a)		200
Garnet.....	624	1,277	1,630	331	606
Hematite.....	(a)	138	(a)	45	
Iceland spar.....	(a)	(a)	(a)	398	(a)
Jet.....			(a)	(a)	460
Lapis lazuli.....	(a)	(a)	(a)		
Malachite.....		(a)			
Meerschaum (sepiolite).....	(a)	(a)	(a)		
Obsidian.....	(a)	(a)		40	67
Olivine.....	458	1,018		100	
Opal.....	805	6,304	(a)	(a)	336
Phenacite.....	(a)	(a)			
Pyrite.....	(a)	(a)		(a)	
Quartz.....	28,273	15,211	17,632	14,676	11,114
Rhodonite.....	512	515	160	(a)	275
Rutile.....	(a)				
Satin spar (gypsum).....		(a)			
Smithsonite.....	(a)				(a)
Spinel.....			(a)	(a)	
Spodumene.....	(a)	281	(a)		
Staurolite.....	(a)	(a)		(a)	
Thomsonite.....	(a)	(a)	(a)	10	10
Topaz.....	230	907	210	767	(a)
Tourmaline.....	12,452	6,206	17,700	4,869	1,450
Turquoise.....	14,171	20,667	22,750	16,865	6,272
Variscite.....	2,350	753	925	(a)	560
Vesuvianite.....	2,765	320			
Willemite.....	(a)	(a)			
Zircon.....				144	
Zoisite.....	(a)	(a)			
Undistributed.....	4,913	4,251	10,399	8,295	4,055
	131,012	106,523	111,763	265,205	b 518,280

<sup>a</sup> Less than three producers; figures included under "Undistributed."

<sup>b</sup> Production of diamond in Arkansas not reported.

*Value of precious stones produced in the United States in 1921, by States.*

Montana.....	\$489,021
Arizona.....	8,805
Nevada.....	5,538
Colorado.....	3,848
Other States <sup>1</sup> .....	11,068

518,280

<sup>1</sup> California, Connecticut, Maine, Massachusetts, Michigan, Minnesota, New Mexico, North Carolina, Oregon, Pennsylvania, South Dakota, Texas, Utah, Washington, and Wyoming.

## NOTES ON SOME PRECIOUS STONES.

## DIAMOND.

Crystallized quartz (rock crystal), colorless topaz, zircon rendered colorless by heating, white sapphire, spinel, beryl, tourmaline, phenacite, and even glass are often mistaken for diamond. The hardness, specific gravity, and dispersive power of diamond, however, render it distinguishable from other colorless gems. Of the minerals mentioned, spinel is the only one that is singly refracting like the diamond. Glass is also singly refracting. As crystallized quartz is perhaps the mineral that is most frequently mistaken for diamond, the following notes may be useful: Many diamond crystals, as found, are not perfectly transparent, are either nearly round or 8-sided or contain a multiple of eight sides, and are covered with rounded greasy-looking faces. Quartz crystals are generally transparent, somewhat elongated, with six sides (prisms), topped by a pointed termination. The crystal faces are usually planes, look glassy, and do not have the greasy appearance commonly shown by diamonds. The six prism faces of a quartz crystal show horizontal striations when the crystal is so held that the pointed termination is on top. Small black carbonaceous inclusions are perhaps not so common in quartz as in diamond, but they occur in both minerals.

Diamond has a perfect cleavage, whereas quartz generally shows no cleavage. Some quartz crystals show imperfect cleavage or parting, which, however, is not perfectly plain and brilliant like the cleavage surface of a diamond. The diamond is the hardest mineral known; it will scratch any other mineral, whereas quartz, which is much softer, will not scratch a diamond.

The distinction between diamond and quartz, if in the form of cut stones, is best made in a laboratory fitted for the purpose and involves the determination of the optical and physical properties of the stone and the comparison of these properties with those of quartz and diamond. Hardness could, of course, be used as a means of distinguishing them, for a ruby, sapphire, topaz, or beryl would cut quartz, but no mineral other than a diamond can cut a diamond.

No production of diamonds in the Arkansas diamond field, Pike County, Ark., was reported for 1921. Information in possession of the Geological Survey concerning this field will be presented in a report by H. D. Miser and C. S. Ross, which will probably be published before the end of 1922.

## TOPAZ.

Topaz, a silicate of aluminum combined with fluorine, is widely distributed through the United States,<sup>2</sup> but crystals of gem quality are somewhat rare. Topaz occurs in many colors. The purest variety is colorless; others are blue, yellow, and red, the red variety being rare. A remarkably clear, colorless, transparent crystal may be mistaken for a diamond, but it is not nearly so hard and it has a much weaker double refractive and dispersive power. Very little

<sup>2</sup> Sterrett, D. B., Gems and precious stones: U. S. Geol. Survey Mineral Resources, pt. 2, for 1907, 1908, 1912, 1913, and 1914.

play of prismatic colors is, therefore, shown by a faceted topaz, which in some other respects resembles the diamond.

Both the yellow (or citrine) and the smoky varieties of quartz often masquerade in the trade under the name of topaz, but they have nothing in common with topaz except color. Yellow quartz is bought and sold under the names "Indian," "Bohemian," and "Spanish" or "Saxon" topaz, but it is not difficult to distinguish the two, for topaz, with a hardness of 8, will scratch citrine and is much heavier than citrine, sinking rapidly in pure methylene iodide, in which citrine floats. Moreover, topaz may be distinguished from many precious stones by its perfect cleavage, which is in only one direction, parallel to the basal plane. Quartz has no distinct cleavage; its fracture is conchoidal.

Ground topaz is used as an abrasive, topaz powder being frequently used instead of emery powder with a disk of copper, tin, or lead for grinding agate, jasper, chalcedony, and other gem minerals.

#### CORUNDUM (SAPPHIRE).

The increased production of sapphires at Utica, Mont., by the New Mine Sapphire Syndicate, of London, England, was due to the washing of the accumulation of old dirt of five years' standing. The material had been exposed to the weather so long that valuable results were obtained. Mr. Francis H. Wood, director of the company, stated (February 15, 1922) that a larger force of miners were at work below ground and that the washing floors were being enlarged so that the syndicate would be able to wash new dirt to any desirable extent during the summer of 1923.

#### OPAL.

There were practically no operations on the opal property of the Rainbow Ridge Mining Co. in Virgin Valley, Humboldt County, Nev., in 1921. This is the property that produced the large black opal, weighing 16.95 troy ounces, mentioned in the Survey's report for 1919.

#### COPPER ORE GEMS.

Col. H. C. Demming, of Harrisburg, Pa., kindly furnished the Geological Survey with a sample of copper ore called "cuprous gem" from Ferry County, Wash., which he says has been cut and marketed to a slight extent as a gem. It is a mixture of chalcocite and chrysocholla with small quantities of other undetermined minerals. The combination of black and green colors makes a pleasing appearance.

#### MANGANOSITE.

Mr. F. A. Canfield, of Dover, N. J., reported that a small quantity of manganosite from Franklin Furnace, N. J., has been cut into gem stones. This rare mineral is a green oxide of manganese, and the compact variety when cut in cabochon form is said to make a very pretty gem stone.

IMPORTS.<sup>3</sup>

*Gems and precious stones imported and entered for consumption in the United States, 1917-1921.*

Year.	Diamonds.				Other stones not set.	Total, excluding pearls.	Pearls.
	Glazier's.	Dust and bort.	Rough or uncut.	Cut but not set.			
1917.....	\$1,098,102	\$349,746	\$13,092,855	\$18,421,838	\$1,883,810	\$34,846,351	\$4,947,509
1918.....	718,397	475,870	12,636,024	7,734,150	1,102,398	22,666,839	765,929
1919.....	984,381	1,420,442	20,306,758	64,085,610	5,161,639	91,958,830	11,008,973
1920.....	1,527,753	3,387,488	10,526,125	45,240,013	5,419,363	66,100,742	7,879,384
1921.....	435,872	466,345	2,207,365	26,144,323	2,778,931	32,032,836	4,492,063

*Diamonds imported into the United States in the calendar years 1920 and 1921.*

[General imports.]

Country.	1920				1921			
	Uncut.		Cut but not set.		Uncut.		Cut but not set.	
	Carats.	Value.	Carats.	Value.	Carats.	Value.	Carats.	Value.
Aden.....							173	\$19,538
Argentina.....							14	1,011
Australia.....			1	\$710	1	\$40	13	1,938
Austria.....			121	13,325			222	21,257
Belgium.....	2,343	\$185,965	63,390	8,345,615	3,519	175,954	127,087	12,024,417
Brazil.....	7,679	508,236	737	67,445	3,662	123,076	170	24,984
British Guiana.....	2,242	118,483	5	1,112	1,694	57,249		
British India.....							2	138
British South Africa.....	3,374	334,618	171	39,599	5,013	246,677	85	5,728
Canada.....			41	5,945			53	6,386
China.....							23	1,658
Czechoslovakia.....			18	3,215				
Denmark.....			485	86,276			11	1,881
Egypt.....			9	1,592		2,197		
England.....	102,339	9,283,918	22,104	3,003,534	17,035	1,264,767	16,259	1,996,096
Finland.....							5	624
France.....	1,875	55,342	16,247	2,506,090	618	20,653	5,820	638,443
Germany.....			144	16,374			93	7,735
Greece.....			50	6,565				
Hungary.....							20	3,818
Ireland.....							1	138
Italy.....			306	48,857			28	2,710
Japan.....	80	4,748	68	34,456				
Jugoslavia.....			21	4,431				
Mexico.....			1	250				
Netherlands.....	1,146	40,189	198,477	31,024,241	4,453	366,686	104,663	11,497,228
New Zealand.....							274	25,258
Poland and Danzig.....			486	48,898			20	1,550
Portugal.....			333	69,376				
Rumania.....			100	8,448				
Spain.....							10	1,628
Sweden.....							70	19,942
Switzerland.....			758	108,090			209	16,734
Turkey in Europe.....	4	863	3	555			192	17,615
	121,082	10,527,362	304,076	45,444,999	36,120	2,257,299	255,517	26,338,455

<sup>3</sup> Statistics compiled by J. A. Dorsey, of the United States Geological Survey, from records of the Bureau of Foreign and Domestic Commerce.