GOLD WON IN TASMANIA, ALLUVIAL AND QUARTZ, 1909.

Description.	Northern & Southern.	North-eastern.	Eastern.	Western.	Total.
	ozs.	ozs.	ozs	ozs.	ozs.
Quartz	22,938	219	2,450	18,811*	44,418
Alluvial	240	329	...	65	634

* Gold contained in blister copper and silver-lead bullion.

The total production equalled 44,777 fine ounces, valued at £190,201.

5. **Remarkable Masses of Gold.**—The first "nugget" found in Australia was obtained at Hargraves, in New South Wales, on the 13th May, 1851, and weighed a little over 1 lb. In the same year the Burrandong nugget was found near Orange, weighing 2217 ozs. 16 dwts., and the "Brennan" was sold in Sydney for £1156. During the period 1880-82 nuggets weighing from 59 ozs. to 1393 ozs. were found at Temora. The "Jubilee," which weighed 347 ozs., was found in 1887.

In Victoria a nugget found at Canadian Gully in 1853 weighed 1620 ozs.; the "Welcome," found at Ballarat in 1858, weighed 2217 ozs.; and the "Welcome Stranger," unearthed in 1869 at Mount Moliagul, near Dunolly, weighed 2315 ozs., of which 2284 ozs. were fine gold and 31 ozs. silver, and was valued at £9534.

In addition to these alluvial nuggets large masses of gold have been found *in situ* in reefs. A mass known as "Kerr's Hundredweight," discovered in 1851 at Hargraves, in New South Wales, yielded 106 lbs. of gold. Probably the largest mass of gold ever found was obtained in Beyers and Holtermann's claim at Hill End in 1872. The total weight of the specimen, including the small amount of quartz in which it was encased, was 630 lbs. Its dimensions were 4 ft. 9 in. high, 2 ft. 2 in. wide, and about four inches thick. The value was not definitely known, but an offer of £13,000 was refused.

6. **Modes of Occurrence of Gold in Australia.**—(i.) *New South Wales.* The principal gold deposits worked with profit in New South Wales are classified by the Government Geologist of that State as follows:—(*a*) Alluvial or detrital gold. (*b*) Auriferous reefs or lodes. (*c*) Impregnations in stratified deposits, such as slate, quartzite, and volcanic tuff. (*d*) Impregnations in igneous rocks, such as granite, serpentine, felsite, etc. (*e*) Irregular deposits, such as bunches of auriferous ironstone. The detrital gold is found chiefly in Recent and Pleistocene alluvials, in beach sands along the coast, in Tertiary alluvial leads, in Cretaceous alluvial leads, and in Permo-carboniferous conglomerates. In the beach sands the gold is found in association with platinum and tin. In reefs the gangue is principally composed of quartz; calcide is often present, and barytes and fluor-spar are also met with. At Hill End gold was found associated with muscovite. In the oxidised portions of auriferous reefs, limonite, malachite, azurite, and cuprite are found, while below the water-line the veins are impregnated with iron pyrites, galena, copper pyrites, zinc blende, pyrrhotine, and stibnite. The auriferous quartz veins fall into three categories—fissure veins, bedded veins, and contact veins. Large masses of gold have occasionally been found in lodes, such as "Kerr's Hundredweight," alluded to in a preceding paragraph. The so-called saddle reefs in the Hargraves district are identical with those worked so profitably and at such great depths round Bendigo, in Victoria. Altogether gold has been found in association with over forty minerals in New South Wales, one of the most peculiar products being known as "mustard" gold, resultant on the decomposition of tellurides. The substance has the appearance of dull yellow clay, but it readily burnishes when pressed with a knife blade. Native gold has never been found in an absolutely pure state in New South Wales, being always alloyed with silver and also traces of other metals.

(ii.) *Victoria.* In Victoria the occurrence of gold is noted under two main headings —1. Matrix gold. 2. Redistributed gold. The so-called matrix gold occurs in quartz reefs of various kinds, in Ordovician, Silurian, and Lower Devonian sedimentary, metamorphic, and granitoid and porphyritic rocks; in reefs, veins, and lenticular deposits in dykes of granitoid, porphyritic, dioritic, and felspathic rocks, or between dykes and walls of intruded rocks; or in fracture planes or joints in granitoid rocks. Under the above conditions the gold is either free or in combination with iron, arsenic and iron, copper and iron, zinc, lead, antimony, silver, etc.

The redistributed gold is found in sands and gravels of existing streams, in deep leads, in littoral gravels and sands, and in cleavage and joint planes of rocks underlying the deep leads.

(iii.) *Queensland.* The most remarkable mode of occurrence in Queensland is that at the Mount Morgan mine, which presents so many novel features as to demand special reference. At this mine the siliceous material forming the ore body was found enclosed in igneous rock, which continued to the surface, except for a funnel-shaped mass of sandy beds and secondary ore outcropping near the summit of the mount. In a crevice of these sandy beds was deposited a plug of desert sandstone nearly 100 feet deep at its thickest part, with a surface area of three-fifths of an acre, quite distinct from and unconformable to, the beds of loose sand which underlay and surrounded it, and more ferruginous towards the outside than in the centre of its area. A ferruginous belt extended outside the plug, attaining a depth of 150 feet from the surface. It was hard and extremely rich in gold, which was disseminated through the stone in microscopic particles. Beneath the ironstone there was a band of loose sand or soft bed, in some places many feet in thickness, also extremely rich in gold. Underlying and almost surrounding the secondary ores, a great mass of siliceous and kaolin ore was found, denuded of its gold, which is supposed to have been leached out and conveyed in solution and again deposited in the enriched zone. The impoverishment prevails between the depths of 180 and 300 feet, the friable silicia being cellular from the removal of the pyrites. The evidences of the oxidisation and leaching action are greater towards the centre than along the walls of the mass. Below the skeleton ore an unaltered zone of copper sulphide ore was found, in which gold was irregularly distributed, the copper increasing with the depth. Outside both sulphide and skeleton ore are walls of crystalline igneous rocks. Dykes, later than the massive igneous rocks but older than the enriched zone, traverse the siliceous sulphides in various directions. The theory advanced by Dr. Jack that the formations at Mount Morgan were due to geyser action at one time found wide acceptance, but later investigations tend to discredit it. So far, however, no completely satisfactory explanation has been put forward.

(iv.) *Western Australia.* The Government Geologist of Western Australia classifies the conditions under which gold is found in that State as follows:—(*a*) Native metal. (*b*) Compounds with tellurium and other elements. (*c*) Associated with other minerals.

Native gold occurs in several different forms, to which popular names descriptive of their appearance have been given, such as crystalline, dendritic, rough, flake, mustard, and sponge gold. Tellurides of gold abound at Kalgoorlie and Mulgabbie. Calverite is the most frequently occurring mineral, but petzite, goldschmidtite, and the minerals termed kalgoorite and coolgardite are also found. Of the metallic minerals, iron in the form of iron pyrites and oxides is widely distributed. Galena comes next, whilst amongst other minerals found in association with the precious metal may be mentioned zinc blende, arsenopyrite, vanadinite, bismuth pyrrhotite, chalcopyrite, bourononite, copper, scheelite. Quartz is of course the commonest of the earthy secondary minerals, but calcite, chalcedony, gypsum, actinolite, chlorite, and others are also found in association with gold. Some of the native gold is found to be remarkably pure, specimens of sponge gold from lodes at Boulder, Kalgoorlie, and East Coolgardie being found to contain 99.91 per cent. of the precious metal with but 0.09 per cent. of silver.

7. **Place of Commonwealth in the World's Gold Production.**—In the table given below will be found the estimated value of the world's gold production, and the share of the Commonwealth therein during the thirteen years 1897 to 1909. The figures given in the table have been compiled chiefly from returns obtained direct by the Commonwealth Bureau of Census and Statistics from the gold-producing countries of the world.

WORLD'S GOLD PRODUCTION, 1897 to 1909.

Year.	World's Production of Gold.	Gold produced in Commonwealth.	Percentage of C'wealth on Total.
	£	£	%
1897	48,196,000	9,890,000	20.52
1898	58,136,000	11,679,000	20.09
1899	63,015,000	14,533,000	23.06
1900	52,086,000	13,578,000	26.07
1901	53,339,000	14,006,000	26.26
1902	60,619,000	14,812,000	24.43
1903	66,761,000	16,295,000	24.41
1904	70,554,000	15,897,000	22.53
1905	76,839,000	15,551,000	20.24
1906	83,180,000	14,632,000	17.59
1907	84,770,000	13,515,000	15.94
1908	90,370,000	13,059,000	14.45
1909	91,910,000	12,605,000	13.71

The latest published estimates place the world's gold yield at about 92 millions sterling in 1909, towards which the Commonwealth contributed 12½ millions, or about 13¾ per cent. While the production of gold in the Commonwealth rose by about 27½ per cent. in the thirteen years from 1897 to 1909, the world's total increased by about 90 per cent. in the same period. The following table will be found interesting, as shewing the various foreign countries where the chief increases have taken place during the interval in question:—

INCREASE IN GOLD YIELD, VARIOUS COUNTRIES, 1897 to 1909.

Country.	1897.	1900.	1907.	1908.	1909
	£	£	£	£	£
United States ...	11,787,000	16,269,000	18,583,000	19,566,000	20,418,000
Canada ...	1,240,000	5,742,000	1,725,000	2,025,000	1,930,000
Mexico ...	2,045,000	1,884,000	3,733,000	4,137,000	4,582,000
Transvaal ...	11,654,000	1,481,000	27,401,000	29,973,000	30,988,000
Rhodesia ...	800	308,000	2,179,000	2,526,000	2,624,000
Gold Coast ...	85,000	38,000	1,164,000	1,195,000	979,000
Madagascar ...	8,500	142,000	267,000	345,000	434,000
India	1,571,000	1,893,000	2,134,000	2,178,000	2,070,000
Korea ...	208,000	371,000	471,000	480,000	480,000*
Japan ...	142,000	290,000	396,000	457,000	520,000
Java	24,000	112,000	479,000	610,000	630,000
Costa Rica ...	2,000	31,000	70,000	122,000	122,000*

* Not available; previous year's figures taken.

The largest increase was recorded in the Transvaal, where the production nearly trebled itself in the thirteen years 1897 to 1909.

The number of persons engaged in gold mining in each State during the last nine years is shewn in the following table:—

PERSONS EMPLOYED IN GOLD MINING, 1901 to 1909.

Year.	N.S.W.	Victoria.	Q'land.	S. Aust.	W. Aust.	Tas.	Cwlth.
	No.	No.	No.	No.	No.	No.	No.
1901	12,064	27,387	9,438	1,000	19,771	1,112	70,772
1902	10,610	26,151	9,045	1,000	20.476	1,038	68,320
1903	11,247	25,208	9,229	1,000	20,716	973	68,373
1904	10,648	24,331	9,620	1,000	18,804	1,076	65,479
1905	10,309	25,369	10,641	900	18,382	1,207	66,808
1906	8,816	25,304	9,842	900	17,926	988	63,776
1907	7,468	23,291	8,883	914	17,237	953	58,746
1908	6,363	20,853	7,736	1,213	16,075	843	53,083
1909	5,585	18.671	7,150	1,177	17,027	713	50,323

§ 3. Platinum and the Platinoid Metals.

1. **Platinum.**—The existence of platinum was first noted in New South Wales in 1851 by Mr. S. Stutchbury, who found a small quantity near Orange. Since the year 1878 small quantities of the metal have been obtained from beach sands in the northern coastal district. Platiniferous ore was noted in 1889 at Broken Hill. The chief deposits at present worked in the State are situated at Fifield, near Parkes, but the entire production in 1909 was small, amounting to only 440 ozs., valued at £1720, while the total production recorded to the end of 1909 amounted to 11,578 ozs., valued at £20,713. The matter of treating the extensive surface deposits received further attention during the year, but the difficulty of securing the necessary supply of water has not been surmounted. In September, 1909, the price paid locally for the platinum was increased from £2 17s. 6d. to £3 15s. per ounce. Attempts were made by a French company to treat the sands in the vicinity of Jerusalem Creek in the Woodburn division, but it is represented that it was found that a larger plant is necessary to enable operations to be conducted at a profit; work was therefore suspended for the purpose of raising additional capital.

In Victoria the metal has been found in association with copper at the Walhalla Copper Mine in Gippsland, but the mine is not at present being worked. The metal has also been found in small quantities in black sand beaches in the Otago district of New Zealand, and is present in the alluvial wash at Takaka, Nelson. Up to the present, however, the production has been trifling.

2. **Osmium, Iridium, etc.**—Small quantities of osmium, iridium, and rhodium are also found in various localities. As far back as 1860, the Rev. W. B. Clarke states that he found native iridium. Platinum, associated with iridium and osmium, has been found in the washings from the Aberfoil River, about 15 miles from Oban, on the beach sands of the northern coast; in the gem sand at Bingara, Mudgee, Bathurst, and other places. In some cases, as for example in the beach sands of Ballina, the osmiridium and other platinoid metals amount to as much as 40 per cent. of the platinum, or about 28 per cent. of the whole metallic content.

In Victoria, iridosmine has been found near Foster, and at Waratah Range, South Gippsland.

§ 4. Silver.

1. **Discovery in Each State.**—(*a*) *New South Wales.* The occurrence of silver in New South Wales was first mentioned by Count Strzelecki in a letter addressed to Captain King, R.N., dated the 26th October, 1839. In his work, "The Southern Goldfields," published in 1860, the Rev. W. B. Clarke also mentions a discovery of the metal. Since that date silver has been found in a large number of localities throughout