importance. The most powerful impulse to mining operations, and the immediate cause of a somewhat lengthy period of wild excite­ment and speculation was the discovery and successful opening of the Comstock lode in 1859, in the western part of what is now the State of Nevada, but was then part of the Territory of Utah, and known as the “Washoe Country” (from a small tribe of Indians of that name). The locality of the lode, where there soon grew up a large town called Virginia City, is about 20 miles east of the boundary of California, and nearly due east of the northern end of Lake Tahoe. As early as August 1860 two mills were at work stamp­ing and amalgamating the ore from the lode ; mining had begun on a large scale ; and many ingenious metallurgists were en­deavouring to ascertain experimentally how the somewhat com­plex metalliferous combinations there occurring could be best and most economically treated. So far as quantity of bullion produced is concerned, these operations were eminently successful. The various estimates of the total yield of the lode from the time of its discovery to 30th June 1880, collected and published by Mr Eliot Lord, run from $304,752,171-54 to $306,181,251∙05. The total production to the end of 1886 may be estimated as having been not far from $320,000,000. The bullion obtained from the milling of the ores contains about an equal amount in value of silver and gold. The mines on this lode thus added to the bullion stock of the world $100,000,000 more in eighteen years than the whole Freiberg district in Saxony had furnished in a little over 700 years (1168- 1875). The lode is an ore channel of great dimensions, included within volcanic rocks of Tertiary age, which themselves have broken through pre-existing strata of Triassic age. It exhibits some of the features of a fissure vein, combined with those of a contact deposit in part and of a segregated vein in part. The gangue is quartz, very irregularly distributed in bodies often of great size, and for the most part nearly or quite barren of ore. The metalliferous portions of the lode, “bonanzas,” as they are here generally called, are usually of great size, but extremely irregular in their position. Their number has been about twenty, most of them lying near the surface ; but the last important one discovered was struck at a little over 1000 feet below the surface. Its dimensions were—according to Mr Church—about 700 feet in length, by 500 deep, and 90 wide ; the average yield $93∙55 per ton ; and the total value of the bullion obtained from it $104,007,653. The mines on this lode have been worked to a greater depth than any mines in the world extending over an equal amount of ground. Up to October 1886 work was still being carried on at several points below the depth of 3000 feet. The lower levels, below that of the Sutro tunnel, which intersects the lode at a point about 2000 feet below its outcrop, are now aban­doned. Workings are still going on, however, above the great adit level, where there yet remain considerable bodies of low grade ore, which can perhaps be extracted with moderate profit, since more economical methods have been introduced both in mining and milling. The yield of the Comstock lode at present, although small as compared with that of its prosperous years, is still much larger than that of all the mines in the Freiberg district of Saxony.

The success of the Comstock lode workings led to the active exploration of the whole adjacent region, with the result that a great number of localities were discovered where auriferous and argentiferous ores occur, and some of these have been extensively wrought and have produced largely. In very few, however, do the ore deposits bear the distinguishing characters of true or fissure veins. Special mention may be made of the Meadow Valley and Raymond and Ely mines in Lincoln county. The first-named mine is in Pioche, 273 miles south of Palisade station on the Central Pacific Railroad ; the enclosing rock is quartzite of Lower Silurian age, the veins varying in width, but averaging from 2 to 2⅜ feet, the ore being carbonate of lead near the surface with chloride of silver, passing into sulphurets, as usual, in going down. At the end of 1873 this mine was 1100 feet deep, and a large body of ore had been struck yielding $300 in value of silver per ton. The cul­minating years of the prosperity of these mines were 1872 and 1873, and the yield of the Ely district for those years respectively was $5,321,007 and $3,735,596. The Eureka district in the central part of Nevada is of importance on account of the magnitude of its yield, and because mining and smelting operations have been carried on uninterruptedly since 1869, thus affording great facilities for scientific investigations. Its ores are chiefly galena, accom­panied by the various oxidized combinations resulting from its de­composition. Similar ores of zinc are also present, but in much smaller quantity. These ores are rich in gold and silver (average— 15 per cent, lead, 0∙079 silver, and 0∙00248 gold). The rocks in which they occur are chiefly limestones, and of Lower Silurian age ; the deposits are very irregular in form. In many of their features they closely resemble the so-called pipe-veins of the North of Eng­land lead mines. Much of the ore has become decomposed, and has been subjected, since decomposition, to a rearrangement by water, analogous to stratification. The total yield of the Eureka district from 1869 to 1883 is stated at about $60,000,000 in value of gold and silver, and about 225,000 tons of lead. According to present indications, this district is approaching exhaustion.

Utah has important mines resembling to a considerable extent those at Eureka. The Hornsilver mine at Frisco, in southern Utah, is a large contact deposit, 30 to 50 feet wide, between dolomitic limestone and an eruptive rock called rhyolite or trachyte. The ores are sulphate of lead with some carbonate, associated with heavy spar, which occurs chiefly near the wall of eruptive rock. This mine has paid $4,000,000 in dividends, but none since 1884. The Little Cottonwood district, at a height of over 10,000 feet in the Wahsatch range, shows a record of about 3500 “locations” made within an area 2½ miles square. It includes the famous Emma mine, where a large body of ore occurred occupying an egg- shaped cavity in the Carboniferous limestone, which yielded largely (over $2,500,000); but it was soon worked out. The Flagstaff mine in the same canon, a “pipe-vein” or deposit occupying several irregular cave-like openings in the limestone, seems also to have been nearly or quite worked out. One of the largest and most pro­ductive mines in the country, and the most important one in Utah, is the Ontario, in the Uintah district, Summit county. The vein seems to be, in the lower levels at least, a contact mass between walls of quartzite and highly decomposed eruptive rock (called porphyry), and it varies in width from a few inches to 15 feet. It was discovered in 1872, has been worked by a company with $15,000,000 capital since 1877, and up to February 1887 had paid $8,075,000 in dividends. The Silver Reef district in Washington county is a region of remarkable interest, where sandstones of Triassic age have been broken through and invaded by eruptive masses (andesites and trachytes), and where the ore, according to Prof. Reyer, occurs in flat masses and impregnations between the strata, adjacent to the eruptive rock, and is especially largely developed in contact with the remains of plants with which the rock -is filled. The ores are carbonate of copper with chloride of silver, passing into the sulphuret at depths. According to the same authority, these mines produced a few years ago over a million of dollars a year ; but they have much fallen off of late. The census report of 1880 gives the total product of the district up to 1st June 1880 at a little over $3,250,000.

The metalliferous deposits of Colorado are important from their magnitude and variety.@@1 Of the actual precious metal production, by far the largest portion is derived from pyrites and galena and their decomposition products. The telluride ores of Boulder county and the auriferous pyrites of Gilpin county, with a few individual deposits in the southern portion of the State, constitute the source from which it is derived. With these exceptions its mineral deposits may be considered as essentially silver-bearing. The principal source of silver is argentiferous galena and its decom­position products, while argentiferous grey copper or freibergite is, next to this, the most important silver-bearing mineral. The sulphides of silver also occur, and in some cases bismuth is found in sufficient quantity to constitute an ore. As yet, so far as known, no copper is extracted except as an adjunct in the reduction of silver-bearing copper ores. Placer deposits are generally confined to the valley bottoms among high mountain ridges ; their present yield is relatively inconsiderable. Before the silver ores of Lead­ville were discovered, mining in Colorado was principally confined to approximately vertical veins in the Archæan rocks of the Front range or in the eruptive rocks of the San Juan region ; but since the limestone deposits of the Mosquito range have proved so exceptionally rich attention has been more and more turned to the ores in sedimentary rocks, and many new districts have been discovered, but none to rival that of Leadville. The Leadville ores are flat sheets, of the kind often designated in the Cordilleran mining regions as “blanket deposits,” and appear to be contact deposits between the Carboniferous limestone and the overlying felsite, with additional or incidental ore accumulations in the lime­stone in irregular cavities. According to reports locally published the product of the Leadville “smelters” or smelting works in 1886 was—lead, 51,925,546 lb ; silver, 4,569,013 oz.; gold, 22,504 oz.; total value, $7,515,148. From the mode of occurrence of the Leadville deposits it seems probable that they will within a few years become practically exhausted. The area over which the blue limestone of Emmons (dolomite of Rolker) has been found in places productive is, however, very large, having been estimated at 225,000,000 square feet. The Montana deposits, which up to 1880 are reported to have yielded fully $50,000,000, seem now to have been pretty much worked out. The workings from which the ores are now chiefly obtained appear to be of the class of segregated veins. The ores consist largely of auriferous pyrites in a gangue of quartz, oxidized in their upper portions and there easily manipulated, but in depth passing into the more refractory sul­phurets. Unlike the ores described as occurring in Colorado and Utah, they are accompanied by copper rather than by lead, and they are also rather manganiferous than ferriferous. Much yet remains to be done before their nature and value can be fully understood ; and the same may be said of the adjacent Territory of Idaho, the auriferous gravels of which resemble those of Montana, and have been next to those of California and Montana in import-

@@@1 See Census Report for 1880 (1885)