

The distinction between a lode and a reef was that the former was a vein yielding metalliferous minerals, while the latter was a barrier. The gold was found principally in the lodes. At the Waukaringa mine the stuff contained iron and manganese, while a considerable quantity of copper was to be found in the Lady Alice, iron pyrites in the Stapleton mine, N.T., and bismuth at Ballhannah. The width of the lodes varied considerably, and it was frequently the case that when a lode came in contact with another rock it broke into strings and gradually died away. Gold was visible in particles by the aid of the microscope, while pyritous gold was found with the sulphides, and could be obtained only by chemical action. When it was found in its pure state, however, it was liberated by crushing the matrix. Again, gold was imperceptibly disseminated in certain pure-grained old schistose sediments, and could be detected only by spectroscopical analysis. Vein gold had never been found in any appreciable quantity in either secondary or tertiary stratified deposits, and sometimes it was partially diffused through the body of eruptive, but never in modern volcanic rocks. The usual original position of the metal was in the quartz veins that traversed altered Silurian, but chiefly lower Silurian slates. The stratified rocks of the highest antiquity, however, had not borne it. There was no doubt that there was gold in some parts of South Australia, but properly to develop the industry required considerable capital, and obviously a small quantity of gold per ton was obtained from the ore. There would have to be extensive reefs in order that there should be sufficient stone to allow of the crushing of enough to yield payable returns.

*From The Advertiser*

*August 17<sup>th</sup> 1882.*

Professor Tate delivered his third lecture of the series describing the chemistry and mineralogy of South Australia on Wednesday evening, August 16, to a moderate audience. The lecturer principally dealt with the method of extracting gold from ores, and during the course of his remarks gave a brief geological survey of the various finds which have been made in the colony since its earliest days. The first discovery of gold in Australia was entirely the result of an accident, the fortunate discoverer being Professor Lecky, who in 1848 alighted upon a rich vein in New South Wales, which might ultimately have proved his fortune had he not been strictly enjoined by the authorities not to disclose what was then held to be a very important national secret. That gold was to be found in Australia was many years previously predicted by Sir Robert Murchison, who was the original discoverer of the precious mineral in California, and who proposed a Government geological survey in order to confirm his conviction. The late Mr. W. C. Clark imagined that he discovered indications of gold in Australia as early as 1841. Professor Tate then proceeded by means of practical illustrations to detail the process of extracting gold from sands and river beds, and illustrated minutely the various methods employed since primeval times. In order to show that even now they are far from perfect, the lecturer mentioned several instances which had come under his personal notice during his visit to the Northern Territory, where children and Chinamen obtained a lucrative harvest by picking up the grains of gold left strewn on the ground after the crushing. The simple plan of washing adopted by Indians and the natives of America was then illustrated. The difference between the American method of washing and that of Australia was that the former used wooden dishes, while the latter used tin, which were infinitely preferable. The



mechanical appliances used ranged from the primeval vatea to the more modern cradle, but the principle in every case was the same. The machines used in the Northern Territory were, of course, less perfect than in places where water was more easily obtained, and this fact accounts in a great measure for the extensive losses which had been experienced. The manner of obtaining gold from its matrix was then explained. It was stated that gold mining dates back many years before the Christian era, and Nubia was once famed for the magnificent resources of gold it contained, as much as £7,000,000 sterling having been obtained. At the present day a large quantity of gold was supplied to the market by Egypt. The principal gold-producing countries in the world and their annual supplies were stated by the lecturer to be—California, £13,000,000; Australia, £12,000,000; New Zealand, nearly £3,000,000; America, £1,000,000. The method generally adopted of discovering whether a gold mine was a paying one was to trace the veins up to their source, and then look to the left or right of the claim but not beyond it. It was a curious fact in connection with the history of the great gold-fields of the world, that their discovery seemed to follow some immutable law. No sooner was one area exhausted than a fresh field was discovered. The process of separating the gold from quartz, which the lecturer described as a special art in itself and needing some chemical knowledge as well as ordinary experience, was then briefly explained by Professor Tate by means of practical experiments. Mercury was the most important element used in separating the gold from the stone, which was done by amalgamating it. The lecturer concluded by recapitulating some important truths which had come within his personal experience bearing on the subject, and promised at a future time to describe more thoroughly the technicalities.

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#### UNIVERSITY LECTURES.

On Wednesday evening Professor Tate gave the last of his series of lectures on "The Chemistry and Mineralogy of South Australian Ores, and on the method of the extraction of their metals," before a rather small audience. The Professor began by stating that the subject he had to deal with that evening was one of the most difficult, viz., that of extracting gold from iron pyrites. He intended to experiment on a suitable stone roasted to powder, which had been obtained from a mine yielding six ounces to the ton. This curious stone was only known to contain gold through a chemical process, as not even with the aid of a microscope could the eye detect it. The invisible gold in this pyrites was analogous to carbon which was contained in cast iron, and was rather difficult to obtain, as even by mercury it could not be attracted, as the intimate union between the pyrites and the gold was stronger than mercury, and it was only after the gold had been set free that the quick-silver attracted it. Several methods then were used in extracting the valuable mineral—a very popular one being to decompose the iron pyrites by heat. Some years ago a practice was in vogue to roast a lot of stone in kilns, thus making the quartz friable and extricating the gold, but this process had not been fully realized, as a great difficulty in the way was that insufficient heat would have no effect, whilst, if the case were the other way and there was too much heat, a sort of glaze would be produced, leaving a coating over the remaining pyrites which obstructed the work. The lecturer then showed by experiments the effect of heat on the pyrites. The best machine for the working of this quartz was an American invention called the "Concentrator," but there were very few works in Australia fitted for the purpose, the exceptions being at Ballarat and Clunes. The Professor then showed an imitation of the American principle, which was a long fixed sloping cylinder, in which the stone was placed, with a furnace at the lower end. Lately, however, an improvement had been made on this at the Wallaroo Copper-smelting Works, by having a revolving cylinder, which could be altered when convenient. After explaining how the gold was set