

The discovery of the precious metal was made by Litchfield in 1867, in the River Finniss near the lower bar, and it was subsequently confirmed by Mr. Goyder in 1869, who also reported it from the Charlotte, the Blackmore, and the Darwin Rivers, around the head of Port Darwin. He mentioned the discovery of auriferous reefs subsequently, and the issuing of the mineral leases in December, 1872, stating that by May, 1873, no less than thirty Companies had been promoted. Mr. Tate here took the opportunity to mention that a few months ago he was accused by the papers of being a pessimist because he ventured to caution people who were associated with certain Gold-mining Companies. The *Register* gave him a severe whacking, but only a few days since they published a leader which was an abstract of the views he had previously expressed. Referring to the soils of the Northern Territory, he said they contrasted unfavourably with the plains of South Australia. The soil on the hills and coast cliffs seemed to be of the poorest and most sterile kind, and that on the flats for the most part cold and unworkable. He was not alone in the opinion that the Northern Territory as a whole did not offer any special inducements to the agriculturist. There was a concensus of opinion as to the unsuitability of the surfaces on the coast cliffs, and it was the black soil about the borders of the neighbouring lagoons or jungle patches only that were at all fit for cultivation. With respect to the interior country, they had the testimony of Messrs. Manton, Stow, and others as to the utter valuelessness of the lands about the Lower Adelaide; and that of McKinlay, which embraced a larger area, extending to the Alligator Rivers. Professor Tate concluded his lecture by giving results of the Experimental Gardens at Port Essington and Palmerston.

From the Register
August 2nd 1883

UNIVERSITY LECTURES.—Professor Tate, F.G.S., concluded his interesting course of lectures on the Northern Territory on Tuesday evening in the Adelaide University, and showed specimens of the reptiles, insects, grasses, and other curiosities, including two young alligators stuffed. At the close of his lecture Professor Tate announced that he intended shortly beginning a series of lectures upon the minerals occurring in South Australia, the processes of extraction, smelting, &c. The subject would be technical and topical, for the information of persons who were interested in or devoted their time to the development of the mineral resources of South Australia.

From the Register
August 3rd 1882.

THE CHEMISTRY OF GOLD.

In accordance with the arrangements made by the Chancellor of the University of Adelaide to diffuse information through it among other than the regular students, Professor Tate, F.G.S., began another series of lectures on Wednesday evening, the basis being "The Chemistry and Mineralogy of South Australian Ores, and the Method of Extraction of their Minerals." The attendance was not large. The lecturer said that in dealing with his subject he would dwell on the chemistry of gold in the first place, which to notice in all its bearings would occupy more than one lecture; and at the outset he would like to say that, though taking a deep interest in chemistry, he was not a chemist, and it was rather in the character of a mining engineer that he addressed himself to his subject, in the belief that he would be doing some service to those in the colony who invested their money in developing its mineral deposits by bringing forward the principles involved in the manipulation of those various minerals. Gold, he pointed out, had been known in all historic ages, and had always been used as the symbol of wealth for a number of reasons connected with its well-known peculiar properties. Its specific gravity was 19.5, or heavier than that of any other metal save platinum, which was 21.5, and it was the most widely diffused metal over the surface of the earth save iron. It was neither tarnished nor oxidized like other metals by sulphuretted hydrogen, and was not affected by ordinary acids, though soluble in aqua regia and chlorine gas, in which solution it could be precipitated by various reagents, especially sulphate of iron (green vitriol), organic acids, and chloride of tin, the last being a very delicate test of the presence of gold in a solution. It suffered no loss by frequent casting, and no matter wherever found was always the same. Of course it could be

pointed out that Waukaringa gold was not like Northern Territory gold, but that was due to the mixture of other metals, gold never being found absolutely pure. It was found naturally alloyed with silver, iron, copper, and bismuth; but chiefly with silver, which gave it a lighter appearance, and copper a darker hue. Gold, moreover, was the most ductile and malleable of all the metals, a single grain being capable of being drawn out 500 feet, forming so fine a wire that it would hardly bear its own weight. It was only of late years that the tests of ductility and malleability of the metal had been put to the furthest proof, and one result had been that two ounces had been beaten out into 200 square feet, of the thickness of $\frac{1}{12}$ part of an inch. Being soft, the gold was liable to wear, but to prevent this it was generally alloyed with copper, the standard of the British coinage being twenty-two parts of gold and two of copper. It had a great affinity for mercury, with which it formed what was called gold amalgam, and this particular property was the one generally taken advantage of in extracting gold from its matrix. This same property was that which had brought about the "sweating" of gold coins, mercury being rubbed over them till a thin coating of gold was taken off, and in the event of a large number of coins being so treated the practice would naturally become profitable. Having this in view and the ordinary wear of sovereigns, the Banks only gave for them what they were worth as gold, and not the value they represented. Most of the different chemical properties of gold were practically illustrated by experiments, which taught the lecturer's audience that the essential colour of gold, though yellow to the eye, was really green, and, having so far dealt with his subject, Professor Tate reserved any further remarks he had to make on the chemistry of gold to a future occasion.

From the Advertiser
August 10th 1882.

Professor Tate, F.G.S., delivered the second of his series of lectures in the University on Wednesday evening on the "Chemistry and mineralogy of South Australian ores and the method of extracting their metals." The lecturer, in opening, referred to the character and the value of different descriptions of South Australian gold, and mentioned that that obtained from Waukaringa was 19½ carat, and sold at £4 7s. 6d., while that from Blumberg, which contained a considerable percentage of silver, was not so valuable. The gold from the Lady Alice was associated to a very great extent with copper ore. The primitive method of extracting the metal was by picking or washing the stream deposit. It was of secondary origin, and was set free by the degradation of the rocky matrix in which it was originally formed. Detrital gold was found in the rocks which, geologically speaking, were younger than those yielding it, enclosed in veins, and for the most part were formations of the tertiary period. In this colony there were two sources of detrital gold—the Miocene gravels, such as that in the Humbug Scrub, and the Pleistocene river gravels and alluvium derived in part from the waste of the Miocene gold drifts. In Victoria the Miocene drifts were often covered for a large area with thick sheets of basalt. Great progress had been made of late years in gold-mining by the use of the diamond drill, but those who had advocated its introduction into this colony seemed to labor under the erroneous impression that because the drill was found of use in Victoria it might also be found of use in South Australia. It should be remembered, however, that the geological circumstances of the two colonies were different, and the conclusion did not follow as a logical sequence. Gold was also found in veins, or in other words a space in the rocks, rather inclined to the vertical, between two planes more or less even, and fissures filled by a dissimilar rocky material.