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Early theories and practicalities on gold occurrence in Australia

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The occurrence of gold in Australia was initially established by practical, if accidental, observation and followed up by theoretical prediction of exploitable deposits. However, it was the masterful orchestration of a gold rush by a shrewd, somewhat impractical prospector that finally established the existence of payable gold. This was a major event in the history of Australia and it is instructive to examine the scientific theories on the origin and distribution of gold, current at the time, and how these influenced and were interrelated with discoveries and observations on the ground.

A key theory in the mid-19th century was that gold deposits occur along parallel mountain belts at particular meridians. Roderick Murchison was a proponent of this meridian theory, adapted from the earlier ideas of Humboldt and extended by Murchison to a particular global orogenic episode in the Permian in which Silurian strata were deformed and injected with quartz veins infused with gold. His ideas were influenced by his observations in the Ural Mountains, and the known distribution of other gold-bearing ranges in Siberia, the Andes and later, the North American Cordillera. Murchison also proposed that the best source of gold would be the alluvial detritus eroded from these mountains by catastrophic inundations [1]. In 1844 he inferred the existence of gold in Australia, based on comparison of the geology of the eastern highlands, as described by explorer Pawel Strzelecki, with the Ural Mountains and with full knowledge that gold had already been discovered, including by Strzelecki. In Australia, the Rev. William Clarke had developed his own more geometric version of the meridian theory, noting that the eastern Australian highlands were at 90° to the Urals. In 1847 he predicted the occurrence of significant quantities of gold, based on this theory, information on the geology of the Urals combined with his knowledge of the geology of eastern Australia and his own discoveries of gold in 1841, 1843 and 1844 [2,3].

These theoretical predictions were overwhelmed in 1851 when Edward Hargraves, recently returned from the California diggings, realised that he might find sufficient gold near Bathurst to spark a gold rush. The numerous diggers attracted would likely find and prove the exploitable gold. Interestingly, once this had happened efforts to find more gold were influenced by theory. Some of the theory proved useful, in part by coincidence. Clarke was commissioned to search by the NSW Government and headed south to the high country close to his favourite meridian. As well as a pan he carried a barometer, for he considered that the best alluvial goldfields would be found at a particular elevation. Too high and the gold would not yet have been released from the eroding mountains; too low it would be eroded away or buried [4,5]. Theory predicted that reef gold, thought to form by descending solutions, would not persist to depth and Murchison even claimed that reef gold would not pay. It took the efforts of practical miners, particularly on the reef mines of Victoria, to disprove this theory. Other new observations and discoveries ultimately forced much more revision of theory.

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