In 1851, the first gold rush to Ophir began. Records of the presence of gold in this region date from 1823 and by the mid 1800s a number of finds were noted near Lithgow, Bathurst and Orange. William Tipple Smith found gold close to the area now known as Ophir, while in 1851 Edward Hargraves, in company with John Lister and James Tom, also found gold nearby, at the junction of Summer Hill and Lewis Ponds Creeks. The resultant publicity spread quickly and the 1851 gold rush was soon underway. This rush and others that followed had a profound influence on the Central West, colonial New South Wales and, subsequently, on Australia.

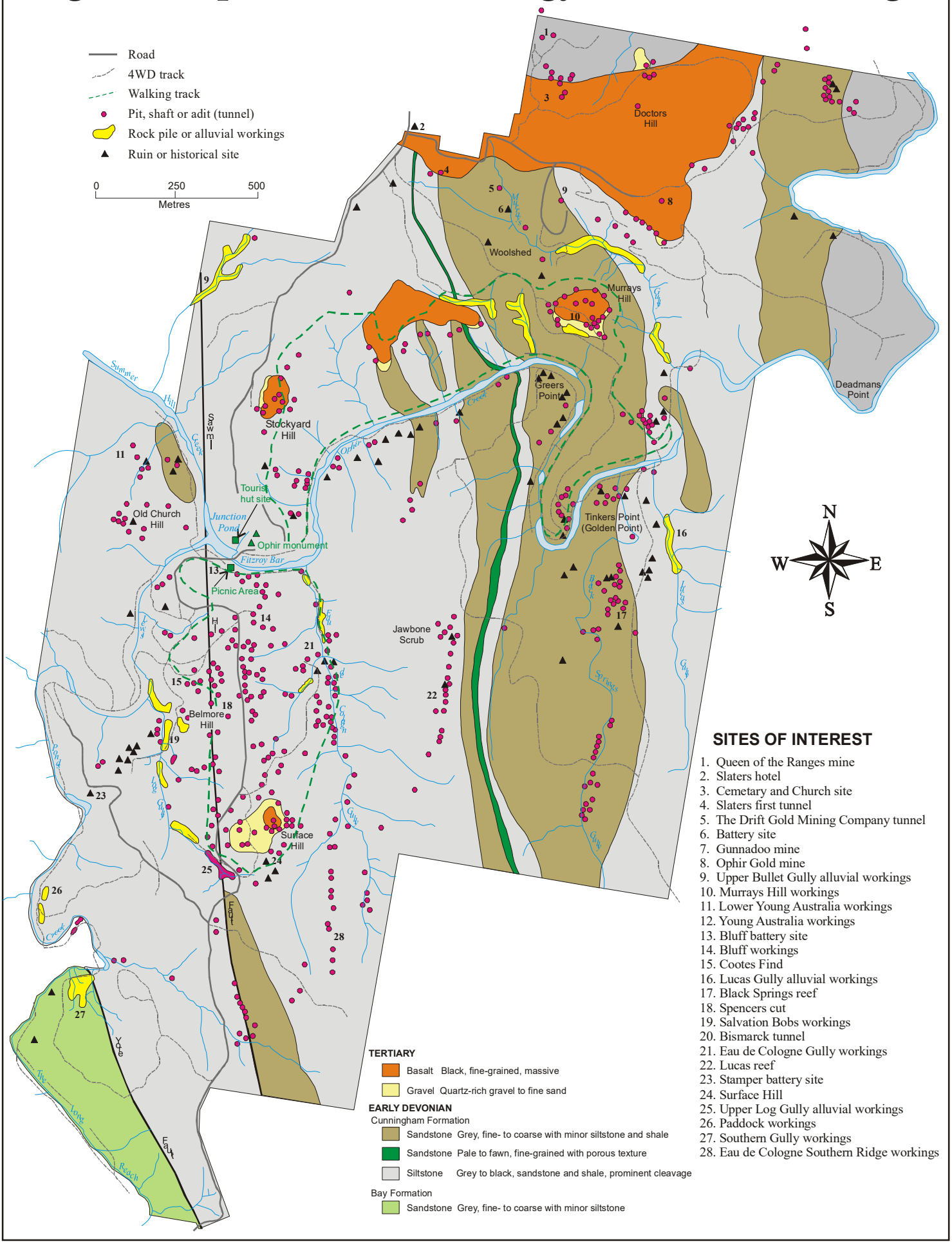
A monument was erected at Ophir in 1923 to mark the historical significance of the site. The Ophir reserve was proclaimed in 1936 and is currently administered by the Ophir Trust. The Reserve provides the opportunity to examine the remnants of the historic gold workings, as well as to gain insight into aspects of the geology and geological history of the area. Various types of gold occurrence are present in the area, including three operating mines - the Gunnadoo mine, Culverson's gold mine and the nearby Ophir gold and quartz pebble mine.

In 2000 the local Councils of Cabonne, Orange and Blayney undertook a collaborative effort to promote the district of the three Councils to Australia and the world. The primary purpose was to provide the gold for the Sydney 2000 Olympic and Paralympic Games medals. The New South Wales Government donated back royalties from this gold to the project. Ten kilograms of gold were required for the medals. Almost all of this gold was sourced from the Cadia mines near Orange, with a small amount from the Ophir area.

In 2001 the then Department of Mineral Resources produced an excellent brochure entitled *Gold... 150 years on*. The brochure focused on the geology, geological history and historical and current gold mining in the Central West region, with special attention given to the Ophir area. Unfortunately, with the changing of Parliamentary Ministers, the brochure was removed from circulation, resulting in the loss of this informative and useful literature.

This document is extracted from the original *Gold... 150 years on* brochure. The focus here is on the Ophir Reserve, an excellent site for learning about the occurrence of gold and the historical methods of mining the precious metal. The original author of the geological content of *Gold... 150 years on*, geoscientist Gary Burton, is acknowledged for his enthusiasm and technical input into the original brochure and this abridged version. The historical data on the discovery of gold was prepared with enthusiasm and accuracy by Derek Dolstra, former Technical Officer with the Department of Mineral Resources.

Figure 1. Ophir Reserve Geology and Gold Workings



SITES OF INTEREST

1. Queen of the Ranges mine
2. Slaters hotel
3. Cemetary and Church site
4. Slaters first tunnel
5. The Drift Gold Mining Company tunnel
6. Battery site
7. Gunnadoo mine
8. Ophir Gold mine
9. Upper Bullet Gully alluvial workings
10. Murrays Hill workings
11. Lower Young Australia workings
12. Young Australia workings
13. Bluff battery site
14. Bluff workings
15. Cootes Find
16. Lucas Gully alluvial workings
17. Black Springs reef
18. Spencers cut
19. Salvation Bobs workings
20. Bismarck tunnel
21. Eau de Cologne Gully workings
22. Lucas reef
23. Stamper battery site
24. Surface Hill
25. Upper Log Gully alluvial workings
26. Paddock workings
27. Southern Gully workings
28. Eau de Cologne Southern Ridge workings

Table 1. Simplified geological history of the Ophir area.

PERIOD	YEARS AGO	LIFE FORMS ORIGINATING	GEOLOGICAL EVENTS
QUATERNARY	0 2,000,000	Human Beings	Erosion of Tertiary and older rocks. Redistribution of some gold from Tertiary gravels into present streams.
TERTIARY	65,000,000	Grazing and carnivorous mammals	Outpouring of lavas from Canobolas Volcano. Hot, wet conditions produced widespread sandy and gravelly deposits from abundant rivers. Erosion of older rocks, liberation of some gold.
CRETACEOUS	145,000,000	Last dinosaurs First flowering plants	
JURASSIC	200,000,000	First birds	No rocks preserved from this period in local area.
TRIASSIC	251,000,000	First dinosaurs and mammals	No rocks preserved from this period in local area
PERMIAN	299,000,000	Mammal-like reptiles, last Trilobites	No rocks preserved from this period in local area.
CARBONIFEROUS	359,000,000	First reptiles; fern forests	No rocks preserved from this period in local area. Rocks deeply buried and deformed. Gold veins emplaced
DEVONIAN	416,000,000	First amphibians and insects	Sands, silts and clays deposited in deep ocean
SILURIAN	443,000,000	Vascular land plants	
ORDOVICIAN	488,000,000	First corals, fish with vertebrae	
CAMBRIAN	542,000,000	Shellfish, Trilobites	
Neoproterozoic Mesoproterozoic Palaeoproterozoic	700,000,000 1,500,000,000 3,500,000,000 4,500,000,000	Algae Complex cells Primitive cells Formation of the Earth	

The oldest and most common rocks in the Ophir Reserve area are sandstones, siltstones and shales which were deposited in a relatively deep ocean between 410 and 390 million years ago (Table 1). This was the Early Devonian period. Fossils are not common in these rocks within the Reserve, but have been identified elsewhere. The fossils not only provide the age of the rock but also indicate the environment that the rock was deposited in. We know that this was a relatively deep marine environment, probably in water depths of several kilometres.

During the Middle Devonian and Early Carboniferous (between 395 and 345 million years ago) the Devonian rocks were deeply buried and subjected to intense pressures which folded the rocks and produced a very obvious fracturing, known as a *slaty cleavage* (this is what makes slates break into flat sheets). The gold-bearing quartz veins in the Ophir area are considered to have been emplaced into the surrounding rocks during this period because they show a unique relationship with the structures produced by the deformation. The folding resulting from the deformation has locally tilted the rocks to the east (Photo 1).

Photo 1. Tilted sandstones and siltstones from Queen of the Ranges mine (Site 1)

When the deformation occurred the rocks were as much as 10 km below the surface. This estimation is based on the presence of diagnostic metamorphic minerals such as *biotite* mica which formed as a result of the high pressures and temperatures attained during deformation. These conditions drove very hot water through the rocks, dissolving *silica* (quartz) and gold and subsequently precipitating these along fractures to form veins.

Over the succeeding millions of years the region has been periodically uplifted, then worn downward again by the actions of wind and water. During the Tertiary period (from about 65 million years ago), when the continent was experiencing very hot, wet conditions, widespread very active streams cut into the landscape and deposited areas of river gravel and sand. The gold-bearing reefs which were exposed during erosion shed some of their gold into the Tertiary watercourses.

Between about 13 and 11 million years ago the area passed across a point in the Earth's mantle where upwelling heat (known as a *mantle plume* or *hotspot*) produced melting of the upper mantle and lower crustal rocks (Figure 2). This resulted in the eruption of the Canobolas Volcano, producing enormous amounts of basaltic lavas which covered a very wide area. The very hot, low viscosity lava preferentially flowed down topographic low areas such as river valleys. Once cooled, the basalts formed a very hard cap over any buried

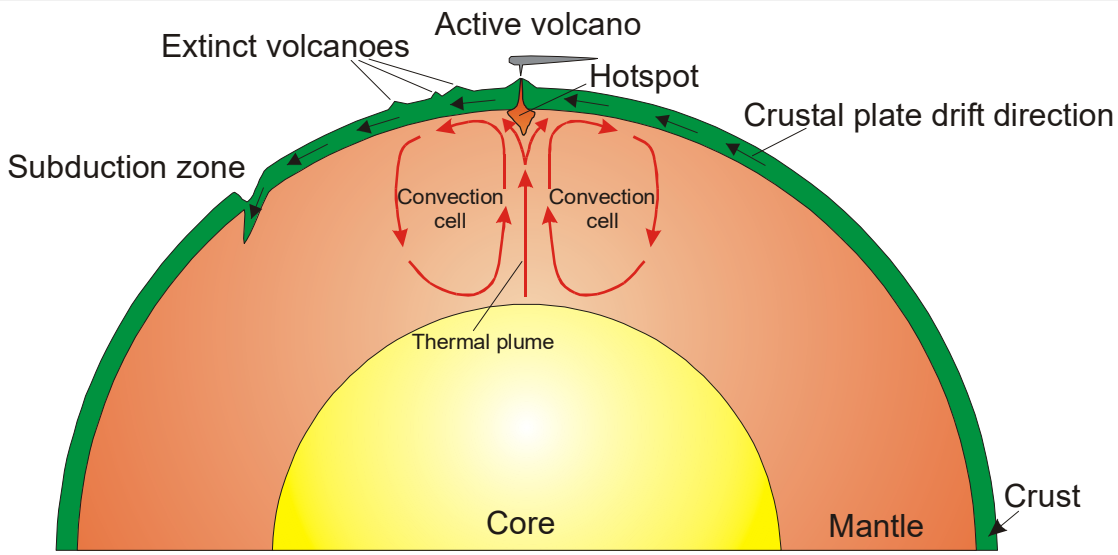


Figure 2. Diagrammatic representation of a mantle hotspot, showing convection cells. The slowly drifting crustal plate passes across the hotspot, where magma formed by melting at the hotspot intrudes outward, erupting at the surface to form a volcano. As the volcano passes away from the hotspot its magma cools and hardens and the volcano becomes extinct.

Tertiary gravels, preserving them against erosion. At Ophir the remnants of the basalt are up to 30 m thick, well below what they would originally have been. At least three lava flows are preserved at Ophir.

After the cessation of the eruptions the river systems re-established themselves (in some cases with very different courses) and weathering and erosion of the region continued. Since deposition of the basalts, the

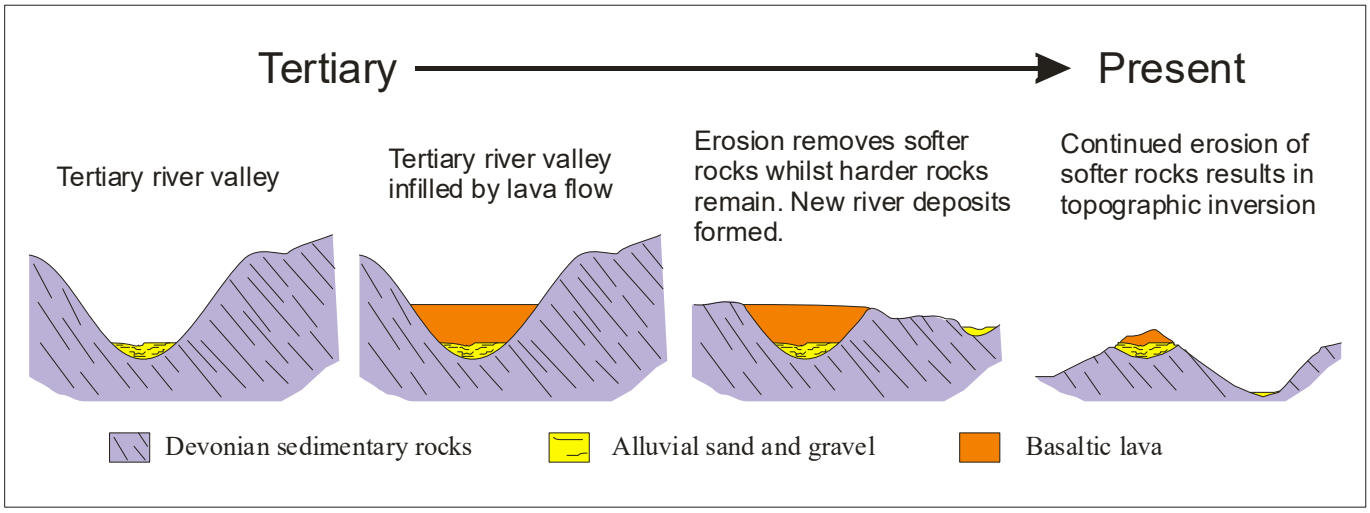


Figure 3. Diagrammatic representation of the processes resulting in topographic inversion.

From Bob and Nancy's Geotourism Site: http://ozgeotours.yolasite.com


Photo 2. Tunnel in deep lead sands and gravels beneath Tertiary basalt, Stockyard Hill.

current watercourses have cut through at least 140 m of rock (based on the difference between the highest (690 m) basalt capped point in the reserve and the lowest (550 m). The present topography includes remnants of the basalt flows and the protected, underlying gravels. Where basalt overlies, and preserves gravel beds, the old gravels are known as a *deep lead* (Photo 2). The Devonian rocks are now well-exposed in the river valleys and on the slopes of hills.

Deep leads are common throughout eastern Australia. They commonly occur on the tops of hills. This phenomenon, where old river gravels, which once occupied topographically low areas, are now perched on the tops of ridges, is known as *topographic inversion*. It results from the thick lava flows which had built up in the ancient river valley acting as very tough armor against the forces of erosion. The softer surrounding rocks (in this case the Devonian sedimentary rocks) eroded faster over the millions of years since the lava was erupted, eventually eroding below the level of the original Tertiary river valley (Figure 3).

Since the Tertiary period, gold has continued to be eroded from quartz veins in the Devonian rocks, as well as from the Tertiary deep lead gravels. The gold has been transported to the present stream system where it mainly occurs at the base of the alluvium (due to its high density or *specific gravity*). Gold in the Ophir area has a complex history of formation and at least two periods of redistribution.

THE DISCOVERY OF GOLD

People looked for gold in New South Wales before the 1851 gold rush to Ophir. Some was found, even if not publicised. On 15 February 1823, Assistant Surveyor McBrien recorded *numerous particles of gold* on the north side of the Fish River.

In 1939 the Polish explorer Paul Strzlecki demonstrated that he could pan gold. He also recorded gold near Wellington and Hartley. In the *Sydney Morning Herald* of 19 August 1841 he referred to his gold find as having commercial possibilities.

In 1841 the pioneering geologist Rev. W.B. Clarke found specks of gold in Winburndale Creek, north of Bathurst, and near Hartley. The Hartley specimen weighed 1.5 grams. In 1842 he also noted gold in the Wollondilly River.

In the 1840s a Mr W.T. Trappitt uncovered a piece of gold weighing several ounces on his property "Yallundry" in Fredericks Valley, not far from the present Lucknow. Throughout the 1840s a shepherd named McGregor was a well-known prospector. He produced good specimens of gold in quartz from Mitchells Creek near Wellington. Some of the gold was used by Mosely Cohen to produce jewellery, and some was exhibited by Sir Thomas Mitchell in England in 1847.

Convinced by a quote in the *Sydney Morning Herald* from English geologist Sir Roderick Murchison that there were gold deposits in New South Wales, William Tipple Smith, a mineralogist, jeweller and builder started searching. In early 1848, he searched an area bounded by Lewis Ponds Creek, Summer Hill Creek (Fredericks Valley Creek) and Yorkeys Corner (junction of Summer Hill and Lewis Ponds Creeks). He wrote to Murchison on 15 February of his initial gold discoveries and enclosed several samples, and showed a nugget to the Colonial Secretary on 24 January 1849.

Edward Hammond Hargraves returned to Australia from the Californian diggings in January 1851. He applied unsuccessfully for a government grant, but later borrowed £105 from William Northwood to purchase supplies and a horse. Hargraves intended to visit his cousin's property at Wellington. He had also accepted

an invitation to stay with Thomas Icely, who ran a copper mine on his property near Carcoar. The ore contained a little gold.

Hargraves met Icely who suggested that they should instead journey to Mrs Lister's Wellington Inn at Guyong. Hargraves arrived there on 10 February 1851. At the inn, her son, John Lister Jnr, showed Hargraves some interesting rocks. He advised him that he could show him where to find gold. They went to the junction of Radigans Gully and Lewis Ponds Creek, about 4 km upstream from Yorkeys Corner, on 12 February.

Hargraves washed six pans of gravel and found five gold specks. They returned via Byng and enlisted help from James Tom. The three formed a partnership, travelled extensively over the next few days, but found no more gold. Hargraves instructed his two partners in how to make a gold washing cradle. This was constructed by William Tom, James's brother.

On returning to Sydney on April 3, Hargraves applied for a reward of £500 on the basis of the five specks discovered earlier.

Lister and William Tom returned to Yorkeys Corner to try to spot where they knew that a man had previously found two nuggets. Lister and Tom found a few ounces of gold with their cradle. They notified Hargraves, and he arrived at Guyong on 5 May and collected the gold. Hargraves exhibited the gold, giving details of where it had come from, at a public lecture in Bathurst on 8 May. This precipitated the rush to Yorkeys Corner, which was renamed *Ophir*. On 15 May 1851 the *Sydney Morning Herald* announced the discovery of an extensive goldfield. By the next day, 200 hopeful prospectors had left Sydney for the diggings. By 19 May, 400 diggers were at work.

Hargraves then received the credit for the discovery, obtaining £10 000 from the government, a £250 annuity and appointment as a *Gold Commissioner* at £1 per day. The Victorian government later paid him £2381. His three partners only received a £1000 reward between them.

On 23 May Governor Fitzroy declared that all gold belonged to the Crown. He fixed a fee for a licence to search and dig at 30 shillings per month. By 24 May 1851 it was reported that there were 1000 people at work at Ophir. Several stores had opened, but struggled to satisfy demand.

In June 1851 gold was found along the Turon River. This new rush, centred on present-day Sofala, attracted 1750 diggers. Over the next year many fortune-seekers were to leave Ophir for this and other richer fields. The highest number of miner's licences issued at Ophir was 446 in July 1851. By December of that year there were 242 diggers, and by August the next year, only 84.

By mid 1852 much of the gold from Ophir was being won by companies and syndicates. Often they re-mined gravels discarded by the first diggers.

Alluvial mining continued at Ophir up to the First World War, supporting a population that varied between 50 and 200. The number grew a little in the early 1930s, as persons out of work in the Great Depression came to eke out a modest living by fossicking.

GOLD AT OPHIR

Gold occurs in three different settings within the Ophir Reserve: in quartz veins which cut the Devonian rocks; in Tertiary deep lead gravels near the tops of some hills; and amongst gravels within the present drainage system. All of the gold in the Ophir area probably originated from quartz veins which formed during the Middle Devonian to Early Carboniferous periods. Much of the gold has been eroded and redeposited before and after the Tertiary period.

The first discovery of gold at Ophir was within the present drainage system at Fitzroy Bar. Summer Hill, Lewis Ponds and Ophir Creeks have been extensively worked for gold since that time. Gold has also been won from workings in alluvium within Eau de Cologne Gully, Lucas Gully, Murrays Gully, Upper Bullet Gully and at Salvation Bobs mine, as well as at several other areas.

Tertiary gravels near and at the tops of some hills in the area contain gold. The gold occurs primarily within the bottom portion of the gravels. The operating Gunnadoo mine is presently extracting gold from this

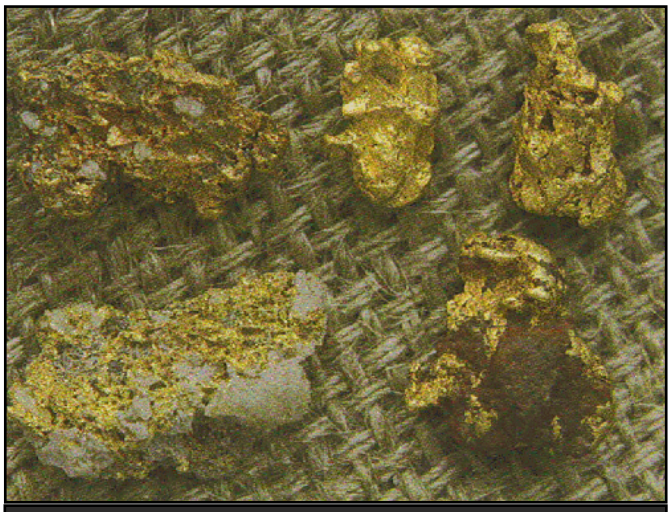


Photo 3. A collection of gold nuggets from the Ophir area. Some of the gold is associated with vein quartz.

type of setting. At this mine the contacts of the Tertiary gravels with both the older Devonian rocks and the overlying basalt are exposed. Similar mines include the Ophir Gold mine, Murrays Hill, Stockyard Hill or Pound Flat and Surface Hill. At the latter locality only a thin veneer of the basalt cap remains and the Tertiary gravels are well exposed along the top of the hill (hence the name “Surface” Hill).

The most significant workings of gold-bearing quartz veins are at Belmore Hill, including Spencers Cut, the Bismarck Tunnel and Cootes Find. Others are at the Bluff workings, the Queen of the Ranges mine, the Young Australia workings, Eau de Cologne Southern Ridge workings, Lucas Reef and Black Springs Reef.