

THE INGHAM 1:250 000 SHEET AREA

Some alluvial *gold* is found *in* the headwaters of Yamanie Creek and Smoko Creek; in a few of the alluvial tin deposits at Broadwater Creek; and in the deep leads at Mount Fox and Black Cow Creek. Lode gold is associated with complex sulphide ore at Rocky Creek.

THE HUGHENDEN 1:250 000 SHEET AREA (BMR Report 126)

Of metals, only gold and minor silver have been produced in commercial quantities. The discovery of alluvial and primary gold along the Cape River in 1867 heralded a long period of spasmodic prospecting which resulted in a total recorded production of nearly 55,000 oz (1710,5 kg) of gold. In 1910 gold and minor silver-lead were discovered 18 km east of Mount Emu Plains homestead, and the total recorded production of silver is 4500 oz (140kg).

The chief gold-producing area was the Cape River Gold and Mineral Field, which included all of the gold deposits in the map area south of the Lolworth Range, and also those at Mount Clearview and Mount Stewart. The field has a total recorded production of 45,000 oz (1399.5 kg). The actual production was considerably greater, because there is no record of the quantity won by the Chinese miners, who were almost as numerous as the Europeans during the productive years of the field, and because the small production in later years was included with that from Charters Towers.

Other producing areas were Lolworth (8363 oz, 260.1kg, of gold) and Mount Emu Plains (4500 oz, 140kg, of silver, and 400 oz, 12.4kg, of gold).

Pentland District (Lower Cape)

The most important single occurrence of gold in the Pentland or 'Lower Cape' district was in the basal conglomerate of the Campaspe Beds, in a strip known as the Cape River Deep Lead. Gold was also won from other deep leads, from quartz veins, and from Recent alluvium. The deposits in Recent alluvium were quickly exhausted, Many of the gullies were extremely rich but the output was not recorded.

The Cape River Deep Lead consisted of auriferous conglomerate, about 30 to 50cm thick, resting on schist; the overlying finer-grained sediments were virtually barren. The lead began just south of Capeville homestead, where it was shallow, narrow, and rich. To the south it became progressively deeper, wider, and poorer. About 4km south of Capeville the grade fell off abruptly where a large aplite dyke forms a high bar in the bedrock. South of the bar, only small disconnected areas were rich enough to be mined, and the cost of sinking below a depth of 30m made further exploration prohibitive. Morton traced the lead at the surface for a further 4km, and concluded that, although rich patches are probably present, they are too small and scattered to repay exploration.

Another gold lead, evidently also in the Campaspe Beds, was worked along Sandy Creek (Chinamans Gully) near Cornelia homestead.

The position of the Sarah Houston (Howson), Mystery, Hayward, Hughes Leader, Just-in-time, and Big lodes is not clear, but they were probably located about 4km north-east of Pentland. The lodes, which were reported to occur in 'granitoid schist', trend north-east. The Golden Hill and

Springs reefs, south-west of Pentland, were other small producers. The hand-sorted ore from the Pentland lodes yielded up to 2 oz (62.2 g) of gold per ton, and the deepest shaft was 30 m deep.

Upper Cape

In the Upper Cape area, workings were centred on the lower reaches of Gorge Creek, where it joins the Cape River. The deposits occur in narrow rich quartz veins near the contact between metasediments of the Cape River Beds and biotite-rich gneissic adamellite of the Ravenswood Granodiorite Complex. Most of the lodes occur in the Cape River Beds. Some were reported to originate from, or occur within, acid porphyry dykes or sills.

Alluvial gold occurred in small rich leads (Canton, Pothole, and Bluff) along Gorge Creek and in the Cape River north of Oak Vale homestead. The leads carried gold to a depth of 12m, where they died out in contact with hornblende schist bedrock. At one time consideration was given to dredging these deposits (Morton, 1933), but nothing eventuated.

The Harp of Erin and Wheel of Fortune lodes are situated 3.5 to 5km south-west of the main group, in mica schist and quartzite cut by granite dykes, but no production figures are available.

Rands reports on gold workings in small veins and alluvium near the headwaters of Reedy Creek and in gullies in quartzite country to the west of Black Mount.

Mount Clearview

The auriferous lodes at Mount Clearview were discovered in 1915, but although considerable development took place, little gold was won. Work recommenced in 1933, and from then until 1938, 1700 oz (52.9kg) of gold were produced, with an average grade of about 14 dwt (21.8 g) per ton. The gold occurred in four lodes in fine-grained gneiss and schist of the Cape River Beds. The metamorphics trend north-east, but the lodes occupy meridional fissures. Granitic dykes striking parallel with the schists are reported to occur in the area, but it is not clear from the reports whether the dykes postdate the lodes, or vice versa.

Rands describes alluvial gold workings (Italian Gully, Sneak away Gully, and others) in the headwaters of Oxley Creek, but he quoted no production figures.

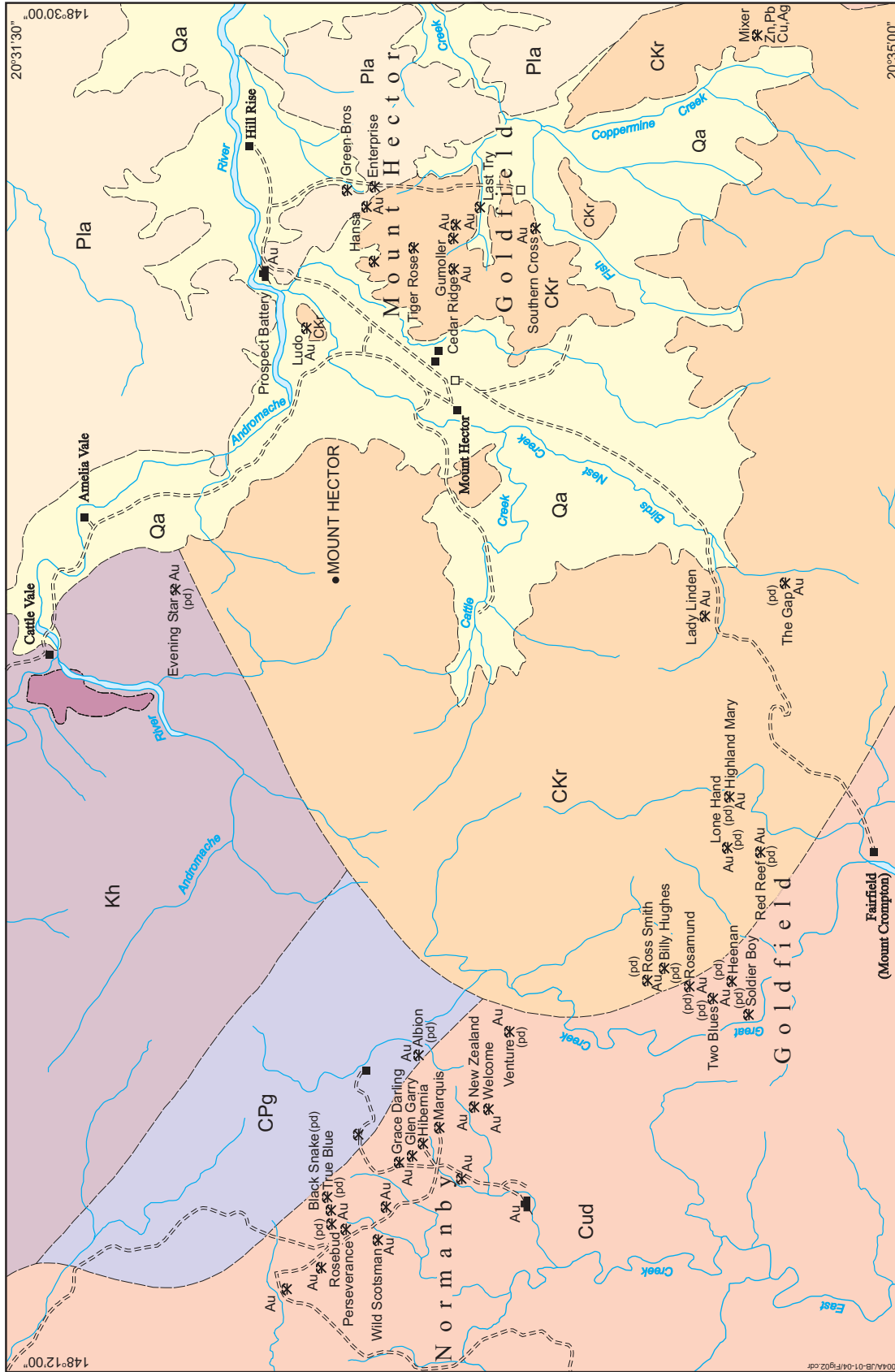
Mount Davenport

Mount Davenport was the centre of some lode and alluvial production. The Union and General Grant lodes were worked in mica schist. The main shaft in the Union reef was sunk to 55m, and the main shaft in the General Grant to 34m.

Mount Remarkable

Both alluvial and lode deposits were worked near Mount Specimen and Mount Remarkable. The problem of locating the workings accurately is complicated by confusion over the identity of Mount Remarkable. It seems that the hill called Mount Specimen on the 1959 RASC 1 :250 000 topographic map, which has been used as a base for the geological map accompanying this Report, was known as Mount Remarkable to the Survey geologists who reported on the area.

Specimen Creek and its tributary gullies were rich in alluvial gold.



Metalliferous deposits

2004A/B-01-04/Fig.02.cdf

The erratic primary gold mineralization occurred in quartz veins related to porphyry dykes. The veins occupied meridional fissures in quartzite and mica schist. The deepest shaft was 49.5m, but most were about 10m deep. The average grade of ore was 40 dwt (62.2 g) per ton, though some lodes carried up to 400 dwt (622 g) per ton. Crushings were small, and were generally composed of picked stone. The main producing lodes were the Balgay and the Barcoo: others were the Morning Star, Governor Blackall, Lone Star, Martins, Albions, Mariners, and Commissioners. Attempts were made in the late 1930s and early 1940s to recommence mining of the Balgay lode, but the venture failed.

At least some of the gold in the Mount Remarkable district appears to have occurred in quartz veinlets in the Upper Permian(?) volcanics (Puv) south-west of Golden Mount.

Mount Emu Plains

The Mount Emu Plains area was worked from 1910 to 1915 and from 1939 to 1942. The mines are in the Dumbano Granite near its contact with the Cape River Beds. The granite here commonly contains muscovite instead of the more typical biotite. The orebodies consist of quartz veins or greisen with quartz lenses: extraction of the gold was hampered by the content of galena, pyrite, arsenopyrite, and sphalerite. The most important lode is the Granite Castle, which has been explored for about 400m on the surface. It consists of greisen and lenses of quartz in a well marked fissure which trends east and dips steeply to the north. It ranges up to 1.5m in width. The quartz veins, which average about 25cm wide, contain most of the gold. The lode has been worked to a depth of 30m in the Granite Castle and 27m in the Granite Castle West. Recoveries from hand-picked shipments were over 20 dwt (31.1g) of gold per ton.

A small but rich producer was the Diecan, sunk on a narrow quartz vein showing free gold. The vein was followed to a depth of 18m.

Lolworth

Several mines situated between Brandy and Toby Creeks were together known as the Lolworth diggings. Gold was discovered in 1926, and mining effectively ceased in 1953, although attempts are still made from time to time to reopen the mines on a small scale. There was very little alluvial production.

The deposits occur in biotite adamellite of the Lolworth Igneous Complex. The adamellite has been intruded by various dykes which may be related to the Mundic Igneous complex. The orebodies were probably formed at relatively high temperatures. They consist of small veins, with greisenized aureoles, which contain pyrite, arsenopyrite, chalcopyrite, and sphalerite; greisen pipes containing small amounts of the same sulphides; and pegmatitic quartz veins. Other high-temperature minerals present in small amounts are wolframite, scheelite, molybdenite, bismuth, and tourmaline. Torbernite has also been recorded. The occurrence of gold in bournonite from the 115-foot (35m) level of the New Venture mine is described in CSIRO Mineragraphic Report No.211.

The Crystal Oak mine was the site of the original discovery. The deposit consists of a stockwork of gold and copper-bearing quartz veins. A small amount of Copper and about 350 oz (10.9kg) of gold were produced between 1928 and 1939. The grade averaged about 20 dwt (31.1g) of gold per ton from picked ore. The workings are less than 30 m deep.

The Midas mine was the biggest producer at Lolworth; 3550 oz (110.4kg) of gold were taken from it between 1934 and 1950. The ore occurs in a pipe of greisenized granite. Besides gold, a little sphalerite and chalcopyrite are present. The main shaft is 40m deep, and the average grade was 28 dwt (43.5g) per ton. The mineragraphy of some specimens of ore from the Midas mine is described in CSIRO Mineragraphic Report No.205.

At the Sunrise and Big Shine mines the ore occurs in small pegmatitic quartz veins occupying fissures in the granite. The Sunrise produced about 800 oz (24.9kg) and the Big Shine 250 oz (7.8kg), The ore averaged about 100 dwt (155.5g) per ton at the Sunrise, and 40 dwt (62.2 g) at the Big Shine.

The Mons Meg lode was discovered in 1934 and was worked until 1953. The orebody is a greisen pipe containing gold and small amounts of galena, sphalerite, and chalcopyrite. The ore averaged 17 dwt (26.4g) per ton, and was enriched where the ore body intersected a diorite dyke (Mundic Igneous Complex?), which probably acted as a barrier to the orebearing fluids, The main shaft is 59m deep, and the total production was 2700 oz (84kg).

Mount Stewart Area

No geological work has been done on most of the mines near Mount Stewart, and their locations are not known, but over 60 of them are mentioned in Wardens' and other reports. Most of the lodes on and around Mount Stewart trend north to north-east, and dip to the east, and their average thickness is about 30cm. The maximum recorded depth of workings is 34m at the Surprise. The distribution of the gold appears to have been erratic. The total recorded production is 1650 oz (51.3kg) of gold from 2300 tons of ore.

The Brilliant Brumby mine, which is still being worked from time to time, lies to the west of the main group. It has been described by Cribb. The main lode trends at 350° and is almost vertical; there are several smaller parallel lodes. The average thickness of the veins is about 30 cm and the maximum thickness about 1 m. The outcrop can be traced for 300 m, and surface workings extend for over 200 m; the main workings, which are at the northern end, are about 120 m long and up to 24 m deep. The total recorded production is 790 oz (24.6 kg) from 950 tons of ore.

Mode of Occurrence and Origin

There are several kinds of primary mineralization in the map area: quartz veins associated with porphyry dykes into which they merge in places (Upper Cape and Mt Remarkable); greisen and pegmatitic quartz veins (Lolworth diggings); quartz veins and greisen (Mt Emu Plains); simple quartz veins (Mt Remarkable, Mt Clearview, and Brilliant Brumby); and erratic pods in barren rock (Pentland district).

It is almost certain that more than one period of mineralization is represented in the area. The primary structural control seems to have been fractures trending between north and north-east.

Daintree emphasized that the mineralization at the Upper Cape and Mount Remarkable mines is often closely associated with acid porphyry dykes or 'elvans'. (The word 'elvan' is used by authors on the geology of Cornwall, for quartz-feldspar porphyry and felsite dykes which intrude the Cornish granites and surrounding slates), for example near Gorge Creek (Upper Cape district), where the quartz veins appeared to him to be almost 'a continuation to the surface of the elvan veins themselves'. Rands describes Greens Specimen reef at the Upper Cape as a kaolinized feldspathic rock resembling quartzite, which is

transected by auriferous quartz veinlets. Unfortunately such dykes were not sighted in the Gorge Creek area during the 1963 regional survey, and their affinities and relationships are unknown. However, throughout north-east Queensland they appear to be characteristic of a high level of intrusion, and are commonly associated with epizonal granites. Therefore the acid porphyry dykes at Gorge Creek and Mount Remarkable are unlikely to be related to the Lolworth Igneous Complex, which is not a high-level intrusion, and whose associated dykes have granitic, pegmatitic, and aplitic textures. The difference in association is epitomized by the contrast between the Lolworth Igneous Complex, on the one hand, and the epizonal subvolcanic Mundic Igneous Complex, on the other, which intrudes it. Clearly it is important that any future study of the gold mineralization in the Cape River district must solve the problem of the identity, age, and relationships of the porphyry dykes.

Morton reports that the Mons Meg lode at Lolworth diggings appears to post-date a diorite dyke cutting across the granite of the Lolworth Igneous Complex. It is thought that this dyke and the mineralization are more likely to be related to the Mundic Igneous Complex than to the Lolworth Igneous Complex. On the air-photographs a prominent swarm of intermediate to basic dykes of the Mundic Igneous Complex can be seen trending north-west through the mineralized area. Such dykes are nowhere known to be related to the Lolworth Igneous Complex. Dykes of porphyritic hornblende andesite, metasomatized and slightly mineralized in places, are described petrographically in CSIRO Mineragraphic Report No, 211. It seems reasonable to relate these dykes to the dyke swarm of the Mundic Igneous Complex that transects the Lolworth diggings.

Nothing is known of the location or geology of the 60 or so separate workings in the Mount Stewart area which are mentioned in Wardens' and other reports, but it is likely that at least some of them are related to the Mundic Igneous Complex, which forms Mount Stewart itself.

Alluvial gold derived directly from coarse disseminations in a porphyry dyke was recorded by Daintree near Mount Remarkable or Mount Specimen. It is possible that this has a genetic connection with the gold occurring in veins of quartz and feldspar in volcanics (Puv) south-west of Golden Mount.

The most likely source of the mineralization at Mount Emu Plains and Mount Clearview are respectively the Dumbano Granite and the Lolworth Igneous Complex. Although dykes are mentioned in the reports on Mount Clearview, their relationship with the mineralization is not clear.

The source of the gold-bearing veins in the Pentland district and at Mount Davenport is unknown, Hands (1891, p 2) reports that the Union reef is 'crossed' (presumably cut) by dykes of coarse muscovite(?) granite, which suggests that these reefs may be related to or older than the Lolworth Igneous Complex.

Many creeks, which were often used as reference points in the old reports, such as Sandy Creek, Reedy Creek, and Specimen Creek, are not marked on the RASC topographic map which was used as a base for the geological map. However, in most cases they can be identified by perusing the air-photographs while reading the descriptions in the reports.

In view of the occurrence of coarse waterworn alluvial gold at the base of the Campaspe Beds in the Cape River Deep Lead, and the similar occurrence at Chinamans Gully, the Campaspe Beds should be regarded as a prospective target if any further exploration for gold is carried out in the area.

On geological grounds it seems reasonable to suggest the existence of potentially auriferous deep leads beneath the basalt which all but encircles the Lolworth diggings.

The possibility of fossil gold placers occurring in the sedimentary rocks along the present north-eastern edge of the Galilee and Eromanga Basins was first pointed out by Daintree, and should also be considered in the course of further exploration.

THE CLARKE RIVER 1:250 000 SHEET AREA

Gold has been mined from the Lucky Creek Goldfield near the headwaters of Lucky Creek, which is a tributary of the Burdekin River in the northern part of the Sheet area. The gold is in lenticular quartz reefs that conform to the bedding of steeply-dipping sediments of the Lucky Creek Formation. Gold mineralization occupied a length of 1,000 feet and a width ranging from 8 inches to 2 feet. The deepest mine was the 'Try Again', which was worked to a depth of 115 feet. Production reached a peak in 1907, when about 250 tons of ore was mined to yield an average of 2 oz Au per ton.

THE EINASLEIGH 1 :250 000 SHEET AREA

About 75,000 oz of gold have been won from the Oaks Goldfield, one mile west of Kidston. Gold was discovered here in 1907 and mined till 1942. The most comprehensive description of the Oaks Goldfield is that by Marks.

The gold is found in quartz veins and altered and crushed zones of the Forsayth Granite.

Less important occurrences of gold are apparently associated with quartz porphyry in Balcooma Creek.

THE GILBERTON 1:250 000 SHEET AREA

The *Woolgar Goldfield* covers an area of 2850 km², but most of the mines are contained within an area of 1000 km² near the Woolgar River on the south-western edge of the Gregory Range in the southern part of the Sheet area. The most comprehensive description of the field was provided by Saint-Smith.

The gold reefs are in granite and Archaean? metamorphics, both of which are intruded by dolerite ('diorite') and pegmatite dykes. Saint-Smith described the reefs as occupying 'shrinkage lines along the margins of pegmatitic granite dykes'. Reefs also occur in shears within the dolerite (amphibolite) dykes. The reefs ranged from 3 to 210 m in length (average 60m); they were 0.6m wide and worked to an average depth of 24m, about the depth of the water table. The reefs generally dipped from 80° to 85°. Some of the gold ore contained lead, copper, and manganese minerals.

The main production was obtained from the Woolgar Goldfield between 1880 and 1887, when 567kg (15 000 oz) of gold was won, including 150kg (4000 oz) of alluvial gold. Production declined after this period, and up to the time of Saint-Smith's inspection in 1922 only 113kg (3000 oz) of gold, averaging 50 g/tonne (1 1/3 oz per ton), were produced. The main producing mines were the Perseverance-Try Again, Soap-spar, and Mowbray. The Soap-spar and Redjacket mines were the only mines working in 1958.

The *Percyville Goldfield* is situated on the Percy River in the northern part of the Sheet area. The gold occurs in reefs near the contact of Precambrian metamorphics with granite, both of which have been intruded by pegmatite and rhyolite dykes. Ball (1915) described the lodes as generally siliceous. The gold reefs average 0.6m in width and some are nearly 0.5km long. Most workings do not penetrate below the oxidized zone, which is probably 30-45m deep; the deepest workings extended to 152m in the Union Mine. The gold ore contained appreciable amounts of lead, silver, zinc, and copper; one assay at the 30m level of the Homeward Bound Mines was 560 g/tonne (15½ oz per ton) Ag, 45 g/tonne (1¼ oz per ton) Au, 13% Pb, 2% Cu.

Total production from 1912 to 1917 on the Percyville Goldfield was 2080 tonnes of ore, which yielded 150kg (3950 oz) gold, 400kg (10334 oz) silver, and 90 tonnes copper; 13 tonnes of lead were won in 1912. The largest production from any one mine was 105kg (2800 oz) of gold from the Union Mine. The primary ore averaged 20 to 25 percent copper and 220 to 260 g/tonne (6 to 7 oz per ton) of gold, with exceptional small rich patches containing 3700 g/tonne (100 oz per tonne) gold.

Gold has also been mined from quartz reefs in the Proterozoic granite at *Mount Hogan* in the headwaters of Granite Creek in the north-east. No information is available on the size of the reefs. Jack and Etheridge recorded production of 170 kg (4500 oz) of gold averaging 65 g/tonne (1¼ oz per ton) from 1885 to 1890.

Gold averaging 75 to 110 g/tonne (2 to 3 oz per ton) was mined at *Mount Moran*, 3km north of Ortona copper mine near the northern boundary of the Sheet area. Gold was obtained from quartz veins in weathered and leached dolerite dykes between depths of 15m and 90m, below a cover of Cretaceous sediments. The Mount Moran Mine should not be confused with Mount Moran, a prominent peak in the Mount Hogan goldfield.

THE GEORGETOWN 1:250 000 SHEET AREA

About 600 000 oz of gold have been won from the Etheridge Goldfield since mining operations began in 1877, with an average grade of 1½ oz gold per ton. Today no mines are being worked on this field; in 1957 unsuccessful attempts were made to open the City of Glasgow mine. Cameron's comprehensive descriptions of the auriferous quartz reefs on the Etheridge Goldfield have been supplemented by later mine descriptions by Reid and Cribb.

In the primary zone the gold in the reefs contains pyrite, galena, chalcopyrite, and sphalerite; the oxidized zone extends from 60 feet to 100 feet deep. Only 14 mines were worked to a depth greater than 200 feet and in general the gold content decreased below 300 feet.

The principal gold mines were the Cumberland, which produced 65,713 oz of gold from ore averaging 1oz 18 dwt gold per ton, and the Durham near Georgetown; and the Queenslander and Nil Desperandum near Forsayth. The Union Mine, situated near the southern boundary of the Georgetown Sheet in the Percyville field contained rich pockets of ore which yielded up to 100 oz gold per ton. 2.800 oz of gold were extracted from the Union Mine. The primary ore averaged 20 to 25 percent copper and 6 to 7 oz gold per ton.

THE NORTH WESTERN DISTRICT

Gold first attracted prospectors to the district, but the deposits, though rich in some cases, were not extensive and the mineable gold was soon worked out. A partial revival of gold mining took place in the depression years of the nineteen-thirties, but since that time the amount of gold produced has been negligible. The principal centres of gold-mining were *Top Camp* (alluvial), south of Cloncurry, *Soldier's Cap* and *Gilded Rose* (reef), south-east of Cloncurry, *Bower Bird-Doughboy Creek* (reef and alluvial), south-west of Kajabbi, and *May Downs* (reef), north-west of Mount Isa. The prospects of finding payable gold deposits are not as favourable as for base metals. Areas south and east of Cloncurry are considered most favourable for further prospecting.

<i>Mine</i>	Ore Treated (Tonnes)	Copper Produced (Tonnes)	<i>Grade of Ore (% Cu)</i>	Gold Recovered (kg)
Mount Cuthbert	61 653	4393	7.0	4.9
Kalkadoon	46 616	3550	7.6	1.0
Orphan	24 130	2786	11.5	17.0
Dobbyn	16 846	2864	17.0	10.6
Mighty Atom	9655	1181	12.2	0.9
Crusader	3700	386	10.4	1.1
Little Wonder	1735	214	12.4	0.4
Lady May	1024 (992*)	205	20.7	1.1
Warwick Castle	1605	176	11.0	0.3
Mussolini	718	142	19.5	0.1

*Records incomplete. Copper and gold production and percentage yield of copper based on smaller figure.

The discovery of the unusual *Silver Phantom* deposit near Kuridala in 1953 shows that it is possible for new deposits to be found by careful prospecting even in areas which were thought to have been thoroughly examined. Parcels of high-grade ore consisting of native silver and cerargyrite have been obtained from the deposit.

The total recorded production of gold is less than 57kg, practically all of it as a by-product from the production of copper from the main mines. The figures for individual mines are included in the Table. Jensen has recorded gold from the Lochness area, and Rayner from Silver Ridge 64km north of Mount Cuthbert. It does not appear to be present in economic quantities or grade at either place. 'Colours' have been obtained from a number of places within the area of outcropping Precambrian, from both crystalline and sedimentary rocks.