



Mineralogical Society of Western Australia (inc.)

April 2002

Volume 3, Issue 2

Presidents Report I was pleased to see such good attendance at our February meeting. A number of issues were canvassed including the Mineralogical Societies Joint Seminar in 2005, fieldtrips and upcoming lectures. Professor Peter Williams of Sydney has offered to give a lecture on the Hidden Collection in May, on a date yet to be fixed. The idea I suggested of a series of mineralogical lectures on specific topics was well received. To that end the following topics were decided;

Mineral chemistry – Peter Clark

Physical properties of minerals – Ted Fowler

Mineral associations – Mark Jacobson

Mineral classification – Roger Staley

The rock forming minerals – Peter Clark

Mark has been actively on the trail of likely collecting localities with some success – more later. The Hon editor still requires articles for the newsletter, so please support him

Field trip to the Rifle Range quartz crystal locality Toodyay, WA. for Sunday 14 April 2002

The Mineralogical Society will be leading a one day field trip to a quartz crystal locality where the quartz contains phantoms and other inclusions such as chlorite. This locality is an easy collecting locality, ideal for small children and picnics. Although spectacular crystals can not be found there, small, loose crystals to 1 centimetre length can be easily found, particularly by screening the topsoil.

Mineralogy

The largest clear quartz crystals reach up to 3 centimetres in length by 1.2 cm in diameter. These are quite rare. Some crystals contain various mineral inclusions such as rutile and siderite. Phantoms are common. Most crystals average 1.5 cm long by 1/2 cm diameter, and are terminated at one end.

The quartz crystals are found loose in the topsoil, weathering directly from thin, vuggy quartz veins that subcrop below. Larger masses of vein quartz within quartzite can be found within the topsoil. The quartz veins formed within a metamorphic quartzite bed that traverses the area. Fractures within the quartzite allowed low temperature quartz-rich water solutions to re-crystallize within them.

Location

The known digging area is located at 448,750 E and 6,508,050 N, AGD 1966, UTM grid zone 50, survey tracts 27956, 17775, 22584 and 35809. The area is located on the Avon Valley, 1:50,000 scale map sheet.

Directions

Field trip participants will meet at the intersection of the Toodyay-Goomalling road with the Toodyay-Perth road (route 50), at 10 AM. The group will travel together to the locality, an additional 2.1 kilometres.

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Diary2002

April 3rd

Guest Speaker
Joshep Cole

June 5th
Club Meeting

August 7th
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Guest Speakers Topic

Small Scale Gold Mining in the Yilgarn Goldfield, 1980 – 1986

Society member Joseph Cole will give the principal talk at the April meeting on the development of a small gold mine from surface sampling to ore extraction and treatment. Joseph will describe the orebody, underground development, extraction and treatment at the Local State battery. A brief history of mining in the general area will be covered and samples of ore and examples of tools, together with photographs will be available for inspection.

This type of operation, once an important part of mining in Western Australia is rapidly disappearing. There is no doubt that Joseph's talk will appeal to members interested in both the practical and historical aspects of small scale gold mining in W.A.

Inward Correspondence

The Mineralogical Society of Queensland

December Newsletter

An article on the Bob Taylor Memorial Trophy and Bob's contribution to the society was followed by "run down" on the society Xmas party. Tony Forsyth provided an informative article on fossicking Up North. A synopsis of the 19th New Zealand Micro Mineral Symposium Oct 2001 was also included.

The Mineralogical Society of N.S.W.

December Newsletter

The newsletter included an invitation to the Christmas social and swop and sell. Also mention of the Geodiversity Symposium held at the Australian Museum (I have a copy of the abstracts should any member like a copy). The Society had a productive visit to Sunny Corner and North Parkes. At the November meeting Dr Lin Sutherland gave a lecture on the pyrite from La Roya in Spain.

The Mineralogical Society of N.S.W.

February Newsletter

A lecture was given by Takashi Kuriyama on the Minerals of the Hishikari Gold Deposit in Japan. The talk was followed by a mineralogical quiz.

The Mineralogical Society of N.S.W.

March Newsletter

It was announced at the February meeting that \$6000 was to be provided by the Society to publish 1000 copies of a new booklet The Gem Minerals of New England. A summary of the Hishikari lecture was included as well as the Mineralogy Quiz – obviously a common idea.

Should any members like to borrow any of the above or previous newsletters please let me know.

The Mukinbudin pegmatite field, Mukinbudin, WA

Several collecting trips and visits by mineralogical society members have been made to the Mukinbudin area after additional pegmatites started being excavated in the 1990s. Some of the named pegmatites in this field are the Mukinbudin feldspar, Calaling, Gillets (Wondanning), Kaloning, Coshs, Wialki, Coupers, and Strugnell pegmatites. Many other pegmatites are present that have not been named. Geologically these pegmatites are found within a post-tectonic biotite adamellite or adamellite, having formed outside of the greenstone belts. These interior, quartz- and feldspar-rich pegmatites belong to Cerny's (1991) allanite-monazite NYF class of rare-element pegmatites.

In February 2002, the minerals that have been identified from this field are quartz (clear, black and smoky crystals to 60 centimeters long, white massive), albite (white massive, clear crystals), microcline (pink, tan massive and euhedral pocket crystals), muscovite, biotite (plates to 1 meter diameter), magnetite, hematite, fergusonite-(Y), fluorite (light green masses to 2 cm), allanite-(Ce) (kilogram-sized masses), columbite(?), zircon (variety cyrtolite), euxenite(?), monazite, topaz (yellowish opaque crystals to 20 centimeters diameter), pyrite, ilmenite (niobium bearing?), and beryl.

Mineral identification and pegmatite investigation of this field is continuing.

**19th Century Prospecting
and the
21st Century
by
P.W. CLARK**

1. Introduction

The term 'prospecting' is generally associated with the 19th century. However, it is synonymous with its modern equivalent: mineral exploration. Today, however, geologists rarely refer to themselves as prospectors.

At the end of the 20th century, we live in an age of unimaginable change, when rapid technological advances make it difficult if not impossible to keep pace. We also live at a time when man is learning more and more about less and less. Science, including the geological sciences, is at the leading edge of this trend. Though it may be argued that this state of affairs has always been the case throughout history, it appears more acute at this point in time.

It is with this background in mind that a review of the history of mineral exploration in Australia, particularly with regard to the Western Australian gold industry, becomes relevant.

A comparison of methods employed in the 19th century and today highlights not their differences but their similarities, and can best be shown by archival illustrations of the period and anecdotal evidence.

As a result of this review and comparison, it can be argued that the quintessential element of 19th Century prospecting will be just as relevant in the 21st Century, and that element is individual motivation and effort. Ultimately, there can be no technological substitute for the prospector on the ground. Today there is a need for a synergy between the prospector and the geologist.

2. Highlights of Mineral Development in Australia to 1900

The importance of prospectors in the 19th Century can be gauged by the following significant dates in the history of mineral exploration. These include (DOME 1992, No. 6):

- 1797 Coal discovered at Coalcliff, NSW.
- 1825 Coal discovered at Cape Paterson, Vic.
- 1840 Discovery of copper in SA.
- 1848 Discovery of lead in Murchison River, WA.
- 1851 Discovery of gold near Bathurst, NSW, and at Clunes, Castlemaine and Ballarat, Vic.
- 1857 Brown coal discovered in Vic.
- 1859 Copper discovered near Cobar.
- 1860 Copper discoveries at Wallaroo and Moonta in SA.
- 1863 Gold discovered at Walhalla, Vic and Warwick, Qld.
- 1864 Coal discovered at Greta, Cessnock, Maitland in NSW.
- 1866 Gold discovered at Rockhampton, Qld.
- 1869 The 'Welcome Stranger' nugget found at Dunnolly, Vic weighing 2284 oz.
- 1871 Discovery of tin at Mt Bischoff, Tas.
- 1874 Brown coal deposits found in Latrobe Valley, Vic.
- 1877 Gold discovered at Beaconsfield, Tas.
- 1882 Lead, zinc, copper deposit at Captains Flat, NSW developed.
- Gold found at Charters Towers and Mount Morgan, Qld.
- 1883 Lead, silver, zinc discovered at Broken Hill, NSW.
- 1886 Gold and copper discovered at Mt Lyell, Tas.
- 1888 Black coal discovered at Leigh Creek, SA.
- 1890 Tin discovered at Renison Bell, Tas.
- 1893 Copper, lead and zinc discovered at Rosebery, Tas.
- 1900 Iron ore mined from Middleback Range, SA.

2.1 The Inaugural Meeting of the AusIMM

There has long been a lack of recognition of the role of prospectors and a good example of this was the Inaugural Presidential Address at the AusIMM Adelaide meeting on 4 April 1893 which was read by the Hon Dr Campbell MLC and mentioned aspects of the Institute that have relevance today (Dew, 1993).

- Provision for membership has been made on so wide a basis to enable all those interested in the objects of the Institute to unit together either as honorary members, members or associates.
- We shall always gladly embrace within our circle geologists ... and cordially welcome mechanical engineers, mine captains, foremen of mines and furnaces, mineralogists, chemists, analysts, and metallurgists. We hope to attract men having practical knowledge of many subjects connected with mining and metallurgy.

The argument between the professional's and the non-professional's role is still alive today.

3. History of Mine Development in Western Australia

Mining and prospecting for minerals in Western Australia dates back many thousands of years. The aborigines were the State's first miners. They dug for minerals they could use for tools and weapons, and for decorative use. The largest Aboriginal mining excavation evident today is at Wilgie Mia, near Cue, where a large cavern was excavated to obtain red ochre (DOME 1992, No. 7).

Soon after the arrival of the first settlers at the Swan River settlement in 1829, the Western Australian mining industry began with the quarrying of limestone and digging of clay for bricks.

Government rewards were offered for the discovery of coal during the 1830s, but it was not until the mid 1840s that reports of discoveries began to filter through. In 1846 there were reported coal finds on the Murray River, south of Perth, and in the bed of the Irwin River, near Dongara. Copper and lead occurrences were also noted south of Perth, near Mundijong. The first mining company was formed the same year, but attempts to exploit the Mundijong discovery met with little success.

Augustus Gregory found a vein of lead in the bed of the Murchison River near Kalbarri in 1848 and production began from the Geraldine mine at this site in 1850. In 1883, the Collie coalfield was discovered.

The discovery of payable gold at Halls Creek in 1885 was the spark that began mineral development in Western Australia. Even though the Halls Creek gold rush was short-lived, it led to gold prospectors searching throughout the State, and subsequently leading to rich gold discoveries in the Pilbara, Murchison and Yilgarn districts over the next five years, finally culminating in the huge discoveries at Coolgardie in 1892 and Kalgoorlie in 1893. News quickly spread around the world, causing a rush of immigrants from both overseas and the eastern colonies of Australia.

The gold rush increased the population of Western Australia from 46 000 in 1890 to 180 000 in 1900. This brought about great changes, not only to the goldfields, but also Perth and the agricultural area. It resulted in Western Australia progressing from being an impoverished colony to a wealth state by 1901. Gold production peaked in 1903, and had declined significantly by WW II.

However, not all fortunes were made or lost by prospecting and mining. At Coolgardie, at its height, the rush had resulted in 26 stockbrokers and two Stock Exchanges, three breweries supplying 26 hotels, and four Clubs, including one solely for Japanese. Australia has developed with the contributions of men and women from many nations. The mining industry has been a catalyst for development (Dew, 1993).

Government Geologist.

It was not until 1882 that the next temporary Government Geologist (Edward T. Hardman) was appointed.

The appointment was not accomplished without encountering some opposition in the Council as the Parliamentary Debates for 5 September 1882 record.

Hardman's maps and reports on the Kimberley clearly indicated many likely gold-bearing areas, including the site of the 1885 Halls Creek discovery, which led to the Kimberley gold rush of 1885-86.

Sir Thomas Cockburn-Campbell summed up his opening address with the comment that:

"... he trusted and believed he was moving in a matter that would do much good to the colony, and he had confidence it would do no harm."

The ensuing opposition to this motion was led by Messrs Grant and Burt, Mr McKenzie Grant:

"... denied that scientific men had contributed in any way to the important mineral discoveries which had made the fortunes of the other colonies; those discoveries were due to accident or to the labours of practical men, of the pick-and-shovel persuasion."

However, Burt's amendment was carried - twelve to five; and the establishment of the Geological Survey was thereby deferred.

However, the following year, no doubt because Hardman's role in the Kimberley gold discovery was by then publicly acknowledged, and also because of Forrest's continuing support for the establishment of a Geological Survey, an item of £1 000 for a Geological Survey again appeared in the estimates, and after token resistance from Mr Grant, the Legislative Council approved of the expenditure on 16 August 1886.

H.P. Woodward accepted and arrived in Western Australia to take up the appointment on 9 January 1888. The period 1888-1893 was very demanding for Woodward, as it was marked by a rapid succession of substantial gold finds. Not until 1893, when the flood of new finds peaked with the discovery of Kalgoorlie, was he given a professional assistant - Mr Stephen Göczel, a Hungarian geologist.

Woodward resigned in 1895, and Göczel in 1896, both lured away by the promise of higher salaries in the then-booming mining industry. The previous year had seen the publication of Woodward's Mining Handbook (1894) and his Geological Sketch Map of Western Australia (1894).

The next Government Geologist was Andrew Gibb Maitland. Maitland had a clear vision of what a Geological Survey should achieve and he was an excellent scientist and administrator. He took up the position in late 1896; and, by the end of 1897, the Survey had a staff of nine and an organisational structure that was to serve in the same basic form for the next sixty years (GSWA, 1990).

This brief history emphasises the synergy between the prospector and the geologist, something that may be lost in the latter part of the 20th Century.

6. Methods of Prospecting

19th Century

Loaming
Manual Costeaning
The Dolly Pot
Working a Leader
The Berdan Pan

20th Century

Bleg Geochemistry
Mechanical
Mechanical Mills
Structure & Geochemistry
Knelson Concentrator

19th Century

Dry Blowing
Wet Puddling
Sinking Shafts
Panning

20th Century

Geochemical Analysis
Geochemical Analysis
Drilling
Gold Analyses

6.1 Loaming for Gold

Cash, in his book *Loaming for Gold*, written in the 1950s, makes the following observations about prospecting:

“In the opinion of most people and particularly the inexperienced, success in prospecting is purely a matter of luck. Luck may assist and even come to the rescue in any class of undertaking. Those who make determined efforts will get results more often than those who take the lines of least resistance and depend on something turning up.”

“A little nine inch dish is as good in a test as a big one and many times quicker. If a colour is not to be raised with less than a big dish of loam it is not worth trying for the deposit or at least not for a prospector, who has to depend on loaming for his living. In case of getting one colour to the little dish a big dish would yield about half a dozen, but to no advantage. After reaching a position where prospects improved there would be sufficient colors in the little dish for deciding upon the next move, and when a corner of gold is obtainable a little corner is as useful as a big one.”

“Should a day’s work be done where no gold exists it would be some satisfaction to know that it was done with less exertion than with the big dish and also that days of time were saved too. It may here be mentioned that a bucket is more convenient than a kerosene tin when the clear water is being used to finish off a sample in the dish. The wider top makes the operation a little easier.”

“All quartz outcrops on the old goldfields have been examined and loaming is the only method by which those underneath the loam can be found unless there be many feet of overburden, when it is possible that no loam gold would be shed. It may be that the only places worth deep trenches would be the presumed continuation of a known gold bearing reef or lode. Naturally all gold bearing material sheds some gold, but it may not reach the surface in all cases in sufficient quantity to justify a search. Some will tackle a proposition which others would think too difficult and succeed, too.”

“Of the hundreds of shows which have been found in Western Australia of late years it can be said that ninety-nine per cent have been found by loaming.”

7. The Discovery of the Leonora Field

The history of the Leonora Field highlights the relationship between the early prospectors and the geologists who followed them. In 1869, John Forrest led a small expedition to search for possible remains of Ludwig Leichardt’s lost 1848 expedition. Mt. Leonora was first seen on the 20th June, and reached next day. The next few days were spent in searching for water and feed for the horses. On the 28th June, Forrest separated from the main party, and accompanied only by Tommy Windich, his aboriginal guide, made a dash to a point about 30 miles east of Laverton (Reid, undated).

Forrest returned to Gwalia as State Premier in 1899, and found a very different scene, at the foot of the lonely hill he had named was a bustling mine and township.

In his journal, Forrest was pessimistic about the value of the country for agriculture. However, he made the following comment, “as to minerals I am not sufficiently conversant with the science to offer an opinion, except that I should think it was worth-while sending geologists to examine it thoroughly”.

Doodah Sullivan was the first prospector to find gold near the present town of Leonora. Late in 1895, working by himself he found gold about 6 km north of where Leonora is now situated. In March 1896, he pegged the Johannesburg Lease. He died later that year and his grave is on the site of his lease near Mt. George (Turnbull, undated).

In June 1896 the Gold Blocks Leases were applied for by A. McPhee. In July, the Trump Leases were registered by Armstrong, Roach and Collins. In 1898, a 10 head battery was erected near Mt. George. By 1899, other mines such as the Main Reefs and the Ping Pong were also in production and during this year the Gold Blocks produced 3 000 oz of gold.

During 1894, Thomas Tobias, a Coolgardie storekeeper, went to Wales, his birthplace, for a holiday. While there, he organised a Welsh financed syndicate, including a number of Welsh Nationalists, to finance a prospecting party in the Western Australian gold-fields. The syndicate, worth £2 000, called itself the Sons of Gwalia, Gwalia being an ancient name for Wales. Tobias returned early in 1896 and financed three prospectors, F. White, J. Glendinning and J. Carlson. They headed north to Malcolm, which by then was a small, busy goldmining town about 120 km north of Menzies. From there, they went west to the Leonora area and towards the end of May 1896 they pegged a lease about 3 km south of Leonora and called it The Sons of Gwalia after the syndicate. The find was regis-

8. Conclusion

19th Century prospecting methods and the 21st Century's high technology mineral exploration have a common and indispensable link, and that is the prospector/geologist. There needs to be an acceptance of what might be termed the prospector's attitude by more modern geologists and, conversely, those few remaining prospectors would do well to accept more modern technologies. It has been, and will be, through individual effort and astuteness that future mineral deposits will be found. Successful exploration has relied on the prospector's patience, perspicacity, perseverance and a little individual panache.

Comparison of 19th Century and modern prospecting techniques.

<i>19th Century</i>	<i>20th Century</i>
Labour intensive	Capital intensive
Low technology	High technology
Individuals/syndicates/small companies	Mostly large public companies
Slow poor communication and transport	Fast excellent communication and transport
Minimal regulation	Regulated
Government support high	Government support minimal
Danger significant, personal hardship	Safe, comfortable
No environmental concerns	Environmental and safety regulations
No concern for indigenous peoples	Native Title, Aboriginal Heritage

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An application form for membership can be obtained by writing to: -

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Ordinary meetings of the Society are held on the 1st Wednesday in February, April, June, August, October and December in the **W.A. Lapidary and Rock Hunting Club rooms 31 Gladstone Street Rivervale**, commencing at 7.30pm. The January meeting will involve social activities at a time and place to be notified.

Visitors are most welcome

Newsletter of the Mineralogical Society of Western Australia

13 Buchan Place, Hillarys, 6025
Western Australia, Australia

OUR SOCIETY'S MISSION

To encourage mineralogical study by amateur and professional alike and, in so doing, discover, document and preserve the earth's and in particular Western Australia's natural history.

OBJECTIVES

Whilst focusing on the minerals of Western Australia, the overall objectives of the Society shall be:

- (a) To advance the science of mineralogy.
- (b) To disseminate knowledge of minerals, their occurrence and associations.
- (c) To establish and maintain a register of mineral species and their occurrences in Western Australia.
- (d) To increase knowledge of related fields of earth science.
- (e) To keep members abreast of developments in mineralogy.
- (f) To encourage an appreciation of the aesthetic value of minerals.
- (g) To promote the proper care and preservation of mineral specimens.
- (h) To promote the conservation of the geologically unique and of the environment in general.
- (i) To provide a means of contact between professionals and amateurs in the various fields of the earth sciences.
- (j) To foster a sense of cooperation and understanding between individuals, institutions and resource companies in the field of mineralogy.
- (k) To provide a forum for debate and discussion on matters relating to mineralogy.