THE WOOLGAR GOLDFIELD'S INDUSTRIAL 
ARCHAEOLOGY OF CAPITALISM 1879-1939

By

Victor Jean Taylor

Submitted for the degree of Doctor of Philosophy 
of the Australian National University.

SCHOOL OF ARCHAEOLOGY AND ANTHROPOLOGY
ANU COLLEGE OF ARTS AND SOCIAL SCIENCES
THE AUSTRALIAN NATIONAL UNIVERSITY
CANBERRA, APRIL 2013
Declaration

I, Victor Jean Taylor, declare that this thesis, submitted in fulfilment of the requirements for the award of Doctor of Philosophy, in the School of Archaeology and Anthropology, College of Arts and Social Sciences, the Australian National University, is wholly my own work unless otherwise referenced or acknowledged. This thesis has not been submitted for qualifications at any other academic institutions.

© April 2013 Victor Jean Taylor.
Acknowledgements

In acknowledging those that have been involved in assisting me with the research of the Woolgar goldfield and preparation of this dissertation, Dr Lynley Wallis is recognised as the first person to draw my attention to the Woolgar's industrial archaeology. Further appreciation is also due to Lynley for inviting me to take part in some of her fieldwork being conducted on behalf of the Woolgar Valley Aboriginal Corporation which in turn enabled me to meet up with Helen Smith, the Secretary to the Traditional Owners' company. Helen was most helpful, as was Susan Gilmour, the Corporation's lawyer, in obtaining permission from the Traditional Owners to allow me to proceed with my research that was to start in June 2005.

The fieldwork with Lynley during the latter half of 2004 also enabled me to meet up with Dick Cribb to discuss camping arrangements for my forthcoming fieldwork the following year. Dick was the new lessee of Middle Park, the Traditional Owners cattle station that was part of the Woolgar and initially was concerned about his water supply from a nearby aquifer as western Queensland was still suffering from the effects of a long drought. After alleviating his concerns by agreeing to some basic rules for use of the homestead's outdoor ablutions, Dick offered a refrigerator for the duration of the research team's stay and recommended a nearby camp site. He was also helpful after the research team's departure, by sharing his experience as a long time cattleman on vital matters such as camp fireplaces in relation to local weather patterns, various features of the station's landscape and possible mine sites.

In this respect Roland Bartsch from the nearby Strategic Minerals Corporation NL field station, was particularly helpful in leading me across the hazardous Gregory Range to survey the upper levels of the Woolgar. While discussing the area's geology and adjoining mine sites Roland pointed out a particularly perilous mine shaft that had been covered by a thin layer of light timber and dried out tree branches. An important and timely reminder of the need to be vigilant while walking around historical mining sites. Roland also made available some copies of old maps from BHP and the UK company, Billiton's 1960s explorations of the old Woolgar mines. These were later found to be of no archaeological signification to my research and are mentioned purely as an indication of his helpfulness.
In this respect the old Woolgar miners, Arthur Barns, his brother Roger and wife, as well as Frank Crapp were my most valuable sources of information about the Woolgar. Arthur, who lived close to the Middle Park cattle station was not always in the best of health and on a number of occasions was hospitalised. Even so, Arthur was a good source of information on the Lower Woolgar mines and alluvial areas which he had often reworked. Frank on the other hand was always ready for a ‘chat’ about most aspects of the goldfield and I would call in on him during my supply trips to Richmond. Frank in particular is acknowledged and thanked for his loan of the Crapp Family's general store sales ledger which Lynley Wallis later arranged to be digitalised by the AIATSIS Library. One of my lasting memories of Frank was watching his early morning training sessions of his racehorse which he would tether to the side of his flatbed 'Ute' before driving up and down the street where he lived. Fortunately, he lived on the outskirts of Richmond which was not highly populated. Frank died suddenly in 2008 while his friend Arthur, according to the ladies at the Richmond Post Office, always a reliable source of information, was often seen in town during the later extensive flooding of the Woolgar.

The staff members of Richmond Shire Council offices were constantly found to be accommodating about matters regarding the Woolgar and even provided a small office in which to research the Council archives. It was here the local amateur historian Fred Staunton's research paper and two related photographs of Woolgar miners were found. Through the Shire's offices an acquaintance came about with Counsellor John M Forster OAM, ASM, the owner of a cattle station some 110 kms north east of Richmond. The ‘Trivalore’ property has been in the Forster family since the earlier members first arrived from the Scottish-Cumberland borderlands. The visit to the Forster's homestead eventuated in a loan of one of John's home movies showing a short clip of a Wilfley table in action somewhere on the Woolgar. Eventually the 8mm film's short clip was digitalised to a CD which is now included in the appendices of this thesis.

Before addressing the academic guidance I received during my candidature I would like to acknowledge the volunteers from Flinders University and in particular Alice Beale and Bob Stone. Alice for her meticulousness in everything she did and Bob who brought all his archaeological skills from excavating in the Middle East to the Woolgar. Bob's talent is encapsulated in most of the site maps illustrated in this thesis.
In like manner, without the slightest sycophantic intent, I have been impressed from the start of my candidature with the members of my supervisory panel. Unfortunately, Professor Graham Connah had to withdraw from the panel due to ill health leaving Professor Matthew Spriggs to cope with the monitoring of my output. His pleasant demeanour and erudition was always consoling and even more so when the Woolgar's archaeology was proving not as was expected from the first impression. His wise council helped me through a number of difficult periods with Zen-like reality of 'that's the Archaeology'. The two other stalwarts I asked to be on my panel were Dr Martin Gibbs of Sydney University and Dr Janice Wegner of James Cook University, Cairns Campus. Regrettably, Jan also had to leave my panel but with the understanding that I could always contact her on any matter concerning mining in Far North Queensland, which I did regularly. Recently I lost an essential photograph to one of my thesis premisses which I had previously sent to her for an opinion at least five years previously. In desperation I telephoned her to inquire if she remembered the photo and importantly, if she still had it. Within ten minutes the photo was on the screen of my computer. Martin is of similar reliability and was my weekly sounding board as well as my inspiration on many occasions over the past ten years. The regular Friday morning teleconferences with Martin will be missed, so too his greatly valued wise counsel. My other incisive unofficial mentor was Dr Betty Meehan who helped me through several periods of writer's blocks. Any irresoluteness would be quickly put paid to. Last but far from least, Liz Waters, the School's post graduate administrator, now retired, provided much valued friendship, advice and support.

But none equalled my dear wife, who in spite of her highly demanding job would take on any one of the supportive roles mentioned in the above.
Abstract

The customary feature of historical mining sites in Far North tropical Queensland is one of ephemerality. Therefore, the chance to study the Woolgar, a frontier goldfield of similar characteristics to other minesites but with vestiges of industrial archaeology still in situ, was an opportunity not to be missed. Furthermore, the Woolgar's gold rush of 1880 later transpired to be the last in Australia's nomadic age as better financed mining companies with more sophisticated technology were able to handle the complex ores being mined at the deeper levels. Nonetheless, the end of the adventurous nomadic age is seen as Australia emerging from a mercantile economy to that of a self-governing capitalist society even though it was on the periphery of a World System regulated by an ongoing financial restriction. Such an exigent economic and technological environment required adoption of a postprocessual methodology with adaptable components of inquiry and analysis such as had previously been instrumental in deciphering the archaeology of other northern Queensland mine sites.

Thus a variation on Giddens' theory of Structuration has been used as the analytical framework for the Woolgar. The industrial archaeologies of the goldfield that adapted the surrounding landscape and modifications in technology are the visualisations of Giddens' double hermeneutic of exponential agency that are also seen as the portals to past lifeways. The example of agency within Structuration's duality of structure highlights the unfolding processes of individuals, work groups and social collectives as 'being in the world'. More to the point, examples of agency framed within these motivating structures can only be considered if evidence of change is demonstrated in the archaeological record.

Giddens' general classification of a site's Allocative and Authoritative Resources and appropriate judicious analogies produce premisses regarding the Woolgar's economic worldview and the outdated Cornish technological diffusion affecting the Woolgar's production. Past archaeological research of base metal mining operations have a ready source of historical economic material that provides both local and worldview backgrounds of a study. Gold on the other hand and contrary to its mystique has an opaque interpretive milieu requiring a more intensified research. Although gold transformed Australia's world stature, the analogy of recurring restrictive elements of the precious metal is seen as not boding well for future economic alliances.
While this thesis applauds new directions in Historical and Industrial Archaeology it still echoes earlier calls to include the economic background to enhance technological studies that have been considered the gateway to past cultural lifeways since the middle of the last century. Nevertheless, this dissertation questions inappropriate analogies from other cultures such as the use of North American archaeological ceramic assemblages to analyse early Australian social mores. It additionally suggests that Australian culture does not need to look to the British Class System to analyse its frontier mining archaeology. Instead, this thesis advocates a Postprocessualist realistic approach to analysing the archaeology of Australia through the wider lens of Structuration.
# Table of Contents

List of CDs .......................................................................................................................... xi
List of Figures ....................................................................................................................... xii

Preface to the Woolgar Goldfield's Industrial Archaeology of Capitalism 1879-1939 xvi

Chapter 1 : The Woolgar Goldfield's Industrial Archaeology of Capitalism - 1879-1939 ................................................................. 1
   Preamble ............................................................................................................................ 1
   Problem Statements ......................................................................................................... 3
   Basic Premisses ............................................................................................................... 5
   Thesis Outline .................................................................................................................. 5

Chapter 2 : A Review of Archaeology's Epistemology: In search of a framework for the Woolgar Goldfield ............................................................ 9
   Introduction ..................................................................................................................... 9
   Progressive Adaptation ................................................................................................. 12
   Innovation: Processualism ............................................................................................ 14
   Other Processualist Influences ...................................................................................... 19
   Post-Processualism and Prognostic Scope .................................................................... 22
   Prognostic Scope ........................................................................................................... 26

Chapter 3 : Structuration: An investigative framework for industrial archaeology ...... 28
   Introduction ..................................................................................................................... 28
   The ontology of Structuration ....................................................................................... 29
   An overview of Giddens's Sociological theory of Structuration adaptations ............. 31
   The Schema .................................................................................................................... 32
   Distanciation, Time and Space ..................................................................................... 33
   Landscapes ..................................................................................................................... 34
   Financial Instruments: Gold Standard ........................................................................... 37
   Technologies ................................................................................................................... 38
   Governance .................................................................................................................... 39
   Ideologies ....................................................................................................................... 39
   Social Practices ............................................................................................................. 40
   Summarisation of Structuration .................................................................................... 41

Chapter 4 : An Abbreviated Historical Review of Australian Gold as a contextualisation of the Woolgar Goldfield Industrial Archaeology's worldview for the years 1850-1939 ................................................................. 42
   Introduction ..................................................................................................................... 42
   The national aquatic effect of Australia's Gold Rush ...................................................... 43
   Australia's Population Development ............................................................................. 46
   The Gold Standard: An overview of gold's international role ....................................... 48
   The Economic Cycle of the Study Period 1880-1939 .................................................... 56

viii
Chapter 5 : The Historical Archaeology of the Woolgar Goldfield 1879-1939 ..........61

Introduction: The Woolgar's Historical Background ...........................................61
A Review of the Mines Department's historical data ............................................66
Substantiating Lower Camp's settlement and industrial locations .......................72
The Archaeological Research of the Woolgar Goldfield 2005 ...............................74
Section I, Lot 4, Albion Street, Woolgar: MHL No. 11, Leased by William Bray until
October 1901 ........................................................................................................79
William Bray's Material Culture found in Section 1, Lot 4 .................................80
The Clay Pipe Assemblage ..................................................................................83
The Ceramic Collection ......................................................................................84
Table 1: Total ceramic pieces separated into fabric type for Bray's MHL No 4 (Beale
2005:36) ..............................................................................................................85
Table 2: Estimated MVC according to fabric type for Bray's MHL No 4 (Beale
2005:37) ..............................................................................................................85
Section III, Lots 1-2, Albion Street, Woolgar: MHL No. 8, Leased to Mary Brown
until October 1901 ..............................................................................................86
Section II, Lot 1-2, corner of Albion and Mowbray Street, Woolgar: MHL No. 6
Leasee JJ Moore 1902 then transferred to Thomas Lewis until 1910 ..................88
Section III, Lot 11-12 Mowbray Street, Woolgar. MHL No. 5 leased to James
Gilbert until October 1901 ................................................................................90
Table 3 Total ceramic excavated from James Gilbert's MHL No.5 classified
according to fabric (Compiled by Beale 2006:36) .............................................92
Table 4: Estimated earthenware MVC according to Brooks (2005:46-52) from James
Gilbert's MHL No.5 (compiled Beale 2006:40) ..................................................92
Table 5: Estimated porcelain MVC according to Brooks (ibid) from James Gilbert's
MHL No 5 (compiled by Beale 2006:41) .............................................................93
Lower Woolgar's General Ceramic and Glassware Analysis ...............................97
Summation .........................................................................................................98

Chapter 6 : The Technological aspects of the Lower Woolgar Goldfield's Industrial
Archaeology: 1880-1939 .....................................................................................99

Introduction and General Overview .................................................................99
An overview of the Woolgar Goldfield's initial pedestrian surveys ....................101
An outline of the industrial archaeology of the Woolgar goldfield ......................102
The Lower Woolgar's industrial archaeology and technological commentaries .....103
Pioneer Mill 1881-1891 ....................................................................................104
The Mowbray Gold Mining Company Limited mill site 1899-1906 ....................109
Mowbray Mine 1882-1935 ...............................................................................112
The final phase of the Woolgar's study period: the Great Depression ...............122
The Peter Pan Battery 1934-1946 ....................................................................125
Peter Pan's technology ......................................................................................126
The Remaining Industrial Sites in the Lower Woolgar .................................133
No.  1 Battery site or an industrial scrapyard.................................................................134
The dubious No. 2 Battery site......................................................................................138
The Aurora Battery 1936-42.........................................................................................141
Lost World ......................................................................................................................148
Alluvial Site description...............................................................................................148
Lost World miners camp site ......................................................................................152
Lost World Summarised .............................................................................................154
The Summary of the Industrial Archaeology of the Lower Woolgar ..............155

Chapter 7 : Comparative studies of the Woolgar with other mining operations........157
Introduction ...................................................................................................................157
Possible Misguided Interpretation through Ephemerality ..................................158
Overview of the Comparative Sites ...........................................................................160
The Palmer Goldfield Far North Queensland 1873-83: A generalised description 161
The Palmer's Alluvial Mining synonymous with the Chinese ...............................163
The Palmer's Mines, Mining and Methods: Reef Mining .........................................167
Hodgkinson goldfield .................................................................................................169
Egerström's House Location: (HI3281: 2000 Cultural Heritage Studies) ............172
The Atherton Tablelands: Irvinebank ........................................................................180
The township of Koorboora ......................................................................................187
Calcifer............................................................................................................................188
Victorian Mining Fields ..............................................................................................190
Bethanga Mines, northwest Victoria ........................................................................191
Dolly's Creek in the Steiglitz Mining District of Victoria ........................................193
Summary .....................................................................................................................194

Chapter 8 : End Insight ..............................................................................................195
Introduction ...................................................................................................................195
Themes ............................................................................................................................196
...and Issues ..................................................................................................................198
Aims ...............................................................................................................................199
A General Review of the Woolgar's Landscapes Archaeology: The Woolgar's Allocative Resources ..........................................................200
The Lower Woolgar's Industrial Archaeological Landscape ...............................203
Technological transfer: Agency ..............................................................................204
Northern Queensland Mining Technology ...............................................................206
The Challenges of Depression site locations and technology: 1930-1939 ............211
The more subtle Agencies of the Lost World .........................................................213
Financial Literacy ........................................................................................................214
Authoritive Resources ..............................................................................................216
Social Practices cum Social Capital .........................................................................216
Governance ..................................................................................................................217
Ideology ........................................................................................................................218
Summary ......................................................................................................................218
Chapter 9 : Retrospective ........................................................................................................220
References ........................................................................................................................................225
Appendix 1: Artists impressions of the Australian Gold Rush ....................................................250
Appendix 2: Relevant excerpts from Murray 1897:29-32 to provide analysis of....................252
Appendix 3: Gold Council's data on various countries' gold stocks ........................................256
Appendix 4: Queensland Demographics and Rail System .........................................................258
Appendix 5: Queensland's Principle Gold Mine Production ......................................................260
Appendix 6: Historical Gold-Silver differentials ........................................................................261
Appendix 7: Berdan located at Middle Camp Woolgar goldfield during the 2004 visit
( photo Taylor 2004) ........................................................................................................................262
Appendix 8: Provisional school buildings Woolgar (Richmond County Shire Offices)
..........................................................................................................................................................263
Appendix 9: Miners Rights and Trade Licences .........................................................................264
Appendix 10: Haldane Sketch of the Woolgar Goldfield (Haldane [1895] 1932: 389).........272
Appendix 11: Electoral map of Far North Queensland 1921....................................................273
Appendix 12: From Strategic Minerals NL Annual report 2012 ..............................................274
Appendix 13: Lost World list of material culture .........................................................................275
Appendix 14: Examples of sluicing ............................................................................................276

**List of CDs**


CD 2. Crapp Family Hardware Store’s Sales Ledger

CD 3. Wilfley table in operation from John Forster OAM, ASM

List of Figures

Figure 1—1: The Major goldfields of Far North Queensland (Bolton 1972:49) .............................................1
Figure 1—2: Mining townships between the Gregory Range and the Hodgkinson Goldfield, of which some will be compared to The Woolgar in Chapter Seven (Bolton 1972:3) .................................................................................................................................2
Figure 3—1: Gidden's Structuration modified as a methodology to interpret Industrial Archaeology (Drawn by Taylor 2006). ................................................................................................................33
Figure 3—2: Google Earth recording GPS readings of possible Allocative sites shown in Figure 3-3 recorded during 2003's initial pedestrian survey of the Middle and Upper regions of the Woolgar goldfield. ........................................................................................................35
Figure 3—3: Woolgar's geology (Denaro et al 2001-4) ................................................................................35
Figure 3—4: Hewlett's 1928 mining economies model (drawn by Schmitz, 1979: 21) .................................36
Figure 4—1: Australia's Gold Production 1850-1915 (after Eichengreen 1944-295) .................................43
Figure 4—2: Major Gold producers 1850-1915 (Eichengreen 1994-295) .....................................................50
Figure 5—1: Map of Richmond, Queensland. Notations 1: Richmond Fossil Museum, 2: To the Cambridge Downs ruins of the pioneer cattle station's homestead, 3: Historic and Shire Council Building sites, 4: Anglican Church, 5: Racetrace, 6: Pioneers' Cemetery. (Discovery Guide to Outback Queensland 2003:88). ..........62
Figure 5—2: Google Earth satellite image recording the initial GPS reading taken during the author's visits of 2003/4 to Middle Park station showing the location of possible archaeological sites (Taylor 2003). ........................................................................................................63
Figure 5—3: The Woolgar various settlements and mine locations along the Woolgar River (Denaro et al 2001: 8). .........................................................................................................................64
Figure 5—4: Said to be the original official survey of the Lower Woolgar settlement dated 1902 (Denaro et al., 2001: 53-4) .........................................................................................................................68
Figure 5—5: Tracing of the Lower Woolgar Miners' Leases by senior draughtsman R. Watson dated 1887 (QSA: MWO 14B/38 L5251) ...........................................................................................................69
Figure 5—6: Sub Inspector Kaye's memorial tombstone in the grounds of Middle Park Station's homestead (photo Taylor 2004) ..................................................................................................................70
Figure 5—7 Barrows of Banbury 8 HP mobile steam engine No. 2381. Probably from the Mowbray Mine questionably said to indicate the Lower Woolgar Miners' Home Leases (Photo Taylor 2003). ..................................................................................................................73
Figure 5—8: The archaeological record of Section II Lots 1-2 J.J. Moore's MHL 6 as recorded in Geraghty's Survey dated 1887 and 1902 (photo Taylor 2004) .................................................74
Figure 5—9: Google Earth Image of the Lower Woolgar highlighting the main flood affected areas and industrial archaeology to be later surveyed, researched and recorded (drawn by Gibbs 2011) ..............................................................................................................75
Figure 5—10: Google Earth satellite image overlaid with outline of official survey illustrating the Lower Camp Miners' Home Leases and Machine area 94. (compiled by Taylor 2006) .........................................................76
Figure 5—11: Extensive land erosion south of the Lower Woolgar settlement said to be the location of past Chinese market gardens. The starting point for the transect exploration (photo Taylor 2005) ................................................................................................................77
Figure 5—12: Example of the land erosion north of official settlement with Woolgar River in the background. The erosion goes as far as the battery sites further north enveloping the later recognised Aurora battery (photo Taylor 2005)............................78
Figure 5—13: Site map of William Bray's MHL No. 11, Section I Lot 4, Albion Street, Lower Cam (Drawn by Stone 2005).................................................................79
Figure 5—14: William IV three-halfpence specially minted for colonies found near William Bray's lease (photo Taylor 2005)........................................................................81
Figure 5—15: 19th Century miner's axe head found south of William Bray's MHL (photo Taylor 2005) ........................................................................................................81
Figure 5—16 Victorian padlock found near Machine Area 94 (photo Taylor 2005) ....82
Figure 5—17: Site map Mary Brown's kitchen and fire place in the North West corner of Section III lots 1-2 bordered by Mowbray Street (drawn by Stone 2006)........87
Figure 5—18: Mary Brown's kitchen and possibly a repositioned Denbyware (photo Taylor 2005)................................................................................................................87
Figure 5—19: Field drawing of a stone inlay in Moore's MHL No 6 (drawn by Stone 2005) .............................................................................................................................88
Figure 5—20: Excavation investigating possibility of fire damage, Moore's hotel MHL No. 6 (photo Taylor 2005) ....................................................................................................89
Figure 5—21: Site map illustrates the excavations in James Gilbert's MHL No. 5, Section III, 11-12 Mowbray Street (drawn by Stone 2005).......................................................91
Figure 5—22: The excavation of the first spit of 11 BB by Bob Stone assisted by Janice Perry which went no deeper than 15 cms due to Queensland's sodic crust (photo Taylor 2005) ........................................................................................................91
Figure 5—23: Estimated Woolgar Goldfield's demographics (after Denaro passim 2001; Staunton circa 1980s)........................................................................................................94
Figure 5—24: Suggested Wedgewood shard (photo Beale 2006:52)...........................95
Figure 5—25: Royal Coat of Arms (ibid)......................................................................95
Figure 6—1: The tombstones of James Bulmer and Hearwin Crapp situated in between the Middle and Top Camps (photo Wallis 2003)..................................................100
Figure 6—2: The male members of the Crapp Family, with William Crapp in the centre of group (photo donated by Frank Crapp 2005)..............................................101
Figure 6—3: Menghetti's (1982: 26) separation work flowsheets 1872-1878..........107
Figure 6—4: Menghetti's (1982: 27) separation work flowsheets 1886....................107
Figure 6—5: Menghetti's (1982: 28) separation work flowsheets 1901....................108
Figure 6—6: Menghetti's (1982: 29) separation work flowsheets 1917....................108
Figure 6—7: Example of a Wilfley table (Burt, 1982)..................................................111
Figure 6—8: The Mowbray mine's mullock heap with drystone retaining wall (photo Taylor 2005) ......................................................................................................................113
Figure 6—9: Mowbray eastern side showing signs of modern skimming (photo Taylor 2005) ...........................................................................................................................114
Figure 6—10: Modern loading ramp east of the Mowbray mine (photo Taylor 2005) 114
Figure 6—11: The Mowbray Mine site map (drawn by Taylor 2005) ......................115
Figure 6—12: No.1 drystone forge with metalwork remnants (photo Taylor 2005) ....115
Figure 6—13: No. 2 drystone forge (photo Taylor 2005)........................................116
Figure 6—14: No. 3 drystone forge (photo Taylor 2005).................................116
Figure 6—15 Possible housing foundations for steam powered double winding gear and
water pump (photo Taylor 2005) ........................................................................118
Figure 6—16: Possible platform for winding gear on top of mullocks (photo Taylor
2005) ......................................................................................................................119
Figure 6—17: Mowbray mine discarded double winding drum (photo Taylor 2005) .119
Figure 6—18 The palimpsest site map of MA 94 that accommodated the Crapp family,
MGMC, and lastly the Peter Pan battery owned by Kerr & Bromley and finally by
Bromley & Crapp (drawn by Stone and Taylor 2006) ..............................................127
Figure 6—19: The Peter Pan battery 1935 (Denaro et al 2001: 29) ..........................128
Figure 6—20: Abandoned spur wheels found on MA 94 during the first visit to the
Woolgar 2004 (photo Taylor 2004) ..........................................................................129
Figure 6—21: Western perspective of the Peter Pan battery 1935 (Denaro et al 2001:
30) .........................................................................................................................130
Figure 6—22 MA 94 abandoned single phased, non reversible steam engine (photo
Taylor 2003) ............................................................................................................131
Figure 6—23: MA 94 abandoned steam pipe linkage, plus engine bedding with lugs
(photo Taylor 2003) .................................................................................................131
Figure 6—24: Example of the role of spur wheels in the 'Old Mary' battery setup near
Maytown, Palmer goldfield (photo Gibbs 2000) .........................................................132
Figure 6—25: Noting Lower Woolgar goldfield's questionable battery sites (Denaro et
al 2001: 8 revised by Taylor 2006) .........................................................................134
Figure 6—26: The Aurora Battery site now seen as that noted with the numeral 3
(revised by Taylor 2006) ..........................................................................................135
Figure 6—27: Originally, No. 1 battery site map but later adjudged as a scrapyard of
abandoned industrial artefacts (drawn by Stone & Taylor 2005-6) .........................136
Figure 6—28: Dilapidated Overend Cornish style boiler with the main flywheel
removed and an abandoned relatively modern stamp battery tappet under the axle
(photo Taylor 2004) .................................................................................................137
Figure 6—29: Fragment of screw-on tappet found in the scrapyard near abandoned
stamp battery (photo Taylor 2005) ..........................................................................137
Figure 6—30: Originally seen as the No. 2 Battery, this site map is now considered that
of the DoM battery site (drawn by Stone and Taylor 2007) ......................................139
Figure 6—31: The No. 2 Battery later identified as the DoM battery site (Denaro et
al 2001: 28) .............................................................................................................140
Figure 6—32: The DOM battery's collapsed corrugated iron water tank and pig sty
fencing (photo Stone 2005) .....................................................................................141
Figure 6—33: Denaro's (2001: 30) inaccurately labelled 'Battery site Lower Woolgar'
now considered as the Aurora Battery site. Note improvised oven in the background
and surrounding metal scatter identified in Figures 6-34 and 5 ..............................142
Figure 6—34: Different perspective of the now considered Aurora Battery taken from
the north facing south to illustrate the effects of the drought seen during the first
visit to the Woolgar during 2004 (Taylor 2003) ......................................................143
Figure 6—35: Site Map of Aurora battery's archaeological record (drawn by Taylor 2007) .................................................................144
Figure 6—36: Flattened ship's tank-Aurora battery (photo Taylor 2005) ..................145
Figure 6—37: Aurora battery's improvised oven (photo Taylor 2005) .................146
Figure 6—38: Metal Vesta Box circa 1864 produced by Bell and Black, London often seen on far north Queensland mining sites (after Anson 1983:135; Photo Taylor 2005) .................................................................147
Figure 6—39: View of Lost World gully and surrounding landscape (photo Wallis 2004) ........................................................................149
Figure 6—40: Profile of Lost World gully feeding into Sandy Creek (compiled and drawn by Taylor 2006) ........................................................................150
Figure 6—41: West-east profile of Lost World profile (drawn by Digweed 1991:23) 150
Figure 6—42: Lost World's drystone walling near top of the gully (Taylor 2005) ......151
Figure 6—43: Drystone wall halfway across gully at the bottom of Lost World (photo Taylor 2003) .................................................................151
Figure 6—44: Lost World's processing area (drawn by Taylor 2005) ..................153
Figure 6—45: Lost World alluvial miners' camp site (Taylor 2005) ......................153
Figure 7—1: Palmer goldfield Maytown, main street paved sidewalk (photo by Taylor 2000) ........................................................................164
Figure 7—2: Kingsborough General Grant mine's small gauged railway (Queensland Oxley Library) ........................................................................170
Figure 7—3: Thornborough mines small gauged railways (Queensland Oxley Library) ........................................................................170
Figure 7—4: Kingsborough's Tyrconnell goldmine use of the landscape (photo Heather Grant) ........................................................................170
Figure 7—5: Burns Creek causeway (photo Wegner 1999) ..................................172
Figure 7—6: Site map of Ergerström's house and gardens ( from Taylor's field sketchbook 1999) .................................................................173
Figure 7—7: Ergerström at the entrance of his homestead (photo Holtsmark 1999) ...175
Figure 7—8: Ergerström gravesite (photo Wegner 1999) ..................................175
Figure 7—9: Irvinebank dam with stamp battery and processing plant housing to the right and Moffat's panoptican house and office to the left (Photo Mrs I Dedenham see Kerr 1979:18) .................................................................182
Figure 7—10: ore separation workflow (Taylor 2001: 71).................................183
Figure 7—11: The plan view of Irvinebank (Queensland National Trust) ............185
Figure 7—12: Irvinebank battery and smelter 1905 (Cairns Historical Society) ....186
Figure 7—13: Koorboora township with the dam and battery in the foreground (Kerr 1979:92) ........................................................................187
Figure 7—14: Calcifer Smelter and township circa 1900 (photo John Oxley Library) 189
Figure 8—1: Middle Camp battery demonstrating the agency of adaptation with an engine bed for a diesel engine instead of some form of steam power (photo Taylor 2005) .................................................................208
Preface to the Woolgar Goldfield's Industrial Archaeology of Capitalism 1879-1939

In March 2003 the author relocated from Cairns in far north Queensland to Canberra, transferring his James Cook University (JCU) PhD Candidature to the Australian National University (ANU). During the transition, a chance encounter came about with Dr. Lynley Wallis, a temporary relief lecturer at JCU engaged in a cultural heritage project on behalf of the Traditional Owners of their recently acquired Middle Park Cattle Station, northwest Queensland. Included in the land title was the Woolgar Goldfield. Subsequent discussions regarding the Woolgar's industrial archaeology led to the site becoming the main focus of this thesis and an invitation to join Dr. Wallis on her next visit to the goldfield. Accordingly, an initial short exploration of the Woolgar took place in November 2003. The survey of the three main settlements along the Woolgar River proved an encouraging possibility even though the Middle and Upper Camp areas were less accessible and as explained later, both areas had questionable water supplies.

In comparing the previously selected historical archaeology sites on the Atherton Tablelands' for the author's JCU PhD Candidature, the Woolgar's was seen as the better option. Mainly because most of the lower Cape York sites, save for The Palmer and Hodgkinson goldfields lacked significant industrial archaeology and were invariably hampered by spreading Chinee-apple (Ziziphus mauritiana) (see Anonymous 2013a) and Rubber vine (Cryptostegia grandiflora) (Anonymous 2013b). Whereas the Woolgar's historical archaeology, as portrayed by Denaro's et al Geological Record 2001/5: Mining History of the Woolgar Goldfield, North Queensland promised a wider research agenda.

Accordingly, in early April 2004 the author and Dr. Wallis visited the Queensland State Archives (QSA), Brisbane in an attempt to expand upon Denaro's 2001 Woolgar's history. The historical record of the Woolgar or its miners was surprisingly limited at QSA and the State Library (QSL), with little or no mention pre-1887. Later inquiries with State employees revealed that major losses had probably occurred when various data collections were being moved to new locations.

It was also learnt at this time that Strategic Minerals NL, with mineral explorative rights on the Woolgar, were initially in a joint venture with the world-renowned Canadian
Barrick Corporation to intensify their joint subterranean search for significant gold deposits (see Appendix 12). The Joint Venture was in need of a Queensland Environmental Protection Agency (QEPA) cultural heritage survey of areas named Lost World, Grand Central, Sandy Creek and China Wall as displayed in the Appendix. Dr Wallis, who was familiar with the Traditional Owners’ Woolgar sites was contracted to extend her research to such areas and the author was subcontracted to survey the alluvial workings of Lost World. This included assisting with the supervision of required pedestrian transects and offset mapping of any Aboriginal cultural sites that were located during the survey.

The second visit to the Woolgar was in June 2004 to carry out the necessary cultural surveys. Despite being considered the best time of year for fieldwork in Tropical Queensland, daily temperatures were in the mid to high 30s range and several members of the Woolgar Valley Aboriginal Corporation suffered bouts of heat exhaustion while carrying out transects in the open spaces of the China Wall area (see Appendix 12). This highlighted the need to stress that all field workers carry an adequate supply of drinking water. Fortunately, as the research team was being accommodated at the Strategic's field camp there was more than adequate drinking water available to those in the field.

Most of the sites were recorded during the first week enabling the author to concentrate on recording the Lost World area in detail. The main feature of this industrial site was the descending gully in the eastern aspect of a low horseshoe shaped range that had a variety of stone pitching or stacking along the inner walls. Further pedestrian surveys revealed a processing area at the bottom of the gully and mining artefacts to the west, which was seen as the alluvial miners’ camp area.

The Woolgar's main industrial archaeological research was intended to start in July 2004 but had to be cancelled until the following July due to delayed research funding. During that period Dr Lynley had moved to Flinders University, Adelaide but continued with her commitment to the Woolgar Valley Aboriginal Corporation and eventually provided volunteers for the author's fieldwork with three Honour students who were also accompanied by two Flinders graduates. Accordingly, the research team met up in Richmond before making their way out to Middle Park Station. Two vehicles were used, driven by Lynley Wallis and Vic Taylor, to transport the following team
members: Honour Students, Alice Beale, Diane James, Anghar Pendleton, Graduates, Janice Perry and Robert Stone.

The majority of volunteers spent two weeks, from 1st July till 15th July, surveying the Lower Woolgar and excavating two sites before returning to Adelaide. Diane James, a History Honours student stayed on until 22nd July 2005 to help with the final recordings and baseline offset of the Mowbray mine before returning to South Australia.

Two Archaeological Honours Theses resulted from this field trip and are referred to later in the text. Beale's thesis on the Woolgar's ceramics received a 2nd Class result and she went on to work for the Western Australian Museum in Perth whereas nothing more was heard of Pendleton after eventually receiving a copy of her thesis. At this point it would seem remiss not to mention Bob Stone again who was considered the most experienced archaeologist member of the fieldwork team. Bob is a retiree with an archaeological Honours degree from Flinders and the consummate volunteer who joins Sydney University's annual Jordanian excavations. He apparently recently volunteered for some archaeological work at Port Arthur, Tasmania.

The author's own departure from the Woolgar was on 1st August 2005 after double-checking the locations of the Lower Woolgar's 1930s Depression gold processing mill sites and cleaning up the fieldwork's campsite. After leaving, the author went on to Charters Towers and Townsville for a total of two weeks searching for Roger Barns family and various libraries. The Barns family were fortuitously found in a suburb of Charters Towers and the account of this meeting is recorded in the thesis. The library searches of Charters Towers' Excelsior Library and The James Cook University Library and the North Queensland Collection, both on the Townsville campus produced most of the newspaper citations in this thesis. The return journey south took three and half days, arriving back in the Canberra area on the 19th August 2005.
Chapter 1: The Woolgar Goldfield’s Industrial Archaeology of Capitalism - 1879-1939

Preamble
The remote Woolgar goldfield in far north Queensland when viewed as part of the cluster around the Gregory Range does not seem particularly isolated. It has the Croydon field on the western flank and the Etheridge and two smaller goldfields of Gilbert and Oaks on the north and northeast sides of the range (see Figure 1:1).
Nevertheless, it is a four day drive from Canberra or at best a six hour car journey from Townsville to Richmond passing through the goldfields of Ravenswood, Charters Towers and the Cape before another hour's drive across the grasslands to the access point of the Woolgar at Middle Park cattle station.

Figure 1—2: Mining townships between the Gregory Range and the Hodgkinson Goldfield, of which some will be compared to The Woolgar in Chapter Seven (Bolton 1972:3)

Gold was not the only mineral being mined in the northern regions of Queensland (see Figure 1: 2) especially as the age of gold began to fade (Bolton 1972: 116). The spate of mineral discoveries other than gold from the 1870s onwards between the Etheridge and Hodgkinson goldfields provided many more opportunities for the itinerant miners traversing this distant part of Queensland.

In 1875 the equally rare tin ore, considered by many to be the more useful metal than gold was discovered in the Wild River Valley near Herberton with further lodes found three years later at the head waters of the Tate River (see Figure 1:2). When the Herberton deposits were depleted through bad mining practices, a group of major mines and a smelter were developed at Irvinebank in 1882 (Bolton 1972: 119; Taylor 2001). For short periods, other tin deposits in the area were mined at Watsonville, Stannary Hills, Emuford, Lappa and Koorboora but all were short-lived in comparison with Irvinebank, a major tin field east of the Great Divide.
Happenstance, - pistol practice around 1880 at Montalbion using the escarpment as a backdrop to a target - exposed a rich silver lode what is now known as Silver Valley where additional deposits were also found alongside a sizeable deposit of galena (Bolton 1972: 117-8). Further west, extensive copper and relatively small gold deposits were discovered in 1887 at Chillago, Zillmanton and at Girofla, a township named after the main goldmine in the area which was later renamed Mungana (Bolton 1972: 118).

The first copper blast furnace in the area was erected at Calcifer in 1887 but was later decommissioned because of a major smelter being set up at nearby Chillago. This subsequent smelting operation was first affected by adverse overseas markets and then by scandalously corrupt dealings that not only jeopardised the works, the Government and the career of an eminent politician but more tragically left an unpaid workforce stranded in an area with little chance of re-employment (Bolton 1972: 116-21, 131, 278-9; Kennedy 1978). Today, the ruins of the Chillago, marked by the smelter's remaining tall chimney stack can be seen from the east-west development road that carries today's transcontinental road-trains and country-circumnavigating retiree tourists, otherwise known as the grey-nomads. Such abandoned mining complexes near major roadways become a tourist attraction, resulting in archaeological sites being prey to trophy hunters, scrap metal merchants, and the more natural deterioration due to fires and termites (after Bell 1989: 2-9; Wegner et al 2006: 94). This pattern of events leaves most minesites in the Cape York peninsular an archaeological challenge. Hence, there was little hesitation in deciding to abandon further industrial landscape studies of the Atherton Tablelands in preference for the relatively isolated Woolgar goldfield in north western Queensland that still had discarded technology on site.

**Problem Statements**

However, soon after the initial pedestrian survey of the Woolgar it became apparent that the archaeology had been impacted upon by years of widespread flooding and drought resulting in extensive land erosion. While an abandoned stamp battery and three derelict steam engines remained on site, the area close to what was said to be the site of a sizable rural community (Denaro et al 2001:1) was nothing but a wide expanse of wash-outs and land erosion. In addition to this natural phenomenon was the possibility that any artefacts found in the Lower Woolgar had been repositioned by the flooding leaving doubtful interpretive conclusions from a shallow archaeology. Also disappointing was the fact that both the Queensland State Archives and the Mines
Department had lost a considerable amount of historical data (see Kerr 2000 cited later and Byrnes, Pers. Comm., Chief Surveyor, Mines Dept. 2005). Therefore, the Woolgar goldfield's industrial documented past is supplemented by sporadic visiting Mine Warden reports and questionable Mill Crushing Returns (eg. Denaro et al 2001: 15-22), together with a sparse variety of archival Miner's Rights and trade licences applicable to the mining community that have been itemised in Appendix 9. Whilst historical newspaper reports serve as a primary source substitute for lost Queensland State Archives and Department of Mines (DoM) records (see 2000: 2000: 1-2), they characteristically tend towards hyperbole and as such have been treated with caution. In part, such reservations were overcome by the serendipitous find in the Richmond Shire Council records of copies of the research papers of Thomas Staunton, the local amateur historian (cf Richmond State School 1990: 1). These unpublished research manuscripts were the result of regular visits to the Mine Warden's offices in Georgetown, Hughenden, Charters Towers and particularly the State Archives in Brisbane (circa 1980-90s pers. comm. State Archivist Ruth Kerr July 2006). The majority of his research though is unreferenced and as such has been used with prudence, as has the Richmond Shire Council's history of the region (see Authurs 1995) that includes the Woolgar goldfield. In parts, Authurs' (ibid) account seems to be a poor transcription of Staunton's unreferenced research data, while other sections have a discernible non-cited similarity with de Havelland's (1989: 140-53) description of the Woolgar.

Furthermore, unlike most base metal and silver industrial archaeological mining sites, gold does not have a readily interpretive background from related overseas markets providing important daily historical trading data dating back to beyond Australia's entry into such markets (eg Gibson-Jarvie 1976; see Schmitz 1979; and Officer 2009). To a degree these sources provide past economic data relevant to production and consumer demands with the added possibility of highlighting changes in advancing technologies (see Taylor 2003). Gold's lack of transparency is due the unregulated 'Over the Counter' (OTC) trading mechanism that is generally considered unreliable in comparison with Futures Exchanges' registered contracts. Though there are records of the London gold market trading dating back to the 13th century (see Officer 2009) the price of gold after 1717 was tied to a fixed price. The British government standardised the price of gold to simplify trading within its World System that continued well after 1819 under the aegis of the Gold Standard until 1971. In effect, the price of gold remained unchanged for
254 years leaving little interpretive data other than evaluations of the Gold Standard's individual members' gold stocks or the various published opinions on the effectiveness of the Gold Standard discussed later in Chapter Four.

**Basic Premisses**
The contention of this thesis is that global change seen through the Woolgar's wide lens of capitalism highlights various diasporas resulting from dire economic circumstances caused by the Industrial Revolution which had particular relevance to Australia's worldview (after Toynbee [1884]1958). In consequence, historical industrial sites were created, modified and sustained by an emerging Australian nationhood that used the natural resources, determined by the dynamics of world markets that were not always to the advantage of the emerging Nation. Moreover, entwined in the archaeology of the northern Queensland mining sites used as comparisons to the Woolgar are the embryonic governmental, proprietorial and environmental power structures based on past doxa that were being replaced or refreshed by new social mores. Accordingly, this study moves beyond the metaphorical factory gates of an industrial archaeological treatise to present a relative worldview from the Woolgar goldfield's industrial archaeology that embodies Santayana's (1905) foreboding from his *Life of Reason* that has a significant prognosis relevant to this deductive treatise.

Acknowledging Leone's (1999: 198/200) pragmatism that cautions the use of North American studies of material culture as a global interpretive tool. Such incongruity is occasionally seen in Australian Historical Archaeology studies that apply North American urban social mores to ceramic assemblages found on Queensland mining sites to determine class and status. According to Leone's (1999: 200/04) general counter-argument, ceramic appraisals should be reliant on the regularity of supplies, the individual's economic confluences based on the steadiness of employment and predictability of income that should be reflected in the continuity of matching ceramics. Such multifaceted assessment would seem a more reasonable premiss about the Woolgar mining community's economic stability, rather than questionable attempts to classify social status through the medium of haphazard ceramic assemblages.

**Thesis Outline**
Leone's (ibid) last cited argument typifies the result of the next chapter's examination of Archaeology's epistemology in that both Basalla (1988) and Latour (1991) are of the
opinion that originality is rare or non-heroic as most theories are seen as an improvement on prior suppositions. Consequently, Chapter Two follows this line of reasoning in a search for the appropriate framework to interpret the usually frugal mining archaeology of northern Queensland. The initial exploration for a suitable theoretical framework commenced with Daniel (1950, 1967, 1985) and Trigger's (1989) narrations on the history of Archaeology before proceeding to the Processual and Postprocessualist phases of the discipline. Though there were acceptable aspects of Marxism, Critical Theory and some Processualist theories, Giddens's influences on Hodder's (1982) Postprocessualism, later promoted by Johnson (1989) and Barrett (2000; 2000; 2001), reaffirmed the adaptation of Structuration as the preferred methodology for the Woolgar (after Taylor 2001, 2003). Also worthy of note, at the end of the review of Archaeology's phases of development was the increasing popularity of the innovative 'Archaeology of the Contemporary Past' suggesting a realignment with Anthropology, as well as an extrapolative role for the discipline (see Johnson 1999: 231; Harrison et al 2010: 277-8, 283-4).

While mindful of such possibilities, Chapter Three's schema (see Figure 3: 1) shows agency as the locus of the interpretive framework and as a methodological sequence for researching the Woolgar's technological and sociological data. Chapter Four therefore, looks at the influence of Australia's Gold Rush as the incentive that increased the country's population together with the long term effects of the country's new wealth being controlled by the Gold Standard. In turn, Chapter Five acknowledges the Queensland government's policy of early surveys of mining settlement areas, appointment of mining wardens to supervise the mineral claims, machine areas, providing of postal services and the issuance of business licences. The Police presence at the Woolgar was accelerated by the killing of a sub-inspector from the Queensland Native Mounted Police and the frontier mining community's anomic behaviour that was duly recorded in the Queensland Police Gazette (1883). The interpretation of the excavated archaeological record, much of which was ceramic, has been considered cautiously in view of the repositioning possibilities, as an indication of the Lower Woolgar's lifeways according to Leone's formula and the goldfield's onsite technology and yields.

Somewhat dissimilar to Dobres’ (2000: 1) opening statement that technology is 'first and foremost about people', the focus of Chapter Six is more in keeping with White's
(2007 [1959]: 18) opinion that social systems are defined by technology but are also dependent upon expertise. This viewpoint readily applies to the Woolgar's various phases of technology that interacted with the fluctuation of residency of the goldfield. The initial influx of prospectors were Chinese and European alluvial miners who only needed technique rather than technology and who quickly moved on once the easy winnings ran out. In similar fashion to the alluvial miners when the gold leads were opened up, a number of stamp batteries arrived in different areas of the field. The Crapp family, who originated from Cornwall, were the first to have a stamp battery in the Lower Woolgar, while batteries from the western and northern fields moved into the middle and upper regions along the river. The yields in the area also determined the length of stay, with some of the batteries moving on to other sites due to news of fields opening up or the disappointing winnings in the Middle and Upper Camps.

The bulk of the goldfield's onsite technology is to be found in one area close to the Lower Woolgar's surveyed settlement area. The other stamp battery archaeological sites line the eastern banks of the river with the majority of the mine sites further east amongst some of the primary piedmonts of the Gregory Range. The most prominent of these nearby mines is the Mowbray with the mullocks neatly stacked around the collapsed shaft providing reasonable provenance to substantiate that the mine was the oldest in the field. Archeologically, the Mowbray is also by far the most informative minesite of the Woolgar, while the technology alongside the dry river provides potential examples of agency, fully discussed later.

In contrast, the aim of chapter Seven is to demonstrate what is missing from the Woolgar by mainly comparing sites on the Palmer and Hodgkinson that provide examples of further onsite technology and use of the landscapes as part the workflow. Other examples of social structures in the landscape can be seen on the Atherton Tablelands such as Irvinebank, Koorboora and Calcifer, while the northern Palmer and Hodgkinson demonstrates that goldfields can also be poverty traps. Not all the miners that went to the Palmer and most certainly not those on the Hodgkinson made fortunes, as demonstrated by the Swedish adventurer Ergerström who spent his last days scratching a living from a site outside one of the main townships on the Hodgkinson goldfield (after Ergerström 1852-1900). The other significance of the Palmer being used as a comparison is the example of the meticulous Chinese alluvial miners' work ethic, which had been washed away on the Woolgar along with most of Occidental
miners' archaeological record who also worked the alluvial fields in the mid and upper region of the Woolgar.

In spite of the predominant feature of the Woolgar's ephemerality, Chapter Eight submits statements in answer to the main premisses raised throughout the thesis. In particular, the Woolgar's out-of-character technological advancement, Keynes's (eg. 1924: 187) dislike of gold and Santayana's (1905: 284) foreboding. Chapter Nine concludes this study by summarising the benefits of adapting Giddens' structuration theory in not only providing opportunities to investigate examples of agency but also as a methodology in which to proceed with an industrial archaeological study.
Chapter 2 : A Review of Archaeology's Epistemology: In search of a framework for the Woolgar Goldfield

"I cannot help fearing that men may reach a point where they look on every new theory as a danger, every innovation as a toilsome trouble, every social advance as a first step towards revolution, and that they may absolutely refuse to move at all"
Alexis de Tocqueville (1840)

Introduction
The intention of this discourse is to examine the various factions of Archaeology's abbreviated episteme, the system of historical thought (see Foucault 1970; Burke 2005: 96), to determine a suitable framework for a remote mining site in northwest Queensland. Leone's (2010: 52) recent advice is to research widely so as to be conscious of other theories cum methodologies but only select a single interpretive model for a site that would seem to have a marginal use for theory. Accordingly, consideration will be given to interpretive methodologies seeking to provide a research design that identifies industrial archaeological processes with aligned economic and social structures that seem appropriate for the Woolgar goldfield that was operating within the conjunctures of a World System.

The disciplines' past standpoints have not been adverse to eventually adapting or adopting methodologies from any genre in its quest to understand past societies' shadowy archaeology. Otherwise, sterile conclusions without an interpretive rational could be detrimental to the discipline's development (Deetz 1969: 48; Martin 1971: 3; Johnson 1999a: 6; Newman et al 2001: 3), or as labelled earlier, 'stamp collecting' (Higgs 1968: 619; Martin 1971: 2; Connah 1983: 15, n.b. neither citing Higgs). In Australian parlance, such classification was known as 'cowboy archaeology' (Davidson 1983a: 138; 1983b: 27). The derogatory term implied extemporized Archaeology that seemed to be defended by Murray and White (1982: 102) who in fact were advocating particularist frameworks for actual data rather than universal theoretical interpretive laws for the prehistory of the region. An opinion that had already been expressed by Jones (1980: 151-3), who also saw this particular phase of trophy hunting in Australian prehistoric Archaeology drawing to a close.
As will be seen, such reflexive dialogue is recursive throughout Archaeology's extensive anthology where innovative thinking has undergone rigorous, if not a polemic peer review before being accepted as a feasible interpretive model for archaeological signatures. One of the earliest examples on the world scene would be the empiric cultural-historical perspective initiated by the controversial Kossinna (1911) and later adapted by Childe (cf. 1925; 1928, 1930) with Marxist overtones that eventually impacted on the Archaeological world (see Spriggs 1984a, 1984b; Tringham 1983: 86, 94; Trigger 1989: 169-74; Gathercole 2009). Such innovative thinking is particularly seen in Childe's (cf. 1929, 1942, 1956a, 1956b) culture-historic concepts that are generally acknowledged as having been of value to most branches of Archaeology. Childe later admitted that many of his cultural history theories were 'borrowed' from Kossinna's unfashionable German *Kulturkreise* Archaeological frameworks (Trigger 1978: 82) that in turn originated from the German geographer and environmental determinist, Friedrich Ratzel (Brown 2007). Interestingly and somewhat surprisingly, Ratzel was incongruously part of the German non-evolutionist school of thought (White 2007 [1959]: xix-xx).

Whether Wittfogel's (1957) premiss for his monocausal study of hydraulic bureaucracies creating authoritarian empires originated from *Kulturkreise* roots is a moot point. Nevertheless both Childe and Wittfogel's voluntaristic theories were seriously called into question by Carneiro's (1970: 733-4) own coercive theory on the origins of state with his ecological theory based on the premiss that warfare resulted from restricted resources and social circumscription that eventuated in large scale political integration. This is a premiss that has surely more than stood the test of time. Notably, later development saw this approach being absorbed by British Archaeology's Post-Processual interpretive models that specifically gazed on the individual's past lifeways and influences.

Such innovations have not had an easy passage in Australian Archaeology, especially from the likes of Megaw. His empirical contribution to Australian discipline has been of value, but in spite of admitting himself to be ideologically unsound (Megaw 1988: 53) he regularly criticized Australian Archaeology's various progressive interpretive frameworks as being outdated (Megaw 1984: 7; 1997: 39; 2004: 25). Such criticisms over the years seem vacuous as they were without specificity or an alternative suggestion as to how good academic disciplined inquiry should proceed. Whereas,
exploring Archaeology's epistemology - an interesting exercise in itself - leads into a variety of other disciplinary guidelines that have widened our interpretive horizons.

These widening developments can be regarded cautiously as an incremental changing narrative as the discipline still warily continues to seek improvement to its methodology (cf. Murray 2002: 47-8). Although, this observation is far from original (cf. Daniel 1967: 101-2; Bray 1977: 379; Friedman et al. 1977: 401-2; Trigger 1978: 33), it interestingly has a similarity with Basalla's (1988) evolutionary study of technology's progress. In his study, Basalla (1988) initially cites the efforts of Butler, Gilfillan, Ogburn, Pitt-Rivers, and more importantly Usher, who opined that invention is rarely original and that progress becomes the result of collective change. This cooperative advancement would seem to be based upon four premisses of perception, research, insight and critical revision. Incongruous as it seems, such perceptions can be seen as the protean characteristic of Archaeology's own development which, as demonstrated later, the sheer numbers of new ideas, especially those scientifically based did not always result in innovations or improvements (after Basalla 1988:23-4). Therefore, as this chapter ventures into such a metaphorical minefield it will seek, or, if necessary, rehash a referenced premiss as a possible economic-socio-environmental framework to interpret the sparse elements of the Woolgar's past industrial archaeology. Moreover, as suggested by Mouzelis (1995: 42) it is also necessary to take heed of certain antifoundationalist stances, such as post-structuralism trans-historical generalisations, that are judged as broadly similar in considering the apparent zeitgeist in applying agency without demonstrating change.

Fashion is all consuming and has of late to an extent materialised in Archaeology as transgressions in oversimplification and the use of teleologism in an effort to explain past social practices (after Sibeon 2004: 1-11). While guided by such criticism and Schuyler's (1971) history of American Archaeology, which especially avoids the malaise of presentism to explain the past (cf. Meltzer 1979: 644). Thus, this chapter will progress through the various factions of Archaeology's explorative phases of 'Progressive Adaptation', 'Innovation: Processualism', 'Post-Processualism and Prognostic Scope' and 'Contemporary Historical Archaeological Theory' (CHAT) as a prelude to outlining a methodology for the Woolgar in the next chapter. The intention therefore is to arrive at a realistic framework, which will also be mindful of such dubious cultural relativism as demonstrated by Allyson Brooks' (1995) dissertation that
used a nomad African tribal mobility to interpret an abandoned American mining site. The seemingly more appropriate Australian mining comparisons should be found in Kirkman (1980 & 1982) and Wegner (1980) as contrasts for the marginalised mining communities that congregated along the upper and lower reaches of the Woolgar River during the late 19th and early 20th centuries.

**Progressive Adaptation**

The steady trend of development narrated by Daniel's (1967) highly readable early history of Archaeology describes the British, French and Scandinavian disciplines as a conscious logical progression from antiquarianism and dilettantism to come of age in the late nineteenth century. Daniel's relaxed style features past archaeologists' contributions, in which he dubs Boucher de Perthes, W. M. Flinders Petrie and Pitt-Rivers as founders of modern excavation techniques, even though Pitt-Rivers' field methods were not recognized until after his death in Woolley's (1955) *Spadework* (Daniel 1967: 49, 90, 225, 233). Notably there is no mention of the innovative young Scot, Daniel Wilson's (1851) research of Scottish proto-historic tombs, hill forts, weapons and social systems based on Thomsen's 'Three Age System' that at the time was considered to be a ground-breaking methodology (Trigger 1981: 140-1). Wilson was also overlooked by the respected Sir Mortimer Wheeler, who instead hailed Worsaae and Childe as the first effective archaeologists while observing that: 'Archaeology...adapts and adopts methods of natural science and unblushingly seeks its aid' (Wheeler 1956: 299-30).

Such is the developing theme of Daniel's book, as it chronicles the discipline's comparative normative methodologies, which according to Trigger (1989: 10-11) have been in progress since the mid sixteenth century and as such are seen as examples of Usher's 'collective change' rather than any form of heroic discovery (cf. Basalla 1988: 23). For instance, the seventeenth century Bishop Ussher's World Time-line based on Genesis, and more specifically, Lyell's later geological uniformitarianism was adapted by the discipline to identify component stratigraphies at various excavated levels. Morgan's unilinear classification of the Native Americans would seem a modification of Thomsen's Three-Age System while other Victorian evolutionists such as Spencer and Tylor advocated deluded unilinear notions of social evolution (White 2007 [1959]: 69-70). All very different from the biological evolutionists Darwin and Wallace's similar theories on humankind's metamorphosis by natural selection that are claimed to have
broadened Archaeology's research design (Daniel 1967:7, 99-131). In a later publication, which was Daniel's (1985: 360) autobiography, Isaac de la Peyrère (1655) is mentioned as having the earliest notion of human evolution with the added claim to the fame of his book being the only archaeological and geological treatise to date to have been burnt in public. Undoubtedly droll, but Daniel disregarded the evolutionary theories of Anaximander and the later Lamarck, possibly because he, unlike Higgs cited later, may have thought them unimportant contributions to Archaeology's development. Nonetheless, it would be remiss in this abridged overview of Archaeology's episteme not to mention the Greek philosopher Anaximander, circa 610 BC (Russell 1946: 46) as the earliest evolutionist on record providing the original notion of human development.

Though Lamarck's theory (1963 [1809]) was not apparently acknowledged by Daniel it had been recognised by Darwin (1861), who in contrast appeared to be reluctant to recognise Wallace's input to his own research on human evolution (Winchester 2004: 61-4). Higgs (1968: 617) on the other hand, broadly a contemporary of Daniel's, sees Lamarck's notion of humankind's free-will and superior communication skills as vitally important in the interpretation of the mass of artefactual data from the 'pre-Darwinian phase of'...man's [sic] history', which otherwise, according to Higgs (ibid) could have been '...a dubious accreditation to the Supernatural!' Furthermore, Higgs (1968: 620), misrepresented by Klejn (1977: 12) as being Australian, also questioned the future objectivity of Archaeology with the essential proposition that our future lies in the broadening study of past human behaviour in an ecological context. Tapp (1970: 307-8), who is Australian, and a philosopher of History (pers. comm. McBryde 2006), though sympathetic to Higgs's disquiet over the discipline's stagnation did venture that it would be a diagnostic fallacy if current humankind's advanced complex mental states were ascribed to our remote ancestors. This was a caution that could also be attributed to Tylor's (1878: 5) or even Croce's (1960 [1915]: 315) theory on cultural relativism which was later echoed in Boasian anthropological doctrine (e.g. Salmon 1997: 47). However, Tapp (1970: 8) affirmed Higgs' environmental framework but, following in Basalla's mode of antecedence, Higgs neglected to acknowledge the then current environmental functionalists of the time, such as Miller (1965). The Binfords' (1968) seminal applications of a system theory was also overlooked, although that too could be seen to hark back to Worsaae's 1840 environmental functionalist arguments (after Trigger 1989: 247).
Innovation: Processualism

Interestingly, Daniel's (1967:99-131) account of this watershed period which he calls 'Archaeology comes of Age' is surprisingly devoid of any mention of the concerns of the discipline's stagnation nor of the so called 'new' Archaeology gaining momentum in America. This was a methodology originally outlined by the American archaeologist Philip Phillips (1955: 246-7) as an anthropological framework to allow for a cultural super-organic analysis of artefacts (cf Spriggs 1984a: 2). In a later publication Willey and Phillips (1958: 1-7, 11-57 and Part 1) essentially called for a processual methodology, an appeal repeated by Binford in 1963 and in later publications (1963; 1964; 1965), which were all noticeably excluded from Daniel's publication covering this period of development. Such omissions seem far from an oversight when considering his past conservatism expressed in A hundred years of archaeology (Daniel 1950) and particularly in his later review of Willey's (1974) retrospections on the 'new' Archaeology '...[in that] they were being practiced...long before that precious and prissy phrase gained currency' (Daniel 1976: 181). Furthermore, Daniel (1976: 182) was also of the opinion that such Processualism had already been promoted by Hawkes (1954) and in Piggott's (1960: 3) advocacy of a priori, while Grahame Clark's three dimensional Archaeology with artefactual seriation coupled with a social context underpinned by ecology was already in existence. However, both Clark and Piggott did admit some lack of forcefulness in promoting their works (Daniel 1976:182), even though their interpretations were aligned with the then innovative analytical approach. Their publications had not been conveyed in terms of the emerging 'new speak' and therefore conceded an unclear concurrency with the so called new evolving archaeological methodologies. Perhaps the fashionable 'new speak' could be rationalised as American Archaeology's endeavours to divest itself of the stigma cast upon it by Boasian Anthropology that archaeologists were overly reluctant to venture into the realms of analytical theory (Trigger 1978: 5).

Irrespective of Daniel's aversion to a progressive Archaeology, there was no further mention of the subject in his later memoirs (Daniel 1985). However, it is worthy of note that Daniel did publish Childe's (1958) earlier Marxist analytical paper that had been rejected by the Cambridge Journal (cf Gathercole 2009: 183-4). But also notable is the relaxed style of Daniel's autobiography as he regales his readers with his
upbringing and returns to the 'Land of Our Fathers', seasoned with ongoing contretemps over Rouffignac's fake French Palaeolithic art and social interaction with numerous luminaries (Daniel 1985: 252-61,306). Such accounts intermingled with his involvement with his own television program, editorial duties at Antiquity, and Stewardship of St John's College, Cambridge (Daniel 1985: 271-296), Daniel certainly entreats the question, when did he find the time to write? Nevertheless, he was arguably the first major scholar of the history of Archaeology.

Also appreciative of Daniel's contributions and writing style is the Russian archaeological theorist Klejn (1977: 4), whose global history of Archaeology's development covers the period from the late 1930s to the mid 1970s. In his publication he dubs the late 60s early 70s as a 'revolution in Archaeology' (Klejn 1977:3). Such a description is somewhat wanting in originality (cf. Martin 1971: 1-2), and very questionable according to Meltzer's (1979: 653) comments in his discussion paper centred around Archaeology's use of a Kuhnian paradigm. Meltzer argues that there had been no radical change in the way we look at the archaeological record to reflect a transformation in our underlying research principles and therefore such continuity in the structure of archaeological research hardly evinces a revolution or even evolution. This was an opinion already expressed by Trigger (1978:2-18) that New Archaeology's prominence in the late 1960s and early '70s was not so unique as it was derived from an already well-established framework in American Archaeology subsumed by Anthropology. Nonetheless, Klejn's paper is remarkable because of its detail and more so, because of the political climate at the time of his publication in America. His paper claimed, while a resident in the USSR, that Soviet Archaeology was also in transition parallel to the 'new Archaeology' after realising that Russian Archaeology was oversimplified based on linear interpretations of Marxist-Leninist ideologies (Klejn 1977:12-16). Although later tempered, this perhaps seditious assessment does raise the question: was this merely a further promotion of functionalism and Marxist teleological contributions to Archaeology's methodology?

In similar fashion, American and British archaeologists were also questioning their research methods. Martin (1971: 2-3), together with like-minded American reactionary colleagues, saw a sterile discipline without goals and indeed welcomed the change from one of history to science. The American historical archaeologist Orser (1996: 13) later adjudged American Archaeology as certainly ready for a change as it was long weary of
old debates. Kohl (1985: 106) on reflection had previously welcomed the transformation, as it forced archaeologists to present explicit research designs to test alternate hypotheses or explanation of their data despite the largely confused theoretical issues caused by continual perplexity between methodology - and functionalist - based frameworks.

Johnson Jr. (1972: 367-70), a milder critic of Archaeology's latest development in comparison to some (e.g. Walker 1967; 1978: 223-33.), warrants mention because of what he considered an inappropriate application of positivism to Archaeology. More so, because Johnson (ibid) makes the very valid point well before later commentators that: 'none of the other social sciences had yet been able to successfully discover general laws of human behaviour other than trifling or superficial observations with obscure common sense statements'. Furthermore, by citing both Feyerabend (1962) and Kuhn's (1977 [1962]) explanation of theory as 'general unrestricted axiomatic assumptions', Johnson (ibid) points out that theories in social sciences cannot be proved by scientific methodologies, as a hypothetico-deductive model is incapable of managing the possible magnitude of 'fluid' evidence to verify an argument. And, as a side observation by the author, it would seem at no time was there provision made for the essential scientific procedure of 'Proof of Concept' in a laboratory or workshop before being applied to field data. Moreover, as Caldwell (1971: 411) observed, it would be unreasonable to expect archaeologists to succeed where scientists have failed; indeed this was a cautionary comment in reviewing the Binford's (1968) joint New Perspectives in Archaeology. But even more significant and typifying this review's themes of questionable adaptability and originality, is Toulmin's (1970: 40) invalidation of the perceived cerebral limitations of archaeologists with his observation that the intellectual function of Kuhn's paradigm is precisely the same as Collingwood's ([1940] 1948: 21-57) chapter on 'Absolute Presuppositions'.

Also emerging around the late 1960s and early 70s was an assortment of basic archaeological functionalist-systems methodologies that had been spawned by an array of geographers (cf. James 1972: 510; Earle et al 1987: 502-3; Fleming 2006: 267). Likewise, the Binford's (1968: 313-41) ecological Holocene Density Equilibrium systems theories along with Flannery's (1969: 73-100) Broad Spectrum Revolution (BSR), were both ostensibly influenced by Lotka's ideas (1925: 357). Earlier notions of a harmony between human evolution and the ecosystem as seen in the Odums' (1959)
ecological homeostasis studies can be seen as the basis for later cultural and landscape studies. But, not all similar studies, like Renfrew (1972, 1973) and for the most part Clarke (1968; 1972) have stood the test of time (Shennan 1989: 635), whereas the Binford's and more particularly Flannery's BSR premisses were later successfully substantiated in Stiner and Munro's (2002) Mediterranean field studies of prehistoric diet and demography.

Flannery's (1969) framework was originally significantly challenged by Salmon (1978: 174) on the grounds that research based on General System Theory (GST) was of questionable value to Archaeology. Systems thinking was not a proven methodology but a failed extensive research program by von Bertalanffy (1950, 1968) and therefore of doubtful addition to Archaeology's interpretive frameworks. Furthermore, after being challenged by Lowe and Barth (1980: 565-573) Salmon (1980: 575-6) expanded her differences of opinion by pointing out that the 'ambiguity in grandiose claims and jargon ridden archaeological texts' on GST must differentiate between empirical examples and a philosophical model to narrate the scientific logic being applied to the archaeological phenomena. Johnson Jr. (1972: 371) previously made a similar comment that confusion arises because the term 'systems model' has been applied to both philosophic and scientific explanations and as such dilutes any heuristic value in a dynamic structural-functionalist model. Or as Dunnell and Simek (1984: 3) succinctly explain, problems arise if a testable product is unable to produce a statement that, in itself, is logically true.

Later commentators on Archaeology's transition, like Kelley and Hanen (1988: 206-7), call attention to the limitations of both Hempelian and especially Kuhn's perplexing positivism. Similar specific criticisms were raised by Masterman's (1970: 82) and Shapere (1971) that the faulty nature of scientific paradigms was inflexible and one-dimensional. Boyd's (2002) more recent 'Scientific Realism' model acknowledges the fallibility of most scientific methods for Archaeology and suggests a framework that contains no reference to theories or laws but interpretive explanations by an inductive methodology allows several probable conclusions from one data set. By seeking empiric generalisations a variety of conclusions can provide an analytical narrative, as seen earlier in Scriven's (1963) suggested detectivism framework. In like manner, the 'Covering Law' models were seen by the 'new' archaeologists to be the more appropriate (after Kelley et al 1988: 165, 173-4, 183). This, from a side issue of originality, was
first conceived by Hume (1748), and later developed by Hempel and Oppenheim (1948) as a scientific model composed of inductive theories gained from a social system that underwent a deductive process to provide a hypothesis (cf. Machlup 1955: 13). South's (1977: 13-15) shallow embrace of such a conciliatory theory can be seen in his Historical Archaeology manual, under his own schematic disguise of 'The hypothetical–deductive-inductive scientific cycle'!

The more considered intellectual approach to prove a theory is provided by Morwood's (1975) short but informative article that discards part of what is seen as the Covering Law process for Archaeology. While explaining that of the two methods involved in the Law, deduction is the more appropriate process of how a hypothesis stands up to being tested rather than how the proposition was constructed. According to Morwood (1975: 114) the important part of an evolving hypothesis is the interdependence of Lakatos’ (1970: 116) 'sophisticated methodological falsification' that does not particularly reject a previous failed hypothesis but instead classifies such falsification as a part of a feasible theory. In providing an example of falsified theories being part of an acceptable theory Morwood (1975: 115) uses Binford's (1967) 'Smudge–pits and hide-smoking …' study. The first hypothesis about smudge-pits being used as mosquito repellents was falsified, but after deliberations on the structure and context of the pit it could also be used for smoking skins. Both activities were conducted in the spring and summer therefore providing the likely interpretation that smudge pits are found in seasonal base camps. Morwood (ibid) goes on to explain that the suitability of a scientific theory has to differentiate truth or fallacy and such theory should be comparative and not an absolute truth about the research in progress.

Nevertheless, Archaeology's phase of Processualism was showing signs of drawing to a close with the adherent Schiffer's (1988:462-4) intense scrutiny of what he saw was Binford's (1977) inappropriate adaptation of Merton's (1968) sociological Middle Range Theory (MRT). Merton's MRT essentially compares the static philosophic high range domain with low range empiric elements to determine a middle range theory of society's life ways (after Schiffer 1988:464-5). Binford's (1977:6; 1978) simplified adaptation of MRT rested on modern-day archaeological studies of the Nunamiut Eskimo and the Navajo Native-Americans to interpret the lifeways of their ancestors. This prime example of cultural relativism, as discussed by Burke (2005: 8) and Spriggs (2008: 538) questions results gained from present day generalized dynamic data applied to past
static archaeological signatures. Schiffer's (1988: 644-83) influential paper densely circumvented such shortcomings by analysing the located artefacts according to their environmental context, in which he classified the host landscape as cultural or natural transformations. Subsequent primary considerations were given to the c-transforms and n-transforms in analysing the associated artefacts with either sociological theory or geomorphic laws as high range philosophical considerations against empiric experience that were eventually modified into a MRT. As implied by Schiffer (1988: 462-4) to correct Binford's (cf. 1968: 68) ill conceived methodology of Processualism, that it is only through the study of a society's material culture that archaeological research can prove idealistic interpretations of human behaviour. Wylie (1989: 1-2, 10-16), later attempted to circumvent such MRT methodology with her 'vertical tacking metaphor' as a 'hopeful' answer to 'the impossible task of attempting to reconstruct the past', which reflects the French sociologist Raymond Boudon (1991: 519-22) negativity towards MRT. Boudon (ibid) opines that the middle range theory does not refer to a specific theory but is a quixotic imbrication of a sociological theory that attempts the somewhat impossible task to embrace the total essences of one society. The 'middle range theory' is no different to any other form of methodology that attempts to prove or justify a theory (ibid).

Other Processualist Influences
Albeit not as intense or diverse as the various mainstream processual archaeological deliberations, Australian prehistoric Archaeology's own self-appraisal, principally prompted by the already cited 'Cambridge in the Bush' polemics, attempted to diffuse the given impression of nonchalance towards theory and methodology. While certainly not of fervent concern, the embryonic stages of professional Archaeology described by Mulvaney's (1986) account in which Australian Archaeology developed its own positivistic methodology with suggestions of systems thinking and surprisingly, indications of phenomenology, the symbolic appraisals of the factual world that substantiated an Aboriginal presence in excess of 30,000 years BP (after Mulvaney 1986: 99-104). Huchet's (1991) later analysis of Australia's archaeological history divides the time from 1960-80 into three periods relating to specific archaeological theories which, as he points out do not conform to the standard definitions being used at the time (Huchet 1991: 46-48). Cultural materialism was the dominant theory over the three decades with cultural ecology and economic materialism playing a supportive role
in the '70s, while Marxism under the guise of historical materialism eventually became an accepted framework after 1980 (see Huchet 1991: 46-7).

Even though Gosden (1999: 105) claims with an unsubstantiated citation that Marx's philosophies were influenced by Morgan (1985 [1877]) they are still perhaps the most innovative frameworks introduced to Western archaeological practices. The more remarkable observation is that Childe was first to use such societal dialectics in his The Most Ancient East (1928) and The Bronze Age (1930) (Tringham 1983: 86, 94). Nevertheless, due to the political climate of the times Childe's controversial but progressive interpretive methodologies were never readily accepted until the 1980s (Spriggs 1984b, 1984a; Tringham 1983; Trigger 1984a, 1984b; Leone 1995; Gathercole 2009). Moreover, while prehistoric Archaeology first used Marxism, British Post-Medieval and the later Industrial Archaeology (the latter term first coined in 1955) both dealt with the physical remains of the Industrial Revolution but ignored such Critical Theory (Nevell 2006). Likewise America's Historical Archaeology of the 1960s and the Australian subset of Historical Archaeology were initially more influenced by Noël hume's [sic] (1964) misguided Archaeology: Handmaiden to History. This was a subjective directive (see eg. Trouillot 1995: 25-7) given to cultural materialist studies of social Archaeology rather than the appropriate historical materialism that was later seen as an essential core by Leone (1984; 1995).

Meanwhile, a similar indifference towards interpretive theory was also evident in the archaeology of the Industrial Revolution as initially voiced by Hudson (1976: 7-8), which was to continue well into the 21st century (after Linehan 2000: 99-103; Young 2002: 11-4; Taylor 2003: 130). Some 25 years after his initial critique, Hudson (2001: 6-9) continued to be concerned at the persistence of inductive studies, admonishing the tendency for narrow descriptive research agendas to persist in spite of his original reproof (Hudson 1976). This was a sentiment also expressed by Gould (1999) as a result of Palmer and Neaverson's (1998: 3-8) comments that over the last decade there had been no attempt to change descriptive research narratives on past industrial related communities. Aside from these reproaches, the membership of the Association of Industrial Archaeology is in the main mature or consists of retired dilettantes from allied industrial backgrounds that renovate archaic industrial machinery and record numerous industrial sites throughout the British Isles for The International Committee for the Conservation of the Industrial Heritage Millennium Congress 2000 (eg. Palmer et al
2001). These site reports are published bi-annually in the Association's high quality journal together with a series of similar quality handbooks as guides to specific areas of Great Britain's rich industrial heritage.

Not in the same format, but still noteworthy, several ground breaking Australian Historical Archaeology papers were published during the years of 1967-1973. The first was a relatively short paper on Cornish style chimneys in Australia published by Allen (1967) as a forerunner to a more notable Australian historical archaeological study of Port Essington (Allen 1969; 1973). The significance of Allen's first publication was that it occurred in the same year as the inauguration of the Society for Historical Archaeology in America (see Pilling 1967) which was to have an enduring impact on the discipline in Australia. As time progressed, a wealth of typologies in Australian Historical Archaeology were published (to name but a few Birmingham 1978, 1979a, 1979b; Birmingham et al 1987; Jack et al 1984; Jack 1985; Jeans 1983a, 1983b, 1987). But in general, they were similar to prehistory's approach in that a theoretical model is unnecessary when ample data is available for interpretation. Orser (1996: 14) on the other hand, explains that American Historical Archaeology has always considered itself a poor relation to prehistoric Archaeology because of the latter's sophisticated interpretive frameworks. If anything, Cleland et al (1978: 243-4) would seem to typify historical archaeologists' suitable attitudes towards fieldwork, excavation and artefacts in that interpretations should be particularised with a sequential perspective of history within the Structural-Functional methodologies of Anthropology and Sociology. Orser (1988) later countered such conservatism and saw the answer to Historical Archaeology's longstanding quandary of being a subset-discipline that was to have a primary focus on Capitalism as an interpretive model.

Whether this phase from the earliest explicit Historical Archaeology until the late 20th century has been innovative or heroic in concept is uncertain. Most of the later adaptations during this period are from earlier notions and, with the exception of Marxism, could not be considered as heroic or of a progressive evolutionary nature. If however such development is claimed, it surely can only be regarded as a Lamarckian phylogenetic evolution in that such ongoing attempts are seen as adaptations to an academic environment with no fundamental change to the overall form (eg. Barrow 1995: 20; Firenze 1997: 9; Ferguson 2008: 351). A similar analogy can be applied to the Post-Processual phase of British Archaeology featured in the next section. The
seemingly regressive methodologies that were later to replace processual premisses were alas, at first tainted from the Australian perspective with dense postmodernism focusing on relativism of the individual imbedded in the archaeological record but as such did not change Archaeology's underlying core principles (eg. McGuire et al 2005: 363).

'A Changing pattern of great liberating ideas ... that inevitably turns into suffocating straitjackets' (Isaiah Berlin 1999: 159)

Post-Processualism and Prognostic Scope
The above citation could well have been Processual Archaeology's threnody or the clarion call of Post-Processualism to supplant the scientific method of analysis with the material culture previously used by the likes of prehistorians Childe and Collingwood. Hodder's (2007: 200-1) conviction was the way out of Archaeology's analytical vacuum despite Gilman's (1987: 515) comments that these specious methodologies being promoted by Cambridge's younger scholars were self-seeking promotions to survive in academia. Such multifaceted philosophical suggestions were to become the interpretive methodologies that were to concentrate on both the individual and the community in the archaeological record. Hodder's (2007: 200-1) recollection as one of the prime instigators of this transition period claims no similarity with the frustrations concerning the limitations and contradictions of New Archaeology. Though Hodder's philosophies had a similarity with Lukes' (1968: 123-4) earlier sociological paper, they were in all likelihood predisposed to Giddens's (1979) advocacy of a similar nature to reconsider the individual's role in society that was codified as methodological individualism. At the same time, the surge of interest at Cambridge in Anglo-French social anthropology, sociology and American symbolic anthropology is given as the motivation for a gathering coterie of change agents (cf. Beckhard et al 1992: 75) to alter the direction of Archaeology's research with the least disruption. Save for a few confrontations with Binford and his followers at the 1979 Sheffield TAG conference (Hodder 2007: 200), the transformation, heralded by Hodder's (1982) Symbolic and Structural Archaeology was to become the versatile methodology of Post-Processualism that first gained a foothold in British Archaeology (cf Hodder 1986).
Maturing from cognitive, contextual, feminist and landscape Archaeology overarched with neo-Marxism (cf. Spriggs 1984b, 1984a) and unfortunately, initially at least, expressed in dense postmodernist texts (eg. Shanks et al 1987; cf. Chapman 1988), Post-Processualism became time honoured. In what is now seen by the later confirmed Post-Processualist Trigger (cf. Yellowhorn 2006: 322-3) as a renewal of earlier convictions, it aligned with Giddens's (1987: 20) double hermeneutic theory that clearly stated that Archaeology is not an experimental discipline but an explanation of the archaeological record within a social context. A salutary observation by the enduring critic who at one time noted the bias in analytical models as 'a rareness of a simple correlations between archaeological interpretations and social conditions' that has now been modified with purpose (Trigger 1989: 379-80).

Trans-Atlantic opinions being expressed at the time by Kohl (1985: 105) saw this period as a display of Anglo-American sophisticated critical self-awareness that was lacking during the heyday of New Archaeology. Earle and Preucel (1987: 504-08) label this phase as 'radical Archaeology' in spite of the tendency towards previous methodologies and also saw, along with Hodder (1984) and Spriggs (1984a) a loose parallel with geography's rejection of positivism. Geography's influence on British prehistory Archaeology, though at times tangential has been widespread (e.g. Bradford 1957; Hodder et al 1976; cf. Tilley 1994: 16-7; Dark 1995: 17-8; Orser Jr 1996: 133). But a more intensive and far reaching influence on the transformation was that of Cambridge sociologist Anthony Giddens' regular inspirational seminars to an expectant archaeological cadre (Hodder 2007: 200-1). Along with such anthropological doyens as Ardener, Gellner, Geertz and Sahlins who had embraced the publications of Bourdieu (1972, 1984) and Foucault (1977, 1978) Archaeology rapidly embarked upon an alternative to the earlier underlying Marxist philosophies being promoted by Spriggs (1984b).

Leone's reflections of the period from the perspective of a committed critical theorist, essentially welcomed the change of direction from the positivists' dehumanisation of Archaeology (Leone 1986: 431-2) but chose to disregard the later European strong criticism of functional-structuralism's failure to account for change (cf. Burke 2005: 141). Instead Leone continued his preference for Marxism and deconstructed interpretations (Leone et al 1987: 283-5; cf. Leone 2007: 205). Even so his neo-Marxist approach, the basis of his seminal publication of William Paca Garden...
(Leone 1984) was considered by Johnson (1989: 195) as 'one of the most elegant and convincing demonstrations of the Marxist view of ideology'. The same plaudit could apply to the contributors to his Historical archaeologies of capitalism (Leone 1995: 4-6), and though he (1995: 252) later warmed to Giddens, Leone's influence continued in a host of conflict studies such as Mrozowski (1996) Beaudry (1999) and other excellent studies of Boott Mills Boarding House (cf. Paynter 1999: 185). Wylie (1999: 26), also a critical theorist, contradicted Beaudry's (1988: 1) earlier assertion that prehistoric and Archaeology methodologies were incompatible with the observation that Post-Processualists 'found some of their most fruitful applications in Historical Archaeology'; an opinion certainly defensible as both are well-matched (also see Shackel et al 1992). Nonetheless, the trans-Atlantic difference remained with American historical Archaeology steadfastly holding on to structuralism and brands of Marxism (see Cheek et al 1990: 57; Hardesty 1990: 43; Leone 1992; Mrozowski 1993; pers. comm. Timmons 2007). Notably, save for Shackel and Little's (1992) excellent British-style Post-Processual review together with contributions by Driscoll (1992) and Johnson (1992: 45-6) neither Giddens, except in a material culture context (cf. Orser Jr 1992: 95; Pendery 1992: 60, 65), nor Bourdieu and Foucault were ever mentioned in the issues of the journal, Historical Archaeology of the 1980-90s. Later, other publications like, those of Cowgill (1993: 95) and Matthews (1999: 263-7) extolled the value of both Giddens and Bourdieu's rational-choice models, as did the VanPoools (1999) in their well presented argument. But, the Vanpools' unlikely synergy of both processualism and post-processualism as a framework to provide a 'rich and robust understandings of the archaeological record' (VanPool et al 1999: 48) is a dubious proposition, particularly when considered in relation to the discipline's more recent developments discussed below.

Another, perhaps rich but most certainly robust if not confrontational hard-line Marxist paper by McGuire, O'Donovan and Wurst (2005: 356) rightly criticises Archaeology in general for not acknowledging Marxist origins for many of its ideas. They also targeted the early post-processualists visits to what they call the 'Marxist buffet' which, in their opinion limits their understanding of praxis, professional skills as, 'an essential in the identification of the contradictions prevalent in the power relations of the social world' (McGuire et al 2005: 363-5). Obviously McGuire et al are unaware of Johnson's (1989: 192) diverse paper on the social world and how agency translates sociological changes
through material culture. Surprisingly in view of Critical Theory's political undertones, few American archaeological theory publications, save for Leone (1999) and Matthews (1999), feature Giddens's framework of Structuration that provides an alternative to conflict analysis by pointing out that the fluidity of a society is not necessarily brought about by variant tensions (Giddens 1981: 5, 9). Furthermore, according to Giddens' (1979: 72) earlier opinion that 'all social actors, no matter how lowly, have some degree of resistance' and humour, at times, can ease oppressive social forms (see Shackel 2000 for further examples). Obversely, the positiveness of the 'ruling classes' can not only be analysed as one person's constraint on another which in effect could be some form of empowerment (Giddens 1982a: 176-78; 1984: 170-76). Intense appraisals, like most of Giddens's Structuration theories are based on the elemental 'duality of structure' that were to remain in trans-Atlantic limbo until Marcia-Anne Dobres' (2000; 2000a) echoed the need for an alternative to Marxist structural and conflict frameworks; an opinion thoroughly endorsed by Renfrew (2001: 29).

Structuration and juxtaposed agency are not new to Archaeology (eg. Johnson 1989: 191-2; Barrett 1994: 94). Nonetheless, adaptations of Giddens' Structuration as an archaeological research methodology to explain an individual's rational choice within the bounds of society were sparse and virtually non-existent in an Australian archaeological context. Gosden and Head (1994: 113) used Giddens' (1984:110-145) Time, Space and Regionalisation to discuss an Australian landscape, Harrison's (2002,) contact study fleetingly mentions Structuration, while Taylor's (2001, 2003) Industrial Archaeological research of Iverinebank and Gibbs' (2010) later study of a post-convict community in Western Australia used Structuration as an interpretive model and methodology. Notably, none of these research papers were published in Australia. Therefore, at this juncture, it would not be amiss to outline briefly Structuration vis-à-vis agency as these two concepts were developed over a number of years (cf. Giddens 1971: 5, 52-60; 1976; 1979; 1981: 1-3; 1982a; 1984; 1985, 1987).

Scott and Marshall (2005: 644) describe Giddens' theory 'as a social ontology, defining global social contexts that exist rather than setting out agendas for development or suggesting clear premises about what actually happens'. Instead Structuration is contingent upon open-ended social practices and how a community binds itself together rather than attempting such an analysis through structural-functionalism or even evolutionary theories. Or, as Matthews (1999: 264-7) understands, Structuration works
by dialectically teasing agency from a community structure allowing meaningful interpretations of the past, which in the Woolgar's case would be through the interplay of archaeology and the historical evidence.

Johnson's earlier (1989: 206-8) publication was an insightful study providing a range of good and not-so-good examples of how material culture should be used to interpret agency. Agency is not necessarily signified by the originality in a design but by changes or adaptations over time. It follows according to Dobres et al (1999: 1-3) that technology is at the heart of agency, whereas Pfaffenberger (1998: 291) incorrectly feels such a focus obscures the human and social dimension of a community. Nonetheless, as later pointed out by Palmer (2005: 60-1), whatever means are used to determine agency in an archaeological framework, it is essential that there is a clear conduit between the methodology and practice. And more importantly, modish frameworks should not be used to give a philosophical sophistication but rather as an explanation of the changed value found in the archaeological record (Dobres et al 2000b: 3; Palmer 2005: 60-1). Accordingly in the next chapter a schema and accompanying explanations of Structuration and agency as conceptual interpretive tools will contribute to addressing such shortfalls by fully outlining an interpretive framework for an industrial archaeology site.

Prognostic Scope
Giddens and Bourdieu's notions continue to influence the expanding and seemingly popular so called 'Contemporary Archaeology' (see Harrison et al 2010) as the latest addition to the discipline particularly in the UK and USA. This is a subtext of Archaeology that sees its origins in the innovative sociological study of contemporary material culture discussed in Rathje's (1979) original archaeological Garbage Project. As Harrison and Schofield explain (2010: 21-53), such a project was far reaching in encouraging many of the Post-Processualists to widen their gaze on the material culture of the contemporary past and once again, as noted by Gosden (1999: 67, 80,125), re-embraces some of Anthropology's methodologies. Another notable influence in Contemporary Archaeology among many (see Harrison et al 2010: 33,93,95-8) is Latour's (1991: 3-5) apt title We Have Never Been Modern, this encourages studies in science, technology and society or STS which on face value seem not too far removed from the industrial and worldview focus of this thesis. Along with other studies that have also been spawned by Latour (2005) labelled as the sociology of association
through an Actor-Network Theory (ANT) Callon and the sociologist John Laws have addressed ways in which material and cultural simultaneously work together (Harrison et al 2010: 95). This is an interesting addition to Archaeology's epistemology but considered by the author as having a nuance of 'reinvention' when compared with Structuration, the already chosen framework for this thesis. Any further discussion of the impact of Contemporary Archaeology is left to Chapter Eight.

In summary, this chapter demonstrates Archaeology's circuitous exploration of analytical procedures that could be classified from the earliest of times of the discipline's history as cultural empiric studies, followed by a relative short period of an American scientific approach and then a return to material culturalism advocated by the British Post-Processualists. The most notable and far reaching influence is seen as Marxism in its various forms firstly introduced to Archaeology by the Australian, V. Gordon Childe in 1925, though not fully accepted as a school of thought in Archaeology until the 1980s. Such influence permeated most if not all of Archaeology's subtexts needing a medium for conflict analysis. The very nature of such a teleological approach to the social sciences encouraged Giddens's to modify the critical theory with Structuration, which takes a more enveloping approach to analyse society's sway on the individual that is reflected through the aspects of agency and Structuration outlined in the following chapter. Overall, this chapter demonstrates the discipline's historic quest for broader academic challenges despite conservative reaction at times to innovative thinking. If all else fails, at least this submission should lay the ghosts of the judgemental Boasian anthropologists to state that archaeologists are not averse to venture into the metaphorical minefield of social theory to enhance its methodology.
Chapter 3: Structuration: An investigative framework for industrial archaeology

Sociology is by its very nature controversial
Antony Giddens (1986: xiii)

Introduction

The outcome of the previous chapter's review of Archaeology's episteme affirms the notion of a revised adaptation of Gidden's Structuration methodology previously used to analyse the archeology of a tin operation running at the same time as the Woolgar (see Taylor 2003). While Giddens' sociology was the major influence in this research framework credit should also be given to Schiffer's (1988: 465) for his notion of classifying landscapes and for pointing out that Archaeology does not have theories but adaptations of Sociology guiding its methodologies. Riley and Yoward's (2001) should also be acknowledged as the first to adapt Structuration to analyse an Industrial Archaeology site. Furthermore, all three authors moved away from the major philosophical modes of research that were current at the time with Schiffer discarding the then popular scientific approach to Archaeology and Riley and his colleague encouraging the replacement of Marx with Giddens as the core to a methodology.

Cultural materialistic framework would have seemed the obvious choice for such a study but there were concerns that functional-structuralism would veer towards an unwanted conflict analysis of a frontier industrial society. This is especially so since Giddens's (1986: 25-8, 162) reconceptualisation of his original view of society as a restrictive dualism to that of a culture with a reflexive duality of structure in which agency places the individual's role as central to the social phenomena. Giddens's (1971: 47-60) earlier evaluation of society's narrative recognized the need for an alternative to the Marxist analysis of Modes and Means of Production by way of super - and infrastructures. Accordingly, such a dialectical materialistic format ranks matter over consciousness that invariably morphs into a conflict study of society. Structuration in contrast, importantly places changes in society activated by agency over the material (after Macey 2001: 97). The other major difference is that Structuration attempts to find compatible motivations within a capitalist society as against Marxist combative analysis that usually searches for conflict even in the tone of language used.
The incongruity of Marxism as a diagnostic tool can be seen in the dialogue considering the *commodity fetish* against the *rate of exploitation* as an attempt to expose marginalised northern Queensland miners and therefore Woolgar miners that took pride in being self-employed or part of a profit-sharing tribute (after Bolton 1972: 62). Furthermore, the synthesis featuring an *organic composition of capital* evaluation against a *constant low capital variable* manifests an example of a Marxist reductionist appraisal of an underpaid workforce that ignores the rudiments of a freedom of choice (after Giddens 1981: 7). The main object of Giddens's sociological theory is to bring to the fore the subject and actor without lapsing into subjectivism (after Adams et al. 2002: 48). Giddens further contends that any premiss considering a society as the end in itself ignores the fundamentals of recursivity or, alternatively, the feedback from any change in the society's structure (after Giddens 1979: 7, 69).

**The ontology of Structuration**

The shift in Giddens's (1981: 1-3) social focus to counter Marx's inchoate theorisation of historical materialism is seen as the result of his review of the classical sociologists (see Giddens 1971). What followed over the years, according to van Jaarsveld (2002) were some 34 books and 200 journal articles as the ontology of Giddens's metatheory to bridge the gap between agency and social structure (eg. 1976; 1979; 1981; 1982a, 1982b; 1984; 1985a, 1986, 1987). In a number of these cited publications, Giddens claims a variation of agency as a *dialectic of control* that over time and space formed social structures whereby rules and resources are continually re-evaluated by the self-same agency (eg. Giddens 1986: 14-6). Such observable detail is offered as the core to Giddens's (see 1976: 127) theory of Structuration that revolves around his 'double hermeneutic' whereby the social structures of everyday life are witnessed or experienced as an ongoing interpretation of various other societal influences (Giddens 1986: 284). The continuing ontological theory reaches beyond the closed or constraining systems of generalised neo-evolutionism and structural-functionalism so as to define the ramification of a social structure in more individual humanistic terms (Giddens 1986: xxvi-vii, 228-9). Hence, Structuration as methodology seeks out adjustments to the status quo and notes the constant individualistic improving modifications within society (Adams *et al* 2002: 48). From the archaeological perspective, such changes must be actually recorded in the historical record or better still seen in the archaeology.
The earlier peer appraisals of Giddens's sociological theory called for a normative statement to articulate and justify his concepts that until recently would seem to have been left to a variety of secondary literature sources to clarify (eg. Bryant 1992: 148). Along with other calls for clarifications were a number of pejorative comments mostly on the theory's obscurity, unoriginality and empirical emptiness (after Marshall 1994: 517). These criticisms were refuted by Giddens in that, as a post-empiricist his sociological focus is only required on the ontology of a theory rather than reiterating past epistemologies. On occasions when an epistemology has been referred to by Giddens, it is in the context of seeking an alternative to Marx's dialectical materialism that argues for a distinctive pluralistic and non-teleological explanation of causation (after Giddens 1979: 70; 1981: 1, 3; Scott et al 2005: 245). The same clarification is sought in the counterarguments in both editions and host of reprints of his *The Constitution of Society* (Giddens 1984; 1986) in which Giddens challenges structuralism (ibid: 207-21), Foucault's time and space theory (ibid: 145-58) and Parsons' views on evolution (ibid: 263-74), all of which are used as comparisons to reinforce his own theory.

Notably, the innovative direction in sociology attracted an equal number of supporters that exonerated Giddens's opaque texts as a result of having to use complex source materials (after Bryant et al 1991: preface). Likewise, Adams and Sydie's (2002: 55) affirmation of Giddens's theory notes that despite his density he has become a status symbol among the 'new leisure class' that have been able to decipher his dense terminology. The more affirmative analysis by Scot & Marshall (2005: 644), notably after Marshall's previous comment, now sees the theory of Structuration as an important advance in sociological studies that brings into the single dynamism of time and space, the dualistic accord between institutionalism and human action (cf Barrett et al 2000: 26; Adams et al 2002: 54).

The pernickety polemics that still surround some of the finer points of Structuration, calling for more epistemology or the dualities of structure to be stated as a dualism of structure, are of no concern to this adaptation (see Giddens 1986: xx-xxi). The more important issue is how adaptable is Giddens theory to Archaeology? The first use of Giddens in an Australian archaeological context was by Gosden and Head (1994: 113) to stress an environmental viewpoint with a very brief reference to Giddens's (1984: 110-45) time and space theory. The second application was by British archaeology and
surprisingly in an Industrial Archaeology context by Riley and Yoward's (2001) successful adaptation of Structuration in a Top-Down Influences versus Bottom up Reaction model to research the social, political, economic and technical aspects of a 19th century corn mill in Portsmouth, Hampshire. Though the paper had "Structuration" in the title there was only one general reference to Giddens in a text that certainly implied his double hermeneutic in a portrayal of the duality of structure in different circumstances through their top-down, bottom-up model (ibid: 86). Interestingly, Riley and Yoward, practitioners of a discipline often assessed as being descriptive and atheoretical, concluded their paper with the recommendation that the theory of Structuration would benefit all industrial archaeological studies (Riley et al 2001: 91). Such a recommendation did result in at least one other interpretive industrial research based on Structuration in order to study the tin mining township of Irvinebank, west of the Great Divide in far north Queensland, though not published in Australia (Taylor 2003).

Hardesty (1988: 12-17) observed that most industrial archaeological commentaries lacked depth, implying that there is more to an industrial site than machinery and derelict buildings. Therefore in accordance with Basalla's observations on originality this adaptation of Baron Giddens's metatheory will similarly select and outline a series of appropriate interpretive avenues to broaden both the technological and economic background to the Woolgar goldfield's archaeological research. However, before explaining the revised edition of the Irvinebank's application of Structuration to accommodate the Woolgar's comparable research aims, it is felt necessary to give further details of the revised application of Giddens's theory that has been adapted as the methodology for this archaeological treatise.

An overview of Giddens's Sociological theory of Structuration adaptations
The term to structurate describes an action to produce both material and social structures and is therefore seen from the archaeological perspective as a means in which to trace and analyse the prevailing material culture and lifeways of past communities through the medium of agency essentially seen in the archaeology. The effect of agency, or if preferred, evidence of power, is the key to a community's ways of life that incorporates various aspects of shared interests and therefore social capital, trust and risk that is monitored by a recursivity or feedback that can if necessary, modify the disposition of social life (after Giddens 1987: 20). The relevant exponential process is
viewed as a double hermeneutic in that agency facilitates considered choices of practice as an improvement on previous social habitus and procedures to add to the continuity of societies across time and space (see Giddens 1981: 122-26). Such elements are inclusive of the term distanciation, seen here as part of the Australian story, with past doxa being gradually replaced by the self-sufficiency efforts of immigrant communities that continually adjusted and enhanced their lifeways over the long term (after Giddens 1986: 258-9). Therefore, the schema (see Figure 3:1) depicts the basic tenets of Giddens's theory in a purposely-stretched ellipse to emphasise the effects of distanciation. In this case it is the depiction of prolonged relationships with previous homelands eventually severed by time and space that portrays the Woolgar's goldfield as part of a World System through various elements identified in the archaeology and its history. The Woolgar goldfield therefore is brought into focus through a wider lens of capitalistic influences of the Gold Standard that were not always beneficial. With this in mind, the following distillation of Structuration is seen as the appropriate research methodology to accommodate the later comparative worldview of the Woolgar's faint social and technical archaeology with other selected mining sites in northern Queensland.

The Schema
The general impression of Giddens's view of society is not as a collection of victims or conflict ridden factions but as an eventful purposeful social order. Though the analysis of society would seem to be similar to the dialectic nature of Marxism, Giddens's bifurcation of society is in terms of a community's assets and controlling elements are of a complementary nature within the classification of the separated community resources as Allocative and Authoritative Resources (see Giddens 1986: 258). The fact that the Allocative Resource placement in the schema (see Figure 3:1) has the appearance of dominance is purely a case of design expediency. In essence, each banner delineating each resource stands subordinate to the central agency notation as the ontology of each resources and subtitles that are detailed in the following.
Importantly, each Resource is a malleable asset that is intended to form the means in which to expand the possibilities of trade and a democratic governance of society. In Giddens's (1986: 258-62) explanation of these fundamentals as a comparison is made with past neo-evolutionary theories' general tendency to prioritise the garnering of various material resources over the administration of the social order. According to Giddens (ibid), both resources have a parallel significance in the distanciation metaphor that envelopes the storage capacity of the mind to recall past events to assist with the progressive transformation of social life and technological advancement. Such inherent memories can be seen more explicitly as the considered habitus, the acquired patterns of lifeways portrayed in a community's preservation of assets and social relationships across time and space (ibid: 261). The parallel of this can be seen in Purser's (1999: 115-37) description of 19th century frontier societies on the periphery of a World System (eg. the British Empire) that developed their own economy from natural resources while initially having to import most of their own provisions from the core of the World System.

Eventually, these communities were either characterised as insular agrarian groups with limited access to modernity or as industrial cosmopolitan settlements stimulated by social capital, known in the Australian context as matesmanship that provided the
ongoing technological transfer and new ideas to instigate the combined development of their own expansive economy (after Hardesty 1985: 213-15). Later, Hardesty (1988: 1-4) modified the mining communities' role, originally classified as part of the cosmopolitan frontier to that of separate interactive sphere of technology that helps broaden a country's economy. While an analogy can be drawn from Australia's progress, the Woolgar's development is seen in a lesser role after 1887 of only providing a subsistence level of income for the remaining inhabitants after the main gold seams had tended to expired. This review continues according to the schema's Allocative Resources itemised research agenda for the Woolgar's industrial archaeology.

**Landscapes**
The value of landscape archaeology to an industrial archaeological thesis is paramount. Nevertheless, the very nature of past northern Queensland mining communities is one of ephemerality in that most mining equipment, personal items and often housing was moved to the next promising geological region. The faint archaeological footprint left in the tropical outback of the Queensland landscape is often subjected to both years of prolonged droughts and periods of extensive flooding. The Woolgar's landscape, fully discussed later in Chapter Five is no exception, with lower regions of the goldfield showing the effects of descending flood waters from the upper Gregory Range that gained devastating momentum along the dry river beds. During the heaviest rainfalls the flood waters even spread to areas close to the Flinders Highway some 150kms away.
During the initial pedestrian surveys of mid 2005 (see Figure 3: 2), the varied landscape of the goldfield guided by Denaro et al (2001: 4 see Figure 3:3) regional geology and mine site map found most of the lower region's mines were accessible. On the other hand, the surveys of the upper goldfield were hampered by the difficult terrain, leaving
many of the mine sites unexplored. Subsequently, the archaeological record in areas expected to have some traces of Allocative remains had to be left to Jensen's (2000: 53-62) reasoning of using Merleau-Ponty's (1962, 1968) reliance upon Dasein (sic), the 'being-there' perception in a phenomenological proposition based on previous recognition of similar patterns in the landscape. For example, the global practice of past mining operations and treatment mills tended to use the gradients in the land to supplement technology exemplified the interconnectedness of the landscape with world market forces and other financial instruments (after Hardesty 1988: 45). Therefore, despite past climatic effects some consolation should be taken from the fact that both the rationale and physicality of the past are marginally ingrained in the landscape to provide some vestige of the Woolgar's biography.

\[
\text{Figure 3—4: Hewlett's 1928 mining economies model (drawn by Schmitz, 1979: 21)}
\]

To demonstrate this point further, Hewlett's model (see Figure 3: 4) of a minefield's life span and therefore the interconnectedness of both the landscape and technology is seen as a guide to the various phases of activity. Following Stage One of a mining economy, mines go into steady decline leaving behind, as in the Woolgar's case, a scarred landscape caused by 163 registered mines and probably unofficial areas of alluvial mining. Compared with other mines in the region the Woolgar landscape divulges very
little by way of technological or Authoritative (see Figure 3: 1) use of the surrounding countryside other than the mine itself. Mine sites and supportive areas are designated or monitored by the respective Mine Departments.

Usually the high ground of a miningscape has an archaeological record of industrial modifications to indicate small gauged railways from adit to lower processing areas while other prominent elevated levels are seen as possible authoritative panopticon sites. Subsequent identification of both the Allocative and Authoritative Resources in a minescape becomes examples of past agency. Similarly, the lower terrain's indications of industry such as various phases of ore separation and subsequent concentration or even alluvial mining have to take into account the past effects of adverse climatic conditions by way of washouts and land erosion that can usually compromise the cultural evidence of occupation and social activities. In the Woolgar's case, any examples of technology being used in unison with the land or forms of governmental influence will be discussed in the subsequent Chapters Five and Six as well as the comparative chapter, Chapter Seven.

Financial Instruments: Gold Standard

In the previous adaptation of Giddens's theory, the official historical data from the London and New York Metal Exchanges were used to analyse the Tin Market movements, which in turn highlighted the Irvinebank's hedging program in adverse market conditions (see Taylor 2001 and 2003). Such in-depth scrutiny proved the premiss based on the management's profitable trading skills in a declining tin market that the mining and smelting operation at Irvinebank was a paradox for its time (see Taylor 2003: 31-2). Unlike the previous adaptation's reliance on analysing the allied market of the time, this study will have to review the effects of the Gold Standard and capitalism through the lens of the Woolgar and Australia that are discussed in the later Chapter Four. Importantly, the point of assessing the Gold Standard also bears some relevance to the emerging suggestion from the more modern aspects of archaeology that it should act as an aide memoire akin to Santayana's (1905: 284) caveat and poignant premiss that repetition is an unfortunate feature of the sentient beings' world.

In contrast to the Tin market being an open outcry futures market, gold trading in London has always been an 'over the counter' (OTC) market operating on a principal to principal basis and therefore less transparent than the trading on an exchange (after
Maslakovic 2009: 2). While there has been a London Gold Market trading under different governing bodies since the 13th century, the market intelligence is of linear nature that offers little or no interpretive opportunity (eg. Officer 2009). Furthermore, the recommendation of the Royal Mint that the price of gold should be restricted to one price level came into effect in 1717 that helped stabilise price fluctuation within the emerging British World System. This standardised format for the price of gold became the forerunner to the 1819 Gold Standard that adopted the same price structure to regulate money supply and currency exchange rates amongst the member trading nations. Accordingly, the Royal Mint's original fixed price for gold at £3: 17: 10½d per troy ounce of 22 carat (0.904 purity) or £4.5s per troy ounce of fine gold (0.999 purity) was to continue with later small price adjustments until 1971. Thus, the rigid price control continued for some 254 years but did not always create harmony amongst members of the Gold Standard. It is this discord that lays the basis for one of the major premisses of this dissertation.

Technologies
To some extent tensions between emerging commercial ideologies and governmental supervision are not always reflected in an industrial landscape and therefore the site's technology should also be included in an interpretive analysis (after Lennon 1997: 8-9). This opinion is partly a previous observation of Fenenga's (1967: 81) that the importance of mining to world economies has been apparent and well documented since Agricola's (1912 [1556]) *De re Metallica*. Many of the primary separation techniques used on the base metal and precious ores are similar by way of continuing Cornish technological influences including the stamp dated back to circa 1198 to produce a slurry of crushed ore and water so as to dispense with the gangue (after Agricola 1912 [1556]: 172, 267, 282-3, 411). Even the post-crushing procedures are similar to later ore separation procedures being used before settlement and final smelting of both gold and tin. Interestingly, the Cornish had a greater influence on German mining than that seen by the proprietor of the Irvinebank operation who had a fervent preference for German technology over and above Cornish techniques and management. It is no coincidence that there were no Cornish miners employed or worked as attribute at Irvinebank (after Kerr 1979: 54-5).

In similar manner to the Allocative Resources description, the Authoritative Resources are the administrative facture of Structuration's Agency's Duality of Structure in that it
is the controlling element within society that governs the expandable assets of a social system and administers and stores past information that could be of benefit later. Such management or agency organises life’s chances emanating from the surrounding natural habitat and the impact of technological advances that have been harnessed from the Allocative Resources to benefit society (after Giddens 1984: 258-9). Furthermore Giddens (1984: 260-1) makes the point that the augmentation of material resources is fundamental to the expansion of agency cum authority by way of providing leverage for social change and or better governance.

**Governance**

The Government's agency seen as central to Queensland's mining infrastructure are represented by Mining Wardens, local council offices, police stations, postal and telegraph installations, schools and in certain cases, hospitals. In many instances, such archaeology is not visible but in a number of cases such past presence is identifiable through the historical records that include maps and photographs that help verify an archaeological survey and excavation. While their positioning in the landscape is interesting as a study of hierarchal significance, especially as most of these Authoritative installations take the high ground. The more obvious example of governance in a far north Queensland mining context is the practice of having the proprietor or management's accommodation as close as possible to mine heads and ore dressing areas (eg. Hooper 1993: 125-61; Taylor 2001: 60-6). It would seem that the homestead, which also served in many cases as an office, was set on the higher ground as a sentinel over the investment just as in the English post-Enclosure era when landowners usually ran their estates from their main residency (after Ashton 1997: 44-6). Thomas (1993: 22-3) more fittingly describes such an arrangement in any landscape as similar to a panopticon watch tower that provided a circular view of prisons and prison yards. These authoritative signatures stand central to some of the comparative industrial sites discussed later where a number of mine associated buildings and police barracks occupied a hierarchal position in the surrounding landscape.

**Ideologies**

The subtle presences of ideologies in an industrial archaeological site are usually hard to find except in the case of a symbolic panopticon in the landscape epitomising the tensions that were emerging from the mid nineteenth century onwards as capitalism and trade unionism confronted each other. Laissez-faire economic symbolism of such
foreign equipment in a landscape is usually fairly obvious whereas, the trade unionist's restrictive ideologies could be expressed by the lack of certain modern equipment that invariably caused unemployment. Possibly the first outward signs of progressive suffrage in an Australian context is exemplified by the gold miners rush that began in 1851 that accelerated the development of capitalism while the embryonic trade union movement throughout the colonies saw their origin in the Eureka uprising against unfair mining taxes (see Anonymous 2007a). In a matter of nine years, a political democracy emerged that was superior to the British homeland. The colonies of Victoria, New South Wales and South Australia attained political freedoms that were being denied in the homeland in spite of the ardent attempts of the British Chartists to counterbalance ongoing social injustices. The emergent Australian trade unionist movement, which initially closely paralleled its British counterpart, soon developed its own workplace goals developed from the experiences of its American and British equivalents (Ebbels and Churchward 1950:1-17). Nevertheless, the union movement's effort to achieve equitable working conditions had to endure deadlocks that eventuated in Government intervention in the Great Strike of 1891-94. The strike first started with the Mercantile Marine, spreading to the Queensland pastoral industry and for a comparative short period was evident in the lead and silver mines of Broken Hill, New South Wales (Hagan 1929: 8). Actual evidence of trade unionism taking a hold west of the Great Divide was in the early 1900s when the Vulcan mine at Irvinebank was a hotbed of workplace unrest due to the proposal of extending an aerial ropeway from a nearby mine to the smelter, making the local teamsters redundant (after O'Callaghan 1974: 35). The only disruption to the Woolgar's production, as mentioned later, was when there was a temporary strike at the Albion Mill over the use Chinese labour (after Denaro et al 2001: 45).

Social Practices
Social practices like ideologies are hard to define unless symbolised by the archaeological record or historical photographs of art centres, churches, hotels cum public houses, libraries, meeting halls, race courses, possible rifle ranges and sportsgrounds. In recognising these influences or power structures as either Allocative Resources or Authoritative Resources demonstrates both proprietary and governmental usage of the landscape. But more importantly from an archaeological perspective these socio-structures are the evidence of possible improvement in the community's social
capital previously referred to in an industrial context as technological transfer (eg. Field 2003; Francis 2002). Nevertheless, similarly to agency, evidence of such reforms must be seen in the archaeological record.

**Summarisation of Structuration**

The aim of this methodology is to widen the gaze of an Australian industrial archaeological study. The adaptability of the time and space paradigm can well accommodate the emerging variety of political tensions and social practices with a seamless interface with the rest of the world of its time. Whereas Functionalist appraisals, no doubt innovative of their time, are seen as etic, in that they seek explanations to changes in the homeostasis from outside the societal corpus. Such a methodology generally fails to take into account Heidegger's Dasein, the being-in-the-world that has created the archaeological record and other important factors such as world markets, natural resources and technologies are often ignored. Therefore, it is important to note that a methodology based on Structuration considers all aspects of human agency by way of ideologies, proprietorial and social practices as not freewill but the direct exponential influence of agency. It is in this respect that the Allocative and Authoritative Resources accounting for both the mercantile and administrative aspirations of a society are conveniently transposed to the Duality of Structure to explain human agency in a mining context in the Woolgar landscape. It is this very element that is not only missing from functionalism but also, for the most part, from an industrial archaeological discourse. Therefore, the intention is to apply the modified model outlined in this chapter to the industrial archaeology of the Woolgar.
Chapter 4: An Abbreviated Historical Review of Australian Gold as a contextualisation of the Woolgar Goldfield Industrial Archaeology's worldview for the years 1850-1939

Introduction
Most industrial archaeological sites narrate in broad terms the sociological and technological but rarely the economic issues of the past. The Woolgar goldfield's economic environment is part of Australia's worldview, and the impact of gold is examined here through Structuration: Agency's Duality of Structure subsection of Financial Instruments as shown in Figure 3: 1 under the Allocative Resources category. The Authoritative Resources elements, such as Governance and Ideologies are also prominent features of gold's lasting effect on Australia's economy until 1971.

Despite Orser's (1996: 71-2) definitive statement echoing Hardesty's (1988: 12-17) earlier assertion that capitalism is the proper focus for Historical Archaeology, it was still some time before the financial wherewithal of an industrial site became an in-depth feature of the storyline (see Taylor 2003). This focus was influenced by Orser and Fagan (1995: 205) and Leone and Potter (1999) in support of a broader archaeological perspective so as to move beyond the customary rendition of the semblances found on a site. Thus, the focus of this chapter is on gold, the portal to this nation's paradigm shifts that, apart from its mesmerism, is a surprisingly impoverished metal with diminutive medicinal or industrial properties. Even so, it became the catalyst for much of Australia's demographic, technological and political expansion that took place during the second half of the 19th century (Goodwin 1970: 406).
The national aquatic effect of Australia's Gold Rush

Notwithstanding gold's questionable attributes, among them is the worldview that the metal is regarded as a fetich implying personal wealth (see Laughlin 1887: 320), but more importantly the resulting dynamic for major trading nations to be recognised as a stable economy within the 1819 Gold Standard accord. This in itself was a bizarre state of affairs in which gold was dug up in one part of the world only to be buried in another to lie fallow for years (Findlay Shirras 1940: 208). Over time such mixed attributes have triggered a number of diasporas, myriads of miseries and countless conflicts that fit John Maynard Keynes' (1924: 187) gaze upon the metal as 'a barbarous relic'. Keynes' later (1964) condemnation, based on his stay in Australia (Clark 1981: 10), provided a more qualified censure than Ruskin's (1862: 743) earlier comment that gold mining was disruptive to the nascent Australian economy in that it did not provide real wealth or meaningful employment. This was an appraisal disputed by Blainey (e.g. 1970: 302-3), as was Goodwin's (1970: 419) and Eichengreen et al (1994: 288,293) assertions that much of Australia's earlier 19th century gold mining was speculative and short-lived. Whatever the opinion of gold as a fetich or even perceived as the *auri sacra fames*, the accursed greed for gold as the root of all evil (Keynes [1930] 1971: 259; Goodwin 1970: 408-11), it was also regarded in the late nineteenth century as a stable uniformity for past, present and future economic values (after Robertson 1895: 420-21). Moreover, gold temporarily supplanted Australia's rural industries as the prime factor in the nation's rapid growth, giving the country economic substance and an improved international stature (Schedvin 1990: 536).
The earliest discovery of payable gold was in 1844 by Sir Roderick Murchison, although according to Edmond Hammond Hargreaves’ (1855) autobiography, Australia's 'golden age' did not start until his return from the Californian goldfields in 1851 and his discovery of the Ophir-Hill End deposit in central west New South Wales (Lilley 2002: 67,69). The Ophir mine's eventual yield of £10 million was soon overshadowed by the production of the then-to-be 'Victorian' Ballarat goldfields discovered around the same time. These mines replaced the Ophir as the epicentre of the Australian gold rush (see Blainey 1970: 303). The idyllic artistic impressions by the pre-Heidelberg School (Appendix 1) hardly depict the violence and at times brutality of the early goldfields that became acknowledged as part of 'gold fever' (Westgarth 1864: 505; Clark 1987: 119-21). Nonetheless, it was the major if not the most important event to foster Australia's transformation from a penal colony to a self-governing economy (Jevons cited in Goodwin 1970: 411; Macintrye 2009: 88-9).

The majority of the initial fortune-seekers came from the British Isles who were soon joined by a body of Americans from the California goldfields, émigrés from central Europe and significant proportions of Chinese to add to both Australia's Authoritative and Allocative Resource pool of mining technology and political ideologies (Jupp 2004: 73). By 1861, 53 per cent of the Australia's population were British born, of which 56.3 per cent were 'English', 28.2 per cent Irish and 15.5 per cent Scottish (Bailey 1959: 270). These are questionable statistics, as Bailey fails to take into account part of the Cornish diaspora that arrived in South Australia in the early 1800s (Hancock 1995: 8) or the strong Welsh presence, particularly in Victoria, mentioned in the 'Diary of a Welsh Swagman' (Evans 1975: 77). However, most of the technological transfer came from the base metal underground mining of Britain and Germany with surface separation techniques emanating from American, Cornish and Chinese miners (Bell 1987: 115). The major pioneering political ideologies of the period were those of the transported British Chartists, calling for universal suffrage and parliamentary reform (Rostow 1958: 63). These activists, along with exiled republicans from the central European republican uprising of 1848 came together in 1854 as part of the Reform League's robust presence at the Ballarat Eureka Stockade (Anonymous 2007a). The immediate effect of this bloody unrest against the existing Victorian mine regulations was the reduction of a miner's right to £1 per annum instead of the £8 for six months. The other far-reaching mollifications were the right to vote in a secret ballot and the termination of
the corrupt Gold Commission that was replaced by a system of decentralised overseeing Mine Wardens for each field (Clark 1987: 129-30). The Mine Warden system for regulating mining operations and accompanying miners' settlements was adopted and later improved upon by the other gold producing colonies (for Queensland see Bernays 1919: 354-83; Drew 1982: 120).

The improved civil rights of universal male suffrage and the secret ballot emanating from the Reform League's efforts at Eureka Stockade are seen by certain Australian historians as the launch of the world's first democracy (Jupp 2004: 73). That is as maybe, but Australia's morphogenesis towards political emancipation had already been inaugurated before Eureka by the British government's decree of 1842 that expanded the New South Wales Legislative Council from twelve nominated members to include twenty-four elected landed members (Clark 1987: 101). This relaxation of Westminster's control over the original colony was later granted to South Australia, followed by Tasmania and then Victoria so that by 1855 each colony had adopted the British parliamentary bicameral system with its own constitution (Macintrye 2009: 91-2). This was a noteworthy achievement, especially since the eastern colonies cum states were being promulgated as a land of opportunity so soon after criminal transportation had ceased to the eastern seaboard on the 10th August 1853 (Clark 1987: 124). Realistically of course, Australia was an essential asset to Britain's World System as a source of gold and a producer of a number of competitively-priced staple products that were important economic factors to the broadening of her international laissez-faire trade policy (Goodwin 1970: 417).

While creating a self-sufficient economic base (e.g. Birmingham 1983: 6-9; Connah 1998: 7-8), the Australian colonies also moved slowly towards total suffrage with South Australia being the first to grant women the vote in 1895. The other colonies took another seven years before women were allowed to vote in the first General Election of 1902 following the morphed States being federated in 1901 (Clark 1987: 192-3; Anonymous 2008). Federal suffrage for Indigenous Australians however took much longer, in fact another 63 years before such constitutional rights were granted for the General Election of 1965. Queensland, seceding from New South Wales in 1859, eventually decided upon a unicameral governing body which withheld such indigenous voting rights until 1972 (Anonymous 2007b).
Whether or not the gold rush brought self-government to the then colonies is a moot point (Macintrye 2009: 91-2). It most certainly played a major role in encouraging a much-needed immigration of free-settlers that were no doubt encouraged by the promise of economic stability and the chance to express progressive social values in Australia's embryonic democracy. It was probably the first time that an imperial World System had been set an example by one of its peripheries without disrupting the status quo of an overarching sociological or financial structure. As such, Australia typifies a component of Wallenstein's (1974: 347) notions of a World System:

'A World-System is a social system, one that has boundaries, structure, member groups, rules of legitimation and coherence. Its life is made up of the conflicting forces [that] hold it together by tension, and tears it apart as each group seeks eternally to remould it to its advantage... [It] has a life span over which its characteristics change in some respects and remains stable in others... What characterises a social system in my view is the fact that life within it is largely self-contained and the dynamics of its development are largely internal'.

It is therefore envisaged that the emerging Australian nation would have been well satisfied with a social order akin to a Weberian society in that it was within what is now recognised as the merchant phase of free enterprise. Though a seemingly radical change in the mindset, this could be seen as a much preferred pathway rather than a re-entry into the British prevailing class structure of industrial capitalism (see Haralambos et al 1996: 41-3; e.g. Orser Jr 1996: 72-3). Furthermore, with gold as a prominent factor in the majority of the colonies' economies, the outlook for new settlers and would-be immigrants must have been positively, Utopian!

**Australia's Population Development**

At the time of the Victorian 1851 gold rush, Australia's overall non-Aboriginal population totalled 437,665. By 1861, it had more than doubled to 1,168,149 (see ABS 2006). During the same period, the newly formed colony of Victoria's population grew sevenfold from 77,000 to 540,000, giving it a numerical supremacy over the other Australian colonies until the last decade of the century (Macintrye 2009: 87). Although the populations of the other colonies increased, the expansion was nowhere near the same rate as in Victoria. Several colonies virtually doubled in residents, like South Australia increasing from 66,538 to 130,812 and Western Australia from 7186 to 15,936. Tasmania's population increase was relatively low at 30 per cent from 69,187 to 89,908, presumably because of the lack of gold mining on the island. The original
colony, New South Wales, with its extensive landmass attracted a 45 per cent increase in new immigrants to give a total population of 357,362 for the period. Earlier, during 1859, the New South Wales numbers were reduced with the formation of Queensland with a population of 23,530, which in view of the new colony's landmass was in need of a greater increased workforce (Duckworth 1899: 325). Most of the colonies had independent emigration agencies in the British Isles attempting to attract the much needed émigré with such incentives as free passages for young single farm workers and, surprisingly, female domestic servants (Jupp 2004: 56-7). The living standards being offered by the Australian colonies were no comparison to those described by Toynbee ([1884] 1985: 2) at the hub of the Industrial Revolution. The mounting dissatisfaction of an agrarian workforce having to relocate to industrialised environments as a means of survival would explain the sizable emigration that took place during 1815-1880 when 8 million people left the British Isles (Toynbee [1884] 1985: 3). Obviously, not all emigrants came to Australia. Some 2 million arrived here by 1880 with the larger proportion of some six million going to the new colonies of North America to escape frequent rural depressions, poverty and a repressive British class system (after Jupp 2004: 87-93). The healthier Australian climate, a newly-attained political freedom, better wages, free education and rural rents of nine pence per acre for five years that could eventually secure a free hold acreage were the obvious attractions (Jupp 2004: 55).

However, the particular need for domestic staff appears to tarnish the new settlers notions of egalitarianism (see Jupp 2004: 58) which was also marred by Ward's (1958: 1-2, 183) definition of Australian mateship as 'co-operation, individuality with the strong belief of equality of all white men'. Such racial determinism was far from unfamiliar to the xenophobic English (Jupp 2004: 102), although it is doubtful whether such intolerance was intellectually based on the then current unilinear philosophies of Gobineau ([1853–55] 1967) or Lubbock (1865; 1868: 330-3). Most likely, such bigotry was ignorance and economic fear-based prejudices that eventuated in the Queensland Macrossan's Chinese Immigrants Regulation Act in 1883. This was designed to curb the increasing Chinese presence, which, by the late 1800s had reached a level of 28 per cent of the population of the new colony (Bolton 1972: 159; Wallace 2000: 117). Such a significant arrival can be attributed in part to the fixed gold price within the British World System as opposed to the free gold markets of Asia (e.g. Bertola 2003: 7).
By 1894, the population of New South Wales had increased to 1,251,450, Victoria’s to 1,179,103 while Queensland’s population remained comparatively low at 445,155, as did South Australia at 82,072. Surprisingly, Western Australia with its extended western seaboard could only attract 157,456, just 3,456 more than the island of Tasmania (Murray 1897: 29-32). Further increases were recorded in 1914 as Australia’s population had reached 4,948,990 with Queensland reaching a figure of 683,253 (ABS 2006). The following years are now generally seen as the age of growth and affluence for a nation in excess of 7.43 million by the end of this study period which concludes in 1939 (Clark 1987: 269). But notably, earlier overseas labour recruitment programs together with public works and private enterprise were – temporarily at least - affected by the lack of foreign investment in times of extreme global economic stress.

The Gold Standard: An overview of gold’s international role
Prior to the formalisation of the Gold Standard in 1819, the British stabilised the economies of their empire cum World System with an *ad hoc* gold price of £4.5s per troy ounce of 24 carat or 0.999 fine gold that had been in effect since 1717 (see Officer 2009). Such a price structure was initially determined as £3 17s 10½d per troy ounce for a lesser .904 purity or 22 carats of gold after Sir Isaac Newton's ([25th September 1717] 1896) report to Parliament that evaluated the differential value of most of the world's trading nations bimetallic coinage (see Appendix 6 for ratios after Robertson 1895: 464). At this point it is worthy of note that Denaro *et al* (2001:15-21) have the surprising practice of giving the Woolgar's gold production in kilos when yield records and major world markets still trade today in imperial weights. Such a clumsy conversion of troy ounces to kilograms meant finding the common denominator for the precious metals troy scale and the equivalent in metric grams. For example, the common denominator for the two imperial scales is the grain with the avoirdupois pound weighing 7000 grains per 16 ounces, each of which have 437.5 grains while the troy pound of 12 ounces with 480 grains per ounce equals 5760 grains per pound. Added to this complexity is the troy scale's pennyweight of 24 grains each with 20 pennyweights to the troy ounce (see Fenna 2002: 113) Accordingly, converting troy ounces to a metric kilogram requires a factor of 31.103480001 or to reverse the process of kilo to troy ounce needs a factor of: 32.150743126506 or 32.15~ (see ARGH industries 2014).
The Isaac's Parliamentary report also gave the general ratio of 15½ troy ounces of silver to one troy ounce of gold, at such a differential it was recommended that the Bank of England purchase gold from any nation willing to trade silver at a narrower ratio than what was seen as the norm. On such a basis the Bank of England would have been a seller of silver and buyer of gold at a narrower silver-gold differential and a buyer of silver, though not necessarily a seller of gold at a wider than 15.5-1 differential.

Although Great Britain adopted a gold monometallism in 1816, Newton's perception of a uniform bimetallic differential and particularly for purchasing gold from countries requiring less silver in exchange for gold can be seen as perhaps the first sophisticated written example of arbitrage that was to become the basis for the 1819 international Gold Standard (see e.g. Robertson 1895: 424, 428-31).

Besides Britain's ad hoc fixed price for gold of £4 : 5s 0d per fine troy ounce there was also the London Gold Market established in the 13th century that fluctuated either side of the quasi official price (see Officer 2011). Such an organisation would have provided forward buying or selling facilities as hedges against gold dealers’ inventories (passim Gibson-Jarvie 1976). Nonetheless, it would seem, unlike the base metal markets (see Taylor 2003: 134, 142-43), that gold was surprisingly not as sensitive to the influences of international trauma or technological advances that usually underscored market advances or declines. For example, during the Napoleonic Wars of the early 1800s the price rose 35 percent to a high in 1813 of £5:15s: 2d but, by 1816 fell back to show only small increases over the earlier level until eventually reaching par in 1820. The next price rise, which is even more indicative of gold as a sluggish interpretive mechanism, was the minimal rise to £4:12:4d during the World's financial crisis of 1931. This trend however was to continue slowly upwards until the price level of £8: 8s per fine troy ounce at the start of WWII in 1939 (see Officer 2011).

The British quasi price of £4: 5s per troy ounce of 24 carat gold was later adopted as the British specie point in the 1819 Gold Standard (see Bannock et al 1998: 177-8). Under such a rigid aegis, the specie was the basis for settlement of national and international currency transaction, bills of exchange and security settlements in gold bullion from the nation's reserves. In essence, this multinational transparent agreement was a safeguard against fiat currencies, a legal tender without substance compared to the level of money supply in proportion to a country's gold reserves valued at the specie per troy ounce of gold of 0.999 purity (see Bannock et al 1998: 177, 389). In Great Britain's case, the
specie point was as already stated, £4: 5s per fine troy ounce that remained unchanged until the start of WWI. Other specie points, such as the United States of America (USA) was US$20.67 per troy ounce that effectively provided both Great Britain and Australia with an exchange rate of £1 for US$4.865 (Bordo 2007).

Australia's membership of the accord was well supported by her gold production, which for convenience of the publisher (see Schmitz 1979) is given in decades and metric tonnes covering the initial period from 1850-59 as 76.8 tonnes - a total not exceeded for the next 40 years. The second decade's production period of 1860-9 yielded 61.9 tonnes before declining to 46.0 and 35.8 tonnes respectfully for the decades of 1870-9 and 1880-9. A reversal in the production started in the extended period before the First World War, which added another 94.6 tonnes for the years 1900-14 (see Schmitz 1979: 80-5).

As already demonstrated, the specie point also served to provide the rate of currency exchange between countries, effectively enabling all international settlements in gold bullion or a reserve currency that reflected a country's Central Bank's gold reserves. Such changes in the gold reserves mirrored not only the nation's wellbeing but also the domestic money supply and determined interest rates in relation to the Central Bank's reserve levels (e.g. Ferguson 2008: 161-2; see schedule Keynes [1930] 1971: 265; Musson 1959: 204-5). Until the start of WW1, the Gold Standard was considered an effective equable factor in international trade especially since members had 'the seal of approval' afforded them by their level of gold reserves (see Bordo et al 1996).
Furthermore, pre-war economies regulated by the Gold Standard were said to have had a minimal annual inflation rate of 1%, whereas post WWI inflation rates were in excess of 5% (Obstfeld et al. 2003: 242, 268). Nevertheless, the international economic stability as a result of the Gold Standard was not without cynical questioning, particularly during the 1890s financial crisis. These misgivings continued after the revised Gold Standard period started post WW1 in 1925 and undoubtedly increased with the American stock market crash of 1929 that in turn resulted in the 1930s Great Depression (Bordo 2007).

The period leading up to the abandonment of the initial Gold Standard in 1925 is fraught with a history of regular rural depressions (see Bolton 1972: 39) that showed signs of recurring again towards the end of the 1880s (Duckworth 1892: 426,428). In general, this period in the global economic history is regarded as part of the long depression that spanned the years from 1873 to 1896. However, such evaluation is seriously questioned by the likes of Fels (1949: 69) and Musson (1959: 204-5), both of whom saw the period as a series of short economic cycles rather a consistent depressive trend. On the other hand, Keynes' detailed analysis labelled these proceeding years: as: 'the famous and curious depression of the 1890s' ([1930] 1971: 146). He goes on to dispel the 'mythical account' current at the time, that the cause of the depression was a shortage of gold. At least, not from Great Britain's perspective as the period was marked 'by an extreme abundance of gold and easy liquidity' with a bank rate of 2 percent until 1896 (Keynes [1930] 1971: 147). Notably, the Bank of England's gold stock and reserves against money supply had more than doubled and the private banks’ cash deposits had gone up by 20 per cent. Strangely, Keynes is unable to fully explain a global environment of falling prices and stagnant trade that accompanied the high unemployment at the time (ibid).

The alternative, although misleading aetiology for the 1890s depression stems from the London merchant bank Barings’ default in underwriting Argentinean and Uruguayan securities (Ziegler 1988: 244-49). This is usually summarised as 'the British banking crisis' (see Todd 1995: 4-5; McLean 1997: 5; Purser 1999: 121). Contrary to this generalised interpretation, Barings did not cause a British banking catastrophe even though the bank's ill-advised underwriting of South American bonds did give cause for serious concern and caution at a time before and after the default in late 1890 (Ziegler 1988: 244). More to the point, it was the Russian government’s recall of most of its
£7.4 million term deposits with Barings that required the solidarity of the British banking fraternity to enable Barings to overcome a stifled liquidity situation (Ziegler 1988: 247-8). Due to the draconian Bankruptcy Act of 1883, the management of the merchant bank took advantage of the then known accommodation of making 'compositions' (Anonymous 1891: 192, 196). Under such an arrangement, one specific payment was made to creditors, in this case through the good offices of Rothschild's and the Bank of England who came to the aid of Barings during this difficult period. After due consideration a consortium was formed to supervise the liquidation of the old Barings and form a new joint stock company under the same name but with a limited liability (Writh 1893: 233). Nevertheless, what the merchant bank’s near-disaster did instigate - while quickly regaining its own universal premier stature – was the British investors taking refuge in safer long term bank deposits, with the knock-on effect of a restricted capital flow to both the American and Australian economies (Ziegler 1988: 267-90).

Keynes' ([1930] 1971: 146-52) related analysis of what he considered was the global cash flow conundrum of the times was not caused by the shortage of gold but exacerbated by the over-hasty investment by both America and Australia in railways (see Appendix 3 for Australian Railways). The actual cause of the economic situation was further mystified by Butlin's (1964: 407) analysis of the long-term effects on the Australian economic downswing of the 1890s as '...external disequilibrium due, not to a general disequilibrium but to a special form of domestic imbalance'. This bewildering economist parlance is taken to imply that overheated economies riddled with debt are not considered a safe investment! As demonstrated by American railways reliance on private enterprise investment whereas the Australian rail systems were funded by various colonies’ cum States’ bonds, requiring regular interest payments to the bond holders and the reimbursement of the principal at the end of the bonds’ tenure. Conversely, when most of the American major railways failed to raise the necessary working capital, the resulting stock market falter, coincidental to the long-term drought and crop failures caused the US Government to seriously consider a bimetallism currency as a way to revive the economy (Mitz 2007). The notion of the dual currency was brought about by gold/silver swaps that had reduced the American gold reserves to a level below $100 million causing further concerns to an already wavering economy. In an effort to counter the failing economy with an increased money supply of both gold
and silver dollars based on precious metal holdings, a similarity to today's quantitative easing only amplified the already global fears of a devalued American currency. Accordingly, the notion of bimetallism was quickly abandoned to return some vestige of stability to the American economy. Even so, American economic well-being was not attained until the early 20th century (Goldsmith 1958: 68-71).

It was this pre-depression period leading up to the economic slump of the 1890s that the American historical archaeologist Purser (1999: 119) describes as 'social babbittry'-flourishing materialism- in the form of status symbols garnered by the upwardly mobile American society that added to the country's economy's woes. Similarly, Australia's own social babbittry was a remarkable period of prosperity but described in more human terms by Mclean (1997: 5-7) as a major boom in Victorian land and property speculations. This was a period when most of the colonies' new infrastructures were reliant upon British investments, which for a number of reasons were beginning to wane (Stevens 1894: 117-120). The ensuing Australian Banking crisis of 1893, essentially due to the demands on an imbalanced money supply, caused a number of financial institutions to fail or go into temporary suspension (see Evans 1975: 204). The subsequent economic depression is not seen by Schedvin (1979: 546-7) as the result of the Barings' situation, but of Australia's own doing by hastily entering into ambitious financial undertakings. In other words, the individual colonies’ public infrastructure improvements based on gold production had been too optimistic (Beales 1934: 75). Furthermore, the poor returns from railway installations and decreasing revenues from lower priced exports left the colonies - short of defaulting on overseas repayment commitments - with little or no other choice but to re-negotiate their nonperforming debts (Clark 1908: 446-7; Greasley et al 1998: 304).

Understandably, the late 1880s' notion of improving current infrastructure and utilities would not have seemed out of place when approaching the London money market for finance with the colonies' healthy economies from agriculture and an ongoing gold production (MacIntryre 2009: 95). The ensuing British investments in the various colonial bonds to finance public works, railways, expanding telegraph installations and a number of colonial immigration incentive schemes were initially well received and suitably managed. However, the unfortunate timing of Barings’ liquidity difficulties sent shock waves through what can be seen in retrospect as an overextended Australian economy that dissuaded further British investment. These unhelpful consequences were
to accelerate the already weakened Australian economy, which, like the USA was still in a devastating drought that lasted from 1887 until 1902 (Hunt 1979: 5; Thorpe 1996: 165; Purser 1999: 121).

The ongoing restricted public works, cash-strapped farming industry that attempted to survive in the downward-spiralling overseas markets and the exponential slump in property values saw rising unemployment in a weakening economy that was far from helped by the seamen and shearsers' strikes (see Duckworth 1892: 425-6; Sutcliffe 1921: 67-82; Keynes [1930] 1971: 150-1). Moreover, the negative foreign immigration at the time to the eastern colonies was of concern as it was considered an essential factor necessary for the various colonies’ economic recovery. Taken as a whole, it was a sorry state of affairs for the land of Utopian dreams, which prior to the 1890s had boasted a living standard 7 per cent higher than any other comparative major economy (McLean 1997: 2-3). Much to Australia’s chagrin, the real income per capita never fully recovered to the pre-depression levels until well after 1907, and even then, it was short of the comparable economies of New Zealand and South Africa (McLean et al 1983: 193-4).

After WW1, there was a reluctance to return to the Gold Standard due to the rampant inflation and more doubts as to whether full restitution of outstanding war debts could be settled at an equitable exchange rate (Obstfeld et al 2003: 242). This is best described in broad brushstrokes of a chaotic world economy that lasted for a number of post-war years. The clichéd description of unsettled economic times as 'from boom to bust' hardly described behind the scenes acrimonious negotiations that led up to the modified Gold Standard of 1925 (Pressnell 1978: 70-80). More to the point, Hayek, after reading Keynes' (1923), found that the Gold Standard’s fixed currency specie was not a guarantee against inflation (Wapshott 2011: 23). If both the exchange rate and domestic prices became unstable and therefore uncontrollable, governments were left with the ponderables of which one to stabilise. At the time both Hayek and Keynes (ibid) agreed it would be better to stabilise the Gold Standard’s fixed rates of exchange despite the fact that their decision foretold of further unfavourable outcomes.

Although Australia's gold production was beginning to wane, (see Figure 4: 2) its gold reserves both at home and in London were within a healthy band as a result of the reviving overseas markets (Tsokhas 1994: 131-33). By the beginning of 1920, the
World Gold Council recorded the highest Australian treasury stocks of 317.51 tonnes of fine gold (see Appendix 2) recalculated as 10,207,946 troy ounces valued at the specie of £4.5 equalling £45,935,759.00. Though the Gold Standard had been suspended since 1914, settlements were still being carried out at each country's specie and in Australia's case continued to determine the money supply (Copland 1924: 39-40). With the improved economy and ample banknote issue, both the Federal Government and individual States continued to fuel the unchecked post war boom to the tune of £920 million deficit as at June 30, 1922 (Copland 1924: 34). Australia's answer to the excessive borrowings was the return to the Gold Standard (Copland 1924: 34; Tsokhas 1994: 130). In spite of mounting pressure from both Australia and South Africa, whom in the meantime had become the world's second and third largest producers, Britain remained resolute in not returning to the Gold Standard until there was an equitable exchange rate between countries (Pressnell 1978: 74).

Eventually these differences were settled, despite at times threats by Australia to neglect to service outstanding debts. The revised Gold Standard was reinstated in 1925 with revised species and the provision that gold reserves could also include gold-backed foreign currency (Tsokhas 1994: 129; Plaut 1982: 114; Pressnell 1978: 79). Nonetheless, in a relatively short period, it became apparent that the systems of international settlements were malfunctioning to such an extent that Great Britain abandoned the Gold Standard in 1931 so as to preserve her gold reserves (Findlay Shirras 1940: 210). Two years later America took the same path and in doing so abrogated all financial instruments specifying settlement in gold, nationalising private holdings and prohibiting Futures trading in the bullion even though it continued to back its own currency with a depleted gold reserve. With the gradual increase in America's gold stocks came the tendency for a number of economies to hold the American dollar as collateral against their own currencies (Bordo 2007). Any attempt to revive some form of revised global agreement or a stabilising medium failed in the aftermath of the New York Stock Market crash of 1929 and the ensuing Great Depression that was to last in some countries until the beginning of WWII (see Bernanke 2004;).

In time, an accord was brought into effect at the Bretton Woods conference of 1944 whereby global exchange rates were based on the American dollar revised species of US$35 per fine troy ounce. Even so, the last vestiges of the Gold Standard finally disappeared in 1971 when America had to again safeguard its gold from a run on its
reserves by abandoning a gold/dollar swap and – as a side issue – lifted the ban on its nationals holding gold as an investment (Bordo 2007). In retrospect, the Gold Standard was eventually seen by many as the root cause of late 19th and early 20th twentieth century economic turmoil affirming Keynes' earlier negative mindset about the metal.

The Economic Cycle of the Study Period 1880-1939

Pressnell's (1978) in-depth study of the post War years portrays a now familiar setting of unrestrained expenditure in an expansive economy that results in either a depression or, to a lesser degree, deflation that stifles the economy with strikes and growing unemployment. However, the situation leading up to the final period of the Gold Standard is also seen as one of inequitable specie points that particularly disadvantaged both Australia and South Africa as debtors to Great Britain, hence the eagerly sought reassessment of the currency exchange rates (see Tocker 1924: 570-1). Within four years, the New York Stock Exchange crashed on October 24th 1929 and precipitated the curiously named (Eichengreen et al 1985: 29) 'devaluation cycle of the 1930s which is often taken to presage Britain's departure from the Gold Standard in 1931. In fact, Argentina and Uruguay suspended gold settlements in December 1929, while at the same time Paraguay and Brazil along with Hungary consistently found their currencies below the relevant specie points. Similarly, Chile, Venezuela, Peru, Australia and New Zealand remained below the specie, causing limited amounts of available credit to primary producers that - as in the 1890 depression - dramatically accelerated the fall in all primary commodity prices (e.g. Flandin 1933:462-7). Producers were then confronted with protective tariffs on food imports imposed by the industrial countries (Eichengreen et al 1985: 928-29).

Many countries like Australia were forced to devalue their currencies (see Schedvin 1969: 12-3) so as to stimulate their economies, and this no doubt galvanised America to do likewise. The devalued American dollar eventually stabilised in January 1934 to $35 per troy ounce, a specie level that was later adopted by the Bretton Woods Conference as a system of exchange but, interestingly, with lower gold content of 59 per cent purity (Eichengreen et al 1985: 930). Nevertheless, in spite of the various currency manipulative efforts to alleviate difficult fiscal times, world economies still floundered until well after WWII (Findlay Shirras 1940: 222; Calomiris 1993: 81).
Whether or not the Gold Standard worked well before 1914 is still a debatable point, especially when taking into account the 1890s’ depression that was in many ways similar to the series of depressions before the Gold Standard came into existence. Bernanke's (1995: 8-12) analysis of the final stages of the Gold Standard in relation to the 1930s’ Great Depression was that the sooner countries left the accord and devalued their currencies, the quicker their economies recovered, as in the case of the British economy (see Richardson 1969: 3-4). The other phenomenon noted in Bernanke's analysis was the extraordinary flow of gold away from countries with un-devalued currency, like the overvalued currencies of the French Latin Monetary Union (LMU) of 1865-1927. The LMU was an accord similar to the Gold Standard, that after WW1 was seriously undermined by the declining economies of the participants which ultimately caused its closure.

It should noted that discussion of the analogous effects of staying tied to gold or, for that matter, any rigid currency in Beevor's (2012) comprehensive history of WW11 came well after this dissertation's premiss formulated in 2009 regarding the plight of failing economies in the European Union. The premiss is exemplified by Germany's decision in 1931 following the disbandment of the Gold Standard to keep the Reichsmark linked to the gold price as a precaution against another bout of hyper-inflation such as was experienced in the 1920s. The near-immediate cumulative effect on the German economy was an uncompetitive exchange rate, substantial reduction in exports, mass unemployment and the cessation of American loans that inflamed the then current demagogic rhetoric for a radical solution – war (after Beevor 2012: 2).

Before moving on to other aspects of the Woolgar's contextualisation, it is acknowledged that not every facet of the Gold Standard era has been covered in this survey. The main focus was to substantiate Keynes' earlier assertion that gold was a disruptive factor to most economies that led to the use of later published examples of an economy restricted by a single economic factor being used to validate the principle premisses of this dissertation.

Queensland

During the early days of Australia’s gold rush Queensland did not exist except in the minds of George Elphinstone Dalrymple, William Lock Morton and twenty New England investors. The visionary syndicate had also gained the support of several
Sydney business houses that added to the financial resources of Dalrymple's intended expedition to explore the previous efforts of John Stokes' 'Plaines of Promise' and Leichhardt's 'Valley of the Lagoons' (Bolton 1972: 10-17). The establishment of the new colony of Queensland in 1859 is usually recorded in history as a brief entry that seems to ignore the politicking by the pastoralists in Sydney or the disgruntled and abandoned settlers in the Moreton Bay (Anonymous 1982: 70). The more in-depth analysis by Thorpe (1996: 135-6) highlights the pastoralist settlements’ labour force, made up of ticket-of-leave men, Chinese, indentured Indians, and Pacific Islanders who lacked support from the colonial government in Sydney which in turn brought about a series of discontent that continued well into the 20th Century.

The appended demographic charts of earlier settlement (see Appendix 4 from Linge 1979: 674) would suggest that Queensland was hard pressed to populate effectively the newest and largest State on Australia's eastern seaboard. This may have been due to the lack of direct sailings from Britain to Queensland and the very selective immigration promotions that were aimed at farming communities in most of the rural counties in the British Isles. Later as the coalfields of Ipswich were developed, immigration programs attempted to attract miners from Durham, Staffordshire and Lancashire (Jupp 2004: 112-16). By 1891, 364,000 immigrants had arrived (Linge 1979: 663-4). Even so, this number of immigrants was still low for such a large expanse of land that was endeavouring to expand other agricultural ventures such as a sugar cane industry in the tropical regions of the Colony and manufacturing enterprises along the coastal regions.

Initially the Colony seemed devoid of obvious alluvial gold deposits (Bolton 1972: 44) but it was not long before the Dalrymple, Daintree and Hann surveys of the northern parts of Queensland reported the possibilities of gold in the region. Dalrymple returned from his exploratory expedition in April 1860 with glowing claims of Queensland becoming the finest and largest pastoral and agricultural region in Australia, but he also acknowledged the possibility of gold in the Ravenswood district (Bolton 1972: 18). Richard Daintree's later Government-backed geological survey of the Einasleigh River region eventually led to gold mining in the relatively nearby areas of Etheridge and Gilbert. In relation to the Woolgar (see Figure 5:1), the sequence of discovery in northern Queensland essentially spans a 15-year period between 1865 and 1880 that commenced with the short-lived Starr River close to Townsville in 1865. The first major field in the area was the Cape River, which opened in 1867 followed by Mount
Woolgar Goldfield

Watt in the same year that soon closed because of poor returns. The Cape River was particularly known for its 2500 men of mixed nationality 'that included the scum of the southern fields, daily brutal fights in which one man was kicked to death...' (Hill 1907). The Gilbert further north (see Figure 1-1) had, according to the Queenslander (6th November 1869), experienced an influx of Chinese alluvial miners that were said to have brought fleas and stirred indigenous tribes into hostility. Two years later the Gilbert field with an eventual population of some 3000 men, including more Chinese, met with increased opposition from hostile local tribes. The eventual shortage of water is said to have been compensated by reports of some miners making £20 a week (Bolton 1972: 47) equalling today as some £1950 according to Officer (2011).

The Etheridge rush of 1870 learned from the mistakes of the Ravenswood earlier rush that year and so ensured the early arrival of crushing facilities to the field. The two major goldfields discovered during 1871 were the Palmer to the north, situated west of Cooktown, and Charters Towers, abutting Ravenswood. Both fields are of some significance since the Palmer was in effect the largest and probably the richest alluvial field in Australia, that at one time attracted 23,000 miners; 17,000 of them Chinese against an estimated 5,000 Occidental miners. An un-substantiated myth surrounded the Chinese, concerning gold smuggling that supposedly took place after declaring the export of the first year's winnings. It was rumoured that most of their gold winnings were smuggled out of the country in the coffins of their dead being returned to the homeland for a customary burial (Wallace 2000: 68).

Charters Towers never attracted Chinese miners, as it was a deep-reefed field and as such became the benchmark for deep mining and specialist separation techniques, due to the gold not being encased in quartz but entrenched in telluride and ironstone (e.g. Watts 1953: 335). The last in the series of finds before the Woolgar was the Hodkinson on the Atherton Tablelands juxtaposed to the Palmer that would seem not as fortuitous as the Palmer as it was beginning to show signs of an early failure. The field quickly failed and in doing so typified the situation of unsuccessful miners being caught in a poverty-trap.

Meanwhile the main successful mines in northern Queensland in the Charters Towers district had established 41 companies with a paid up capital of £489,000, using 81 engines to drive 226 stamp heads. The Etheridge, a smaller field to the west on the
northern reaches of the Gregory Range, was mainly made up of small operators with 15 engines and 88 stamp heads. The short-lived Hodgkinson's four capitalised companies totalled £40,000 with 15 engines and 101 stamp heads. Further north was the Palmer River, which was essentially an alluvial field with only 2 registered companies, each with a £7000 capital using between them nine engines and 50 stamp heads. The last substantial field in the region was the Ravenswood district with 32 engines and 95 heads being worked by four companies with a total capital of £137,000 (Linge 1979: 672). All of these are included in Queensland's cumulative production at the end of 1917 and had produced 19,629,672 troy ounces, at the time valued at £82,111,979. The individual mine production and discovery dates have been tabulated in Appendix 5. The Woolgar in relation to these northern fields was small, but with the questionable distinction of being the last field being worked by individual miners in the closing stages of a nomadic age of large scale rushes (Bolton 1972: 61-2).
Chapter 5: The Historical Archaeology of the Woolgar Goldfield 1879-1939

Introduction: The Woolgar's Historical Background

Modernity has still to envelop the Woolgar Goldfield partially situated on the south-easterly corner of the Gregory Range, some 140 kms north of Richmond in northwest Queensland (see Figure 1:1). In a number of ways, the surrounding region of the goldfield reflects Queensland's, even Australia's pageant, featuring the efforts of the early explorers that led to the interior being opened by pastoralists and then the creation of small cosmopolitan mining frontiers seeking mineral ores west of the Great Divide.

This is seen in the ill-fated attempt by Burke and Wills to find an overland route from Victoria to the Gulf of Carpentaria and their later would-be rescuers, William Landsborough and Frederick Walker's positive reports of the northern interior that brought graziers to the grasslands. On arriving at the Gulf of Carpentaria aboard the Firefly, Landsborough's rescue party moved south in the hope of finding the missing explorers. At much the same time, Frederick Walker's relief expedition left Rockhampton on 7th September 1861 with the same intention (Cohen 2003: 29-30).

During his northerly trek, Walker's (1861: 36-51) journal entry, dated 31st October 1861 records while camping alongside a river, locally known as the Weelgar his expedition was involved in a small skirmish with the local indigenous tribe. Before leaving the area, Walker also made references to other nearby rivers, which he named the Stawell and Dutton Rivers after the President of the Victorian Exploration Committee and his friend Charles Dutton. By the time the Woolgar's gold rush featured in the north Queensland media, a number of substantial pastoral runs had been established in the Richmond area and the name of the Weelgar had changed to the Woolgar for no apparent reason other than local elision.

Today's overland travellers to northern outback Queensland leave Townsville via the Flinders Highway passing through Charters Towers and Hughenden to reach Richmond some 600 kilometres later. It is a small rural township approximately halfway between Mount Isa and Townsville that was to become the Woolgar's supply centre with the main thoroughfare of the township taking its name from one of the first licensed general stores trading on the nearby goldfield (see Figure 5-1). The present day Goldring Street
features the Shire Council office, a museum of local palaeontology, the post office, a variety of stores and hotels plus a simulacrum of an oasis by way of a small artificial lake just northeast of the district hospital, filled with pongy bore water.

Continuing westwards for approximately 20 kms finds a dirt-side road leading north for around another 120 kms to arrive at Middle Park, a cattle station on the western banks of the Woolgar River encompassed by the goldfield (see Figure 5-2). Since 2005 the cattle station and most of the surrounding goldfield has been owned by The Woolgar Valley Aboriginal Corporation. In part, the station is now leased to cattle grazier Dick Cribb and the explorative Strategic Minerals Corporation NL whose survey camp is situated some 15 kms east of the 'homestead' - a euphemism for a collection of aging corrugated iron-sheet buildings and a stockyard alongside the Woolgar River.

Unlike the modern traveller, the early eastern and southern fortune seekers joined miners from any of the declining mining areas in the south eastern region of far north Queensland. Like the Cape River miners or even those from Ravenswood - they would have more than likely taken a north-western route across the grass plains. Overall, it is a gentle low rolling landscape that rarely unveils its features to the northern traveller except for a big sky effect that outlines the riverines of the Stawell River and its
upstream tributary, the Woolgar. Both rivers merge lower downstream under the name of the Stawell that eventually joins the Flinders outside Richmond before veering northwards to empty into the Gulf of Carpentaria.

Figure 5—2: Google Earth satellite image recording the initial GPS reading taken during the author’s visits of 2003/4 to Middle Park station showing the location of possible archaeological sites (Taylor 2003).

Those converging on the Woolgar from the failed northern fields of the Palmer, Hodgkinson and relatively nearby Gilberton fields (see Figure 1:1) would have had to cross the Barrier Range, later known as the Gregory Range (Denaro et al 2001: 37). The Range is also the source of the Woolgar River that usually rises in the wet season near the worked-out Gilberton goldfield. The flow initially moves westwards over the Langdon Falls before passing across broken country and cutting a southerly course through foothills and open woodlands to join the Stawell River on the northern grasslands.

After most of the early itinerant alluvial miners had moved on, the remaining reef miners formed small communities known as Woolgarten, Mount Norman or Woolgar Town in the Lower Camp area and Bellevue and Cattle Camp in the Middle Camp area (see Figure 5-3). The smaller upper river settlements, recognised as Eatonville or Soapspar, Burton’s Bilk and Greasy Bill’s Gully came under the collective name of Top
Camp while Laidlow's Camp, a more recent mining venture is known by the generalised name for the area as Upper Camp. For the ease of future simplified identification, the upper regions of the field will be referred to as Middle Camp and Top Camp, while the original settlement some 15 kms downstream, will be known as Lower Camp (see Figure 5-3). These different mining communities could be loosely defined by their mining methods.

Top Camp and the more northerly and even more remote area of Upper Camp initially attracted alluvial miners that were later replaced by reef miners who extended their prospecting activities along the river towards Middle Camp. In contrast, by 1881 the residents of the Lower Camp had initially 'picked the eyes' out of the relatively large number of nearby prominent gold bearing outcrops before the more serious miners opened the reefs that sequentially attracted the Crapp Family's crushing facility (Denaro et al 2001: 22, 24-5).

Figure 5—3: The Woolgar various settlements and mine locations along the Woolgar River (Denaro et al 2001: 8)
The first official acknowledgement of a goldfield in the region was reported in *The Queenslander* (13th December 1879) newspaper, which published the Mining Warden of Hughenden's telegram to the Under Secretary of Mines stating that gold had been discovered in the vicinity of the Woolgar River and there were some 50 alluvial miners working its lower reaches. According to a later issue of *The Queenslander* dated 21st February 1880, a finder's claim had been made to the Minister of Mines dated 17th January 1880 by Joseph Lynch, Charles Rodgers, William Beckham and P. C. Purcell explaining that because of further exploration in the area they had delayed their finders' claim. Some nine months later, correspondence dated 4th September 1880 between the Under Secretary of Mines and Warden Hodgkinson of Georgetown tells of a suspension in paying the finders' rewards for both Top and Lower Camps. This was an odd decision in view of Clause 4 of the Gold Mines Regulation which only specifies 'an undisturbed occupation of the field for several months' before paying a finders reward (see copy letter 27/11/1880 in Staunton [circa] 1980: 66). It is not apparent from the Woolgar goldfield's historical records if any of the original discoverers ever received a finder's reward, or their later whereabouts.

In the meantime, Warden Hodgkinson's communiqué with the Under Secretary of Mines, dated 19th January 1880 confirmed the rush well underway with men arriving from the nearby disappointing fields of Cape River, Gilberton and Etheridge as well as the northerly Hodgkinson and Palmer (Denaro et al 2001: 37-40). For the next nine months the Queensland media (e.g. *Northern Miner* 31st January 1880; *The Queenslander* 14th February 1880, 20th March 1880, 4th September 1880) would feature the Woolgar miners' varying fortunes and disappointments. Accordingly, the field's early population fluctuated between an estimated 600 down to 200 miners, which could be seen as a validation of Mining Warden Hodgkinson's assessment that the field was patchy as opposed to the earlier predictions of rich lodes similar to Charters Towers (Denaro et al 2001: 41). By mid 1880 to early 1881, a high proportion of the field including the majority of the Chinese alluvial miners had moved on as the free gold diminished, leaving the field to quartz miners of a cultural mix similar in percentage to the earlier gold rushes described in Chapter Four. The small number of remaining itinerant Chinese miners together with the four licensed market gardeners and two shopkeepers formed marginalised communes on the edges of some of the mining communities (QSA MWO 14B X3). It is not clear from the documentary records where
the licensed butcher named Miller, or the general stores of Goldring and Norris, or Norland and Alpin were located, but the latter trading outfit soon left the field due to difficult supply routes and a dwindling populace (Denaro et al 2001: 39-40).

A Review of the Mines Department's historical data

Strangely, Denaro's (2001) official Queensland Mines Department history of the Woolgar seems inconsistent with the Queensland Government's usual Authoritative policy of prompt support for new mines (see Taylor 2003: 132). Normally, new mining settlements, without consideration of size, were quickly surveyed to provide neatly planned Miner's Home Leases (MHL) and Machine Areas (MA) (eg. Hooper 1993). Likewise, other Authoritative Resources such as a Mining Warden, police, postal service and if necessary a school were made available to the emerging mining community with the same alacrity.

According to Denaro (2001 53-4) this was not the case for the Woolgar. The new goldfield's settlement area was not surveyed and laid out showing its occupancy until 1902 (see Figure 5: 4) some 22 years after the initial rush and, more surprisingly when the field was in decline (see Denaro et al 2001: 50). Such a statement by Denaro (2001: 42) conflicts with his earlier comments that the Woolgar's existence had been acknowledged in the 1880 Queensland Parliamentary Papers, in 1882 and again in 1897. The later gazette citation dated 3rd July 1897 stated the field was to include an area further east of the recognized Lower Woolgar reefs known as Hampstead giving an extended total area of 1,137 square miles or 1,829.82 square kilometres (Denaro et al 2001: 51). Together with Denaro's (2001: 41) earlier inclusion of Mining Warden Hodgkinson's report in the Queenslander dated 4th September 1880 and the chance archival find of senior draughtsman R. Watson's tracing of a previous survey dated 6th January 1887 (see Figure 5-5 ) – this suggests the usual early governmental support for new mine settlements.

In the interests of trying to find some semblance of continuity in the Woolgar's history, another archival search on the residents of the Lower Woolgar added to the confusion. According to items 6-11 in the Georgetown Register of Miners Home Leases, dated 12th October 1901 (QSA 4/59 LAG14B12) there were fundamental changes to the lease holdings of the Lower Camp settlement. Under the Mines Act 1898, William Bray leasing Section I/Lot 4, J.J. Moore on II/1-2, Mary Brown III/1-2, Kate McGovern III/3-4 and James Gilbert III/11-12 had their leases prematurely terminated on 12th October.
1901 for non-payment of rents. Based on the same source the only occupants left on the Government surveyed area were T. Lewis occupying Lots II/1-2 and his next door neighbour W. Howell on Lots II/3-4.
Figure 5—4: Said to be the original official survey of the Lower Woolgar settlement dated 1902 (Denaro et al., 2001: 53-4).
Figure 5—5: Tracing of the Lower Woolgar Miners' Leases by senior draughtsman R. Watson dated 1887
(QSA: MWO 14B/38 L5251)
Equally implying an earlier Authoritative Resource involvement was Mine Warden Hodgkinson's concern about defaulted rents from the occupied MHLs (Denaro et al 2001: 41) rather than the field's anomic behaviour that was rife according to the *Queensland Police Gazette* (1881, 1882a, 1882b).

It was during these early days of the goldfield that a detachment of the Queensland Mounted Native Police arrived in the area at the request of the pastoralists and miners that in turn led to the demise of Police Sub-Inspector Kaye in 1881 (QSA A/38864; JUS/N77/81/259) and of the local marauding Wannamara (QSA file No. 294-51). The commemorative headstone sent from Brisbane at the behest of the dead officer's mother in England (QSA A/38864/0427B) still stands forlornly memorialising the slain officer on the eastern bank of the river opposite the government surveyed settlement, (see Figure 5-6).

![Figure 5—6: Sub Inspector Kaye's memorial tombstone in the grounds of Middle Park Station's homestead (photo Taylor 2004)](image-url)
The headstone should also act symbolically as a memorial to the local Wannamara clan said to have been massacred in a retaliatory act carried out on the orders of Sub-Inspector Nichols (QSA, JUS/N77/259), the same officer who was answerable for the earlier Irvinebank massacre (Genever et al 2006). The Wannamara massacre site remains undiscovered despite a series of excavations carried out by a separate research project led by Lynley Wallis (see Wallis et al 2005). These fruitless excavations were based on Arthur Barns' unsubstantiated past sightings of human remains uncovered by flooding in neighbouring cattle stations.

More than likely this fracas gave cause for the original police station administering the upper regions of the Woolgar to be relocated to an indeterminate area laid off by Warden Mowbray in Lower Camp (after QSA A/38872). Furthermore, the Lower Camp became the seat of the area's Petty Court Sessions with the resident Senior Constable Thomas Lonegan appointed on 4th August 1880 as the professional legal advisor and clerk to the Mining Warden cum local magistrate. Lonegan was later replaced by Constable Thomas Redmond on 24th August 1882 (after Denaro et al 2001: 41-2).

The matter concerning outstanding rents was seemingly settled by a quid pro quo arrangement with Warden Hodgkinson fulfilling his promise by having the postal service laid on. Accordingly, the Woolgar's first post office was opened in August 1880 with G. Pratt as Postmaster handling the weekly mail arriving via Gilberton (ibid). By 1881 another 94 miners had arrived with the necessary Miner's Right issued by Warden Mowbray, who in the meantime seems to have moved from Georgetown to take up residency on the Woolgar (Staunton [circa] 1980: 66). This event is perhaps borne out by the anecdotal naming of the main mine to the east of the Lower Camp and the street running north-south through the official settlement as 'Mowbray'. Notably, the other street in the settlement running east-west was named 'Albion', the oldest known name of Great Britain that possibly reflects the high percentage of Britons on the field at the time.

In short, there was an earlier laying-out and surveying of Lower Camp than that given by Denaro, which is often inappropriately referred to in his text as a 'town' (passim Denaro et al 2001). The settlement's only sense of a community nucleus was the possible hotel in the Moore's MHL, Section II on the corner of Albion and Mowbray Streets. And, in place of the usual graveyard, there was only a single memorial
headstone to Sub-Inspector Kaye killed in September 1881 during the fracas with the Wannamara (A/38864 & JUS/N77/81/259. They present a scant but eloquent account of frontier lifeways of the times.

Substantiating Lower Camp's settlement and industrial locations
Fortunately, the attempt to obtain a copy of the original survey or the exact location of the Lower Camp's surveyed settlement area was not met with the same rebuff as that when approaching Denaro for clarification of certain aspects of his official version of the Woolgar's history. The Chief Surveyor of the Queensland Mines Department, Jim Bell went to some lengths to explain that due to the loss of much of the Department's archival records he was unable to provide any earlier plans or documents being indicated as being available by the notations on the copy of Geraghty's survey dated 5th May 1902. Furthermore, because of the considerable changes over the last 126 years in the declination between true north and magnetic north, plus various modifications to the cadastral system, a 25 degrees error would more than likely displace the settlement site by as much as 2000 metre (Pers.comm. Bell, May 2006). Perhaps such considerations may have caused Denaro (2001: 34) to incorrectly identify the official settlement area based on an abandoned mobile steam boiler (see Figure 5-7) on the outer edge of a large expanse of flood eroded land. But even so, it was a strange evaluation since the official survey outlines a similar building to the archaeological record (see Figure 5-8), found in Section II Lots 1 and 2 (see Figure 5-3 & 4).
The site referred to by Denaro is thought to be that of the large canvas campsite described in the *Queenslander* (*20th March 1880*), which is now assumed to be the extensive area of washouts (see Figure 5-8). However, the uncertain location of the surveyed area for the Miners Home leases was overcome by triangulating the GPS readings of Octag1, Old Bat and Hut1 recorded in Figure 5-2 taken during one of the author's earlier excursions to the Woolgar. The same GPS readings were later used in overlaying a copy of Geraghty's drawing on to a Google Earth image of the Lower Woolgar to provide a reasonable provenance for the area (see Figure 5-10). The three Google images (Figures 5-9, 11) illustrate the ephemerality of the area as well as providing fair warning to the research team that any surface archaeology would probably be unreliable due to the repositioning of artefacts by the flooding Woolgar River.
The Archaeological Research of the Woolgar Goldfield 2005

Despite the inconsistent historical background the effects of flooding and an ongoing drought with unseasonal high temperatures for the time of year, the fieldwork commenced on the 1st July 2005. The base camp, as suggested by Dick Cribb was established on the western bank of the dry Woolgar River in close proximity to the homestead's regular water supply and the main research area on the opposite bank of the river (see Figures 5-2 and 10).

The first on-site research team meeting defined the research roles and responsibilities of key members. The author was responsible for site interpretations, the field diary and site data, as well as photography along with assisting Bob Stone's with his baseline offset drawings and excavations. Apart from back up photography and taking charge of her Honour Students, Lynley Wallis also helped with some baseline offsets but mainly organised and supervised at the appropriate time dry screening of the main excavation. Domestic duties were organised on an ad hoc basis while the replenishment of firewood, water, gas and groceries were the responsibility of the writer.

The field methods to be adopted and the areas to be initially surveyed by transect were also outlined. The locations of any artefacts found during the pedestrian survey would be marked by a small stake with an attached coloured ribbon and then photographed. The already recognised and classified archaeological sites according to the Schema in
Figure 3-1 would also be photographed and recorded with baseline offset drawings. Randomised shovel test pits areas would predetermine excavations of possible residences and selected MHL’s sites.

The individual spit levels of excavations would be 20 centimetres (cms) and any recovered artefacts would be recorded on the supplied site record sheet according to location in the spit. Importantly, the excavation of battery sites and suspected processing sites would not be carried out based on health and safety precautions particularly applicable to gold mining sites.

Historical gold extraction methods from the slurry of crushed ore invariably used mercury to concentrate the gold winnings and cyanide to leach any particles left in the tailings. Therefore, no form of excavation in or around stamp battery sites would be undertaken. By way of further caution, it is advisable to always shower as soon as possible after being in an area of a stamp battery. Furthermore, extreme caution is also to be exercised while surveying mine sites. These surveys should never be conducted alone.
The first objective of the research team was a methodical search of the Lower Woolgar. Accordingly transects spaced five-seven metres apart from the easterly river bank would start in a line abreast from the deep washout shown in Figure 5-9 and 11 and move slowly northwards towards the Scrapyard and DoM stamp battery sites also shown in Figure 5-9.
The stamp batteries and government surveyed sites are known from earlier exploratory visits and had already been recognised as Authoritative Resources but any chance of finding an archaeological record of an Allocative Resource nature seemed unlikely, especially since there has never been full occupancy of the official Lower Camp settlement. The occupancy of the 46 available plots amounted to one single and five double plots plus a Machine Area. Such a low occupancy possibly reflects the itinerant nature of the goldfield and its 'official' fortunes in the form of crushing returns and alluvial winnings not being consistently monitored by the various visiting Authoritative Mining Wardens. Then again, the vacant plots could also be indicative of a prudent itinerant mining community’s reluctance to pay rent for land in such a remote frontier area when it was easier and cheaper to seek refuge outside the official domain. Such economies could well explain the large expanses of eroded land previously mentioned that encircle the official settlement (see Figures 5-9 & 12). Apart from the usual high rivers during the tropical rainy season, there was particularly severe flooding recorded in 1895, 1907, 1917, 1934, 1974, 2000, 2008 and 2009 (Anonymous 1990: 52, 55; Australian Bureau of Meteorology 2010; Denaro *et al* 2001: 22, 28, 64-5; Dunne 1933b: 22)

Nevertheless, of the six rented plots, only four MHL's and the Machine Area's battery site had any suggestion of an archaeological record. Of such sites, Lot 4 in Section I and the Machine Area's archaeological record would most certainly have been affected by the Woolgar's history of flooding by dint of them being so close to the river. The other remaining three sites away from the river were probably also affected by flood waters of higher levels and strength of current. Also worthy of comment, is that a narrower roadway than that shown in the satellite image (see Figure 5-10) is still seen as running through Section II connecting Middle Park to the road out of Richmond. Therefore, interpretations of the material surface scatter and that found in the first spit of any excavation in the Lower Woolgar were inevitably suspect giving this dissertation an added feature of ephemerality. The following describes the archaeological research of Lower Woolgar's residential sites according to Geraghty's official survey and transects of the area.
Section I, Lot 4, Albion Street, Woolgar: MHL No. 11, Leased by William Bray until October 1901

This was originally named OCTAG1 during the author's first visit to the Lower Woolgar due to the seven worn octagonal stamp dies set near the river's levee. Later the area was identified as the middle plot of Section I in the official survey that was leased to William Bray (see Figure 5-4, 5 & 10). How long Bray lived there is not clear but in May 1897, he was in partnership with Joseph Williams mining a claim named 'Beauaraba' in the new extension to the goldfield east of the Lower Camp. According to Denaro (2001: 51), both miners were working a 30 inches (76cms) lode producing 2 troy ounces to the ton. The mine was later renamed the Eulo Queen, but there was no further mention of Bray or Williams in the historical records other than Bray being divested of his lease in 1901.

Figure 5—13: Site map of William Bray's MHL No. 11, Section I Lot 4, Albion Street, Lower Cam (Drawn by Stone 2005)

The Miner's Home Lease No. 11 at 4 Albion Street backs on to the dry river's eastern secondary bank or levee. This slightly undulating levee rises some 1550 cms above a five-metre wide gentle slope towards the primary bank of a dry river lined with riparian trees and bushes. Contrary to the notation on the official survey (see Figure 5-4, 5), there are no traces of any building in Lot 4. Other than the occasional surface scatter and seven octagonal worn stamp-dies inlaid in the southwest corner of Lot 4, the site was archaeologically limited. The stamp dies could have come from the nearby
Machine Area, presumably to be part of some paved area for a possible toss zone. This premiss was subsequently supported by Beales' (2006) Lower Woolgar ceramic study that will be itemized later.

Moving towards the Albion Street boundary, in the area of the hut shown on the official survey map (see Figure 5-4, 5) there was a probable garden bed partially outlined with half buried upturned green beer bottles (see bottom right Figure 5-13). Also, just north in the same area, a faint pathway follows the northern border of the garden's partial bottle border but stops some 10 metres short of the levee's edge. This comparatively clear area between the end of the pathway and another possible toss zone or a collecting point for flood depositioned artefacts was considered as a possible house/hut site, especially since the pathway leads to a probable Albion Street entrance.

**William Bray's Material Culture found in Section 1, Lot 4**

With such a limited variety of possible interpretations, eight random test pits measuring 2x2m were set-up around Lot 3 (see Figure 5-13). The potential sample areas cum test pits if necessary along the edge of the levee were numbered one-to-three while sample areas four to eight were set out either side of the supposed garden area and pathway (see Figure 5-13). Both Beale's (2006) ceramic study and Pendleton's (2006) economical descriptive research of bottles and glass carried out in support of this industrial study (see Appendices 5-1 and 2) will be used where appropriate to assist in dating and identifying social practices where there is clear agency imbedded in this site and any of the other sites in Lower Camp.

Prior to excavation of the various Bray site test pits, the initial transects produced items substantiating the provenance of at least the goldfield. The William IV silver three-half pence coin with an unclear 'tail-side' was particularly eloquent in this regard. Coins that were issued to the colonies between 1834-7 (see Seaby et al 1982:245) (see Figure 5-14) and therefore providing a *terminus ante quem* for the site and goldfield. The silver Victorian sixpence, found in the first spit of Surface Sample 5 had a wreath dated 1888 but was too badly worn and discoloured to be photographed. Nevertheless, it too assisted in establishing the goldfield's provenance. As did the 19th Century miner's axe head (see Figure 5-15), found on Albion Street, bordering MA 94 (see Figure 5-10) that accompanied a Victorian inscribed padlock (see Figure 5-16) possibly from an official building further upstream.
Figure 5—14: William IV three-halfpence specially minted for colonies found near William Bray's lease (photo Taylor 2005)

Figure 5—15: 19th Century miner's axe head found south of William Bray's MHL (photo Taylor 2005)
Other material culture found on the site's test areas did provide some small insights into William Bray's behavioural patterns. Most of these personal signatures were excavated from the first spits of test pits 1-3 along the levee. However, the small amounts of glazed ceramic and blue glass shards intermingled with clay pipe fragments from the first test pit only came from spit one. This gave cause for caution in subsequent interpretations based on the variation in soil colouration when compared to the surrounding sandy earth. Apart from one small fragment of animal bone, there was a general absence of animal remains in the toss zones that added to the premiss of repositioned archaeology. Although, also taken into consideration was the possibility of taphonomy especially after Dick Cribb (Pers.comm. August 2005) mentioned in passing the high incidence of dingoes in the area. Such information could well explain the absences of animal bones in most of the Woolgar's archaeological record. Notably, the ubiquitous broken Colbert-blue glass castor oil bottles (e.g. Arnold 1997: 52) and fragments of Holloway's ointment jars often found on mining sites were present in the test pit and as such were seen as a reasonable indication of Bray's poor unbalanced diet.
The Clay Pipe Assemblage
The one clay pipe fragment found in Surface Sample Area 1 seemed to support the flooding premiss until the sample area transformed into a test pit. The surface fragment eventually became part of a total clay pipe assemblage of 24 pieces consisting of three bowls or parts thereof, 18 embossed stem fragments and three un-branded stem segments. Of the bowl fragments, one bowl was virtually reconstructed but without a stem, leaving a second smaller wicker designed broken bowl, probably of Scottish provenance made in 1900 according to William White's catalogue (see Gojak and Stuart 1999: 39). The remaining bowl fragment included a stem with 5/64th bore and a Staffordshire Knot as part of the pipe's base (White 2003: 15). The 18 stem fragments were difficult to match up and seeing as ten of the stems had clear maker's names it was considered as a reasonable basis for further research along with the five unmatchable nippled mouthpieces recovered from the same spit level. The possible total of 13 discarded pipes is not too excessive for one person in view of the fragility of clay pipes (see Gojak & Stuart 1999: 39-40).

In spite of citing the British Society for Clay Pipe Research Newsletter (SCPR Newsletter) as the foremost publication on such matters the Society's research is considered as inappropriate for Australia as it is of an earlier timeframe and lacks of comparative social status studies (Gojak and Stuart 1999: 38). Interestingly, White (2003: 15-19), the editor of the SCPR Newsletter claims the nipple mouthpiece provides a reasonable indication of date and type of clay pipe. The nippled mouthpiece is suggestive of the short stemmed 'cutty' clay pipe with a perpendicular bowl being manufactured during 1880-1910. Courtney et al (1998: 46) affirm such a short stemmed style of clay pipe was popular with outdoor workmen and particularly known to the Irish as a Dhudeen. However, the pipe bowl fragments found in test pit 1 had the characteristics of a cutty style pipe but the milling around the rim of bowl was seen as a feature of 17th and 18th century Dutch pipes (see Courtney et al 1998: 46). The questionable interpretation of the Dhudeen pipe as British or Australian origin was verified by Courtney's later statement (pers. comm. 2006) that plagiarism was rife among clay pipe makers. With this in mind, the Dhudeen suited Bray as a miner or even the workmen in the Machine Area just three plots upstream.
Apart from the various characteristics of clay pipes, the actual bore size of a stem was earlier considered as a dating medium by Harrington (1954) and Binford (1962) until Gojak & Stuart (1999: 47) and Charter (2007 online) opined that using such methodology is never easy or reliable. Later research specifically found that different pipe stem bore sizes supposedly representing specific dates were incorrect. For example 7/64" bores were at the height of popularity when 1/4" bores were still being made and even later when the trend changed to a 5/64" bore (e.g. White 2003: 18; Charter 2007).

More importantly from the perspective of linking the Woolgar to the World System was the number of stem markings that gave the makers name or part thereof, origin, type and mould number. Five stems were clearly marked 'CORK', one with 'BEN' and two with T.W. B... with LONDON embossed on the opposite side of the stem. The mould reference marking of 'S15' and '1' have been taken to be of dubious dating value while the makers' names, particularly 'CORK' mentioned in Woollard's (2003: 33[SCPR Newsletter]) extensive research of Cripplegate Without, London pipemakers of 1561-1907 was of considerable value. Apparently, Sarah Cork of Old Street Islington was a pipe trimmer in 1851 who could well have been part of a family of pipemakers or in partnership with her husband as reasoned by 20 other examples listed in Woollard's (2003) research. Though Sarah was listed as a pipe trimmer, further research at the British National Archives procured her Will admitted for probate on 12th December 1857 (PRO11/2261 1857) that revealed at the time of her death she was the widow of Robert Cork from whom she had inherited his estate. She in turn passed on the joined estates to their son George Cork while also making provision for her daughter Eliza. It would seem that the Corks were of comparative substance, especially since they had appointed a solicitor, a Mr Wingate of 9 Copthall Court in the City of London. This admittedly circumstantial, but there is no reason why the son George Cork did not expand the family business by exporting to Australia and become part of the World System. Efforts to substantiate such a premiss with the National Clay Tobacco Pipe Archives held at the University of Liverpool were not possible by internet nor did an attempt to obtain clarification direct from that university.

The Ceramic Collection
In like manner the ceramic assemblage of 22 pieces excavated or collected from the surrounding eight test areas were analysed by Beale (2006: 36-7). In spite of the high
proportion of porcelain, some 45.4% as compared to the 27.3% each of earthenware and stoneware, such fragments were reduced to only 5 pieces of tableware in the subsequent analysis. The application of a 'minimum vessel count' (MVC) based on the identification of rims and matching rims (see Brooks 2005: 46-52) in the six pieces of earthenware and the ten potsherds of hard paste porcelain only produced five items of tableware and one object of porcelain (see Table 5-1,2). The six sherds of stoneware were un-matching pieces of Holloway's ointment jars and therefore did not satisfy a MVC application. Overall, this was hardly enough to venture into speculations of upward mobility, especially after Leone's (1999: 198/200) prior caution about using inappropriate status frameworks. However, the small amount of porcelain found in the archaeological record when reduced to a limited amount of tableware could be characteristic of a bachelorhood household.

<table>
<thead>
<tr>
<th>Fabric</th>
<th>Surface</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>Earthenware</td>
<td>6</td>
<td>27.3</td>
</tr>
<tr>
<td>Porcelain</td>
<td>10</td>
<td>45.4</td>
</tr>
<tr>
<td>Stoneware</td>
<td>6</td>
<td>27.3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>22</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 1: Total ceramic pieces separated into fabric type for Bray's MHL No 4 (Beale 2005:36)

<table>
<thead>
<tr>
<th>Fabric</th>
<th>Surface</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
</tr>
<tr>
<td>Earthenware</td>
<td>4</td>
<td>80</td>
</tr>
<tr>
<td>Porcelain</td>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>Stoneware</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>5</strong></td>
<td><strong>100</strong></td>
</tr>
</tbody>
</table>

Table 2: Estimated MVC according to fabric type for Bray's MHL No 4 (Beale 2005:37)

Though the surface broken bottle glass and two unbroken champagne bottles in test areas 4 and 5 could well be evidence of William Bray's good fortune, the likelihood of unburied bottles surviving some 120 years, plus the factor of repositioning from upstream would seriously question such a premiss. More relevant, the slightly buried or submerged fragments of green beer bottles in sample test areas 4, 5 and 7 also suggests that most of his drinking was done around the garden space. There is nothing much in
the surface scatter to associate with Bray's good fortune from his Beauaraba cum Eulo Queen Claim other than his choice to live within the surveyed area for which he would have had to pay rent. Other artefacts like the English clay pipe fragments and ceramic sherds associated with Bray's plot comply with Higginbotham's (1987: 10-11) assertions that such material is of more value in substantiating the date of a site rather than behavioural patterns. This is especially so when joined with more substantive artefacts like the Victorian coin, official padlock and a pick-axe as *terminus post quem* for the Woolgar goldfield.

**Section III, Lots 1-2, Albion Street, Woolgar: MHL No. 8, Leased to Mary Brown until October 1901**

Situated at the crossroads of Albion and Mowbray Streets on the north-eastern corner of Section III, Mary Brown leased Lots 1-2 for herself and family (see Figure 5-4, 5). It is not clear when the Brown family left Lower Camp, but a School survey of the area recording the parents and children dated 11<sup>th</sup> February 1904 shows the Browns as having three children aged eight, seven and five years (EDU/Z2985/382933). A later school survey dated 1<sup>st</sup> May 1908 shows the Browns as residents of Middle Camp with six children living a quarter of mile (~400 metre) from the proposed new school (Taylor 1908). The virtually sterile archaeological record of Lots 1-2 raises the possibility of this site also having experienced severe flooding.
Figure 5—17: Site map Mary Brown's kitchen and fire place in the North West corner of Section III lots 1-2 bordered by Mowbray Street (drawn by Stone 2006)

Figure 5—18: Mary Brown’s kitchen and possibly a repositioned Denbyware (photo Taylor 2005)

Except for a well designed stone fireplace and a nearby stone configuration, presumably an oven arrangement with large segment of a broken saltglazed Denbyware pot
alongside the outer wall of the putative oven, the site was sterile (see Figure 5: 18). The saltglazed stoneware, manufactured by J. Bourne & Son, Denby, Derbyshire since 1800 (Vincentelli 1988) was not imported to Australia until after 1850 (Beale 2006: 50). The fact that it was lying outside the northern aspect of the oven configuration without any other surface scatter again raises the possibility of flood effects. However, a single item of material culture in such a context adds little or no interpretive value to a site other than it was possibly the Brown's kitchen.

Section II, Lot 1-2, corner of Albion and Mowbray Street, Woolgar: MHL No. 6 Leasee JJ Moore 1902 then transferred to Thomas Lewis until 1910
Opposite Mary Brown's lease is the clear outline in stone of John James Moore's home cum hotel that in itself presents another unclear archaeological record of past incumbents or their building. The close proximity of two access roads to the Middle Park homestead (see Figure 5: 10) on either side of the site could explain the lack of surface scatter although the type of building allied to the stone configuration sets more of a conundrum.

The site is recorded in Geraghty's survey map as a hotel, which according to the Queensland Post Office Directory (QPD) 1889 also served as a butcher's shop.
Therefore, the eastern stone inlay is considered as flooring for a bar cum shop-counter at the front of the building. The adjoining stone squarish outline to the rear was either the living quarters or a stock room, or even both. Exploratory test pits at two of the square's corners (see Figure 5-20) produced evidence of poles in which one had been burnt below ground that probably supported either a tree-bark humpy or tent construction rather than a house elevated on blocks or low stilts (see Appendix 8).

![Figure 5—20: Excavation investigating possibility of fire damage, Moore's hotel MHL No. 6 (photo Taylor 2005)](image)

Exactly when the fire took place is uncertain but there is corroborating evidence of a fire as seen in some of the misshapen surface glass found in the area. Whether this gave cause for the Moores to move is unclear, although it seems that they were part of the Lower Camp's diminishing population around the early 1900s. According to Taylor's (1908) school survey for Middle Camp, their two daughters, aged nine and seven years, were seen as prospects for the new school. This would seem to indicate that his wife gave birth to their first child about the time of their departure from Mowbray Street around 1901. Anyhow, attempts to produce a substantive record of the Moores or the later occupant, Thomas Lewis who supposedly took up residency after 1902 met with little success. The excavation in the kitchen area reached the Queensland sodic crust (e.g. Shaw et al 1994) after just one spit. It was surprising that an area conceived as public could be so sterile.
Section III, Lot 11-12 Mowbray Street, Woolgar. MHL No. 5 leased to James Gilbert until October 1901

Unlike the other nearby MHLs this lease showed signs of surface scatter over a relatively large area. As a consequence, a recording grid was set-up with 2 metre squares along a north-south baseline of 28 metres with an east-west offset of 12 metres that was cross-referenced accordingly to what was initially thought to be 11 Mowbray Street. The location of the archaeological record is illustrated by the coloured calibration shown on the following site map (see Figure 5-21). It would be appropriate at this stage to point out that the orientation of the Lower Camp government surveyed area was not sufficiently clear until after the fieldwork when it was possible to register the various sites' GPS readings onto a satellite image. Until then, the site illustrated in the site map (see Figure 5-21) was considered as one site and labelled Hut 2 until later clarified. It became apparent when comparing Geraghty's survey with the site's grid that the areas of 2CC together with 3AA-CC were, as previously thought, part of the Gilbert's lease in Section III but the excavations in 9-13 AA-CC had actually taken place on part of Mowbray Street and two unoccupied plots on the other side of the street. Such a premiss is based on Geraghty's survey scale of one inch to two chains converted to align with the scale used on the site's grid of one centimetre to two metres. The width of Mowbray Street on the survey measures 3/8th of an inch, therefore equaling .375 of 2 chains or 44 yards, or 40.2336~metres (Fenna 2002: 46). Hence, the Mowbray Street measures 15.0876 metres that equals to 7.5438 squares of the site grid that extends from Gilbert's lease boundary in Row 3, to Row 11 on the other side of the street. As such, the location of the rubbish dump is seen as being in the lower half of Section II's Lot 10 in which squares 11-12 BB and CC produced most of the artefacts. The surrounding surface-scatter annotations shown on the research grid 1-5 YY through to squares BB and the severe fragmentation of both glass and ceramic are seen as a result of regular horse-drawn traffic carrying ore from the nearby mines to Machine Area 94. Later, grazing stock and passing access to the homestead during the last 126 years would certainly have added to the bottle and ceramic fragmentation.
Figure 5—21: Site map illustrates the excavations in James Gilbert's MHL No. 5, Section III, 11-12 Mowbray Street (drawn by Stone 2005).

Figure 5—22: The excavation of the first spit of 11 BB by Bob Stone assisted by Janice Perry which went no deeper than 15 cms due to Queensland's sodic crust (photo Taylor 2005)
The excavations at the Gilbert's MHL were carried out in accordance with the earlier procedures but it was not long before first spit reached 10-15cms and the known sodic crust in the area. The character of the top soil and that before the hard crust was sandy and extremely friable from the years of drought. Therefore, the walls of an excavated area tended to regularly crumble hampering a clean outline and any form of stratigraphy at such a shallow level. Nonetheless, the archaeological record was contained within the shallow excavations by the concreted underlay that spread throughout the specified grid. The following synopsis derives from Beale's (2006: 35-55) study of the 689 ceramic pieces excavated from the combined sites of surface, pit and squares 3CC, 11BB – CC (see Table 5-3).

<table>
<thead>
<tr>
<th>Fabric</th>
<th>Surface Sample</th>
<th>3CC Excavation</th>
<th>11BB Excavation</th>
<th>11CC Excavation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
</tr>
<tr>
<td>Eatthenware</td>
<td>98</td>
<td>83.1</td>
<td>26</td>
<td>100</td>
<td>258</td>
</tr>
<tr>
<td>Porcelain</td>
<td>20</td>
<td>16.9</td>
<td>-</td>
<td>-</td>
<td>79</td>
</tr>
<tr>
<td>Stoneware</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Total</td>
<td>118</td>
<td>100</td>
<td>26</td>
<td>100</td>
<td>337</td>
</tr>
</tbody>
</table>

Table 3 Total ceramic excavated from James Gilbert's MHL No.5 classified according to fabric (Compiled by Beale 2006:36)

<table>
<thead>
<tr>
<th>Fabric</th>
<th>Surface Sample</th>
<th>3CC Excavation</th>
<th>11BB Excavation</th>
<th>11CC Excavation</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>#</td>
<td>%</td>
<td>#</td>
<td>%</td>
<td>#</td>
</tr>
<tr>
<td>Tableware</td>
<td>17</td>
<td>53.1</td>
<td>6</td>
<td>85.7</td>
<td>38</td>
</tr>
<tr>
<td>Teaware</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>29</td>
</tr>
<tr>
<td>Hollow ware</td>
<td>6</td>
<td>18.8</td>
<td>1</td>
<td>14.3</td>
<td>11</td>
</tr>
<tr>
<td>Flatware</td>
<td>6</td>
<td>18.8</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Indeterminate</td>
<td>3</td>
<td>9.3</td>
<td>-</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>32</td>
<td>100</td>
<td>7</td>
<td>100</td>
<td>79</td>
</tr>
</tbody>
</table>

Table 4: Estimated earthenware MVC according to Brooks (2005:46-52) from James Gilbert's MHL No.5 (compiled Beale 2006:40)
As already stated Beale (2005:40) relied on Brooks (2005: 46-52) typology to classify the 689 ceramic shards. From the 549 fragments of earthenware, 173 were seen to be whole items of crockery as were 60 items from the 136 shards of porcelain. Considering the maximum estimated occupancy of 10 possible adults, the amount of approximately 233 discarded intact items of crockery seems well out of proportion to the known occupants of the area, especially in view of a major exodus from the field in 1887 (see Figure 5-23).

In like manner, the porcelain collection from the grid was recognised as 31 pieces from different tea-services together with 11 pieces of tableware, 11 possible bowls, four possible serving plates and two unidentified items. Of the total 136 porcelain shards, eight surface pieces were hard paste; six were bone china and six fragments unidentified. The balance of 116 fragments from the two main excavations was recognised as 50 pieces of hard paste porcelain, one shard of soft paste and 51 fragments of bone china with 12 unidentified subsets.
As pointed out by Graham (n.d: 3) Australian ceramics or Australiana were not popular until after the 1900s, leaving Australian consumers totally reliant on English and Chinese imports as reflected in the assemblage unearthed at the Lower Camp. The lack of identifiable ceramic items is not surprising in such a frontier situation as the Woolgar, so it was of some interest that two piece of possible higher quality chinaware such as a small shard indicating Wedgewood and 'by Appointment' ware (see Figure 5-23, 24) should have been uncovered in the 11CC excavation. Though the fragment's small characteristic trademark (see Beale 2006: 52) is seen as the Wedgewood mark dating back to 1759 (Godden 1991: 657) it would seem therefore likely to be a keepsake or heirloom. Even so, this small segment of cream-coloured earthenware is of some significance as it represents the replacement of porcelain on the tables of 18th century English society that added to Josiah Wedgewood's growing stature (Honey 1962: 86).

Beside the Bourne and Wedgewood, the other partial maker's mark was on a small stoneware fragment that has been interpreted as an E. & C. Chandlors product that was part of the company's later output between 1862-1891 (Beale 2006: 51). Beale (2006: 47) was also able to hazard a guess on a segment of 'Fibre' transfer, print based on Bickler's (2004) finds in New Zealand as being possibly manufactured by Lewis Wolfe. Coysh and Henrywood (1990: 215) mention Lewis Wolfe, operating from 1856 until 1883 but do not mention the 'Fibre' design.
Further investigation of the earthenware shard with a partial Royal Coat of Arms was sought from Godden (1964: 552) to the effect that earthenware with such an insignia was manufactured in the 19th century. Apparently, (ibid), pottery with such a backmarking was prolific from the early 19th century onwards and for a purpose. The heraldic crest indicates that the manufacturer, in this case the potter, had been awarded a Royal Warrant in recognition of supplying members of the British royal family with goods of excellence for at least five years. The Royal Warrant has been in existence since 1155, and was a frequent awarded during Queen Victoria's reign of 1837 to 1901 (see The Royal Warrant Holders Association). Though an interesting occurrence of a ceramic shard with the Wedgewood hallmark and one with the Royal Coat of Arms (see Figure 5- 23, 24), there is no reason why such artefacts should not be found in such a remote location as the Woolgar. Although an arena of only possible newfound wealth, such a single occurrence should only be seen as a personal keepsake.

Following Leone's (1999: 198-200) caution in the opening chapter of this thesis, it is seen as appropriate to question frameworks used to interpret Georgian influences on North American urban lifeways or Australian goldfields. While appreciating the efforts of Lawrence (1998, 1999) and Quirk (2009) to add depth to the archaeological interpretations of gold mining communities' self- sufficient lifeways, misnomered generalised studies of gender in place of femininity and gentility replacing etiquette and stature are to say the least, ambiguous. Gender according to Nelson (1997: 15-6) is not a biological classification, it is a sociological conditioning and has nothing to do with essentialism, while gentility implying a status or way of life applies to somebody of noble birth (Hughes et al 1992: 469). That is not to say that evidence of nobility should
not be found in the Australian Outback (see Bolton 1972: 24-43). But Australia by the late 19th century is seen as attempting to throw off the suppressing shackles of the British class system to become a meritorious upwardly mobile society (see Macintrye 2009: 153-5) without the influences from the likes of a Mrs Hyacinth Bouquet's, often pronounced 'Bucket' (see Swift circa 1990s) outlandish snobbish hang-ups. Unfortunately, some goldfield studies imply to the contrary and attempt to portray indirectly the city sophistications observed by Marcus Clarke (see Macintrye 2009: 112-4) on the isolated frontier goldfields of Queensland. Such studies seem to be a countercultural cringe that gold miners were unsophisticated until 'gentrified' by the feminine elements on a goldfield. Hill's (1907) account of 45 years experience on northern Queensland goldfields is seen as a more realistic version of miners looking for financial security so that they too could appreciate a higher socio-economic status with the finer trappings of life. As modernity eventually encroached on the outback through the probable influences of the surrounding pastoralist communities and improved communications so did standards of living; although such signs of an improved financial standing did not always seem apparent when visiting the residences of past Woolgar miners still on the goldfield or in Richmond.

Though the Lower Camp ceramics could perhaps present a telos of improved status, such categorisation and percentage mix as used in North American tableware to indicate an elevated social standing do not apply to the Woolgar assemblage. Nonetheless, the suggested Structuration methodology provides a cautious guideline for behavioural interpretations for a remote Australian mining location. The availability of supply and style available to residents in remote locations must be taken into consideration, as must the local demographics. The demographic factor would no doubt cause the local merchants if still on the Woolgar or those in Richmond to manage their inventory accordingly. This in itself creates a question: did the licensed tradespeople on the Woolgar carry an inventory of ceramics or did they just bring in job lots for a quick sale? Penny Crook's (2005:22) innovative ongoing study on the nature of quality, cost and value in nineteenth-century consumerism would seem the ideal added dimension that examines quality flaws as providing a testable material indicator for relative cost and socioeconomic differentiation to interpret a consumer's choice.

The Woolgar's porcelain probably came from the limited Chinese outlets situated in the various Camps along the river but this does not answer the question about the
availability of the more serviceable earthenware transfer prints. The Richmond retailers would probably have had a better selection but the town was at least a four-day round-trip horse ride away. In contrast, Lawrence's ceramic studies on the Victorian goldfields and more particularly Quirk's (2009) study of Paradise, a goldfield in the coastal hinterlands of Brisbane where supply or choice were surely not so limited, begs the question of application to a frontier situation. Even so, caution should be exercised in applying generalised philosophical interpretive frameworks on Australian frontier sites. In a number of ways therefore, Beale's adopted framework to analyse the Lower Camp ceramic assemblage took heed of the various cited cautions against standardised classification as being always appropriate.

**Lower Woolgar's General Ceramic and Glassware Analysis**

Accordingly, the Lower Camp's ceramic assemblage was found to consist of 80.3% earthenware, 17.8% porcelain and 1.9% stoneware shards that would seem an ideal situation for using Crook's (2005) Quality, Cost and Value analysis if the required testable material indicator of relative cost had been available. On that basis then, which of the Lower Camp residents had the most money, or alternatively who had the more sophisticated tastes? This is a seemingly hopeless question unanswerable by ceramics alone in spite of the high quality depicted by one partial Royal Warrant backmarker, Wedgewood's insignia and the Challinor hallmark. Such ceramics are not unusual occurrences on northern Queensland mining sites, especially at the successful coastal Palmer goldfield, according to Janice Wegner (Per. Comm. August 2007). Therefore, the higher quality chinaware could well have been the property of an ex-Palmer miner that came to the Woolgar.

Concerning Pendleton's (2006) glass analysis, in spite of valiant efforts to describe the various methods of manufacture this added very little to the knowledge of lifeways of the Lower Camp other than the shards being consistent with datable artefacts found on the goldfield. Also, the glass collection was not dissimilar to any other far northern mine sites visited or studied in that the drug of choice was alcohol in large quantities, as demonstrated by the high percentage of green and brown beer bottle shards. Furthermore, any whole bottles found in the Lower Camp region, despite the protestation of Pendleton must be seriously considered as repositions from upstream and of questionable historic relevance to this dissertation.
Summation

In summary, the concerns during the early stages of the Woolgar's fieldwork regarding lack of interpretive material are now seen as the result of severe flood damage followed by periods of drought. There was however, some consolation from William Bray's site in that it provided a few small insights into some of his social practices, such as sitting in his garden while smoking his pipe and probably having a few beers. As for the rubbish dump in the middle of Mowbray Street and its constituent ceramic assemblage, this still remains a mystery as to who was using all that crockery. All in all this has been a testing archaeological exercise that takes small comfort from being able to associate most of the archaeology with the historical record while recognising limited assemblages of agency. The next chapter, Chapter Six on the industrial archaeology of the Woolgar would seem on face value to present better interpretive possibilities for demonstrating the Structuration methodology.
Chapter 6: The Technological aspects of the Lower Woolgar Goldfield's Industrial Archaeology: 1880-1939

Introduction and General Overview

The Lower Woolgar's industrial archaeology is located between Machine Area 95 on the eastern bank of the Woolgar River and the slightly higher level, some 500 meters further upstream (see Figures 5-2). While the industrial archaeology in this area is seen in terms of Agency's Duality of Structure the land erosion between the two areas seriously challenges such evaluations and particularly Rubertone's (1989: 50-1) hypothesis that most ephemerality is traceable.

At first sight both the archaeology of the Lower Woolgar and Denaro's mining history (2001) appeared promising in these terms as the data provided seemed potentially helpful to the future analysis of the various sites (see Figure 5:2). The promise however faded as it became apparent that the Woolgar's archaeology had been seriously affected by the history of extreme weather conditions. The cumulative result was that the upper and lower regions of the field that should have had some vestige of industrial and sociological archaeological record had been completely washed away (see Haldane ([1895]1932: 386-7).

Consequently, unlike the archaeology of other far northern Queensland mining towns, the Woolgar does not display on the outskirts of the community settlement examples of the Authoritative ideologies and social practise by way of the customary 'God's acre', cum graveyard. Although Keid's (1937: 233) sketch map of the Woolgar shows grave sites just north of the Upper Camp region the photocopy of the map was so indistinguishable that it was pointless including it in either the text or Appendix. Fortunately, during a conversation with Roger Barns' wife, nee Bulmer about growing up in the upper regions of the Woolgar, she talked about her collection of Chinese artefacts and the Chinese and European graves sites north of the Soapspar area (Pers.comm. August 2006). Apart from the memorial headstone already mentioned (see Figure 5-6), the only such archaeological record of the Woolgar's past was a possible burial site near the Upper Camp and two formal graves with headstones near Middle Camp (see Figure 6-1).
The possible burial site found in the Upper Camp vicinity was an oblong depression in the ground on a small hill close to some old alluvial workings while the two graves in the Middle Camp area, well above the previous waterline, are marked with substantial headstones by members of the Bulmer and Crapp families (Figure 6-1). Any attempt to add to the meagre archival mining community's Duality of Structure with data from the Richmond Shire office birth, deaths and marriage records was frustrated by the information that all had been destroyed in the 1921 fire of the Shire Offices (Pers. comm. Richmond Shire County Offices July 2005).

To some degree, these archival misgivings were allayed by a number of meetings with two octogenarian Woolgar miners, Frank Crapp and Arthur Barns whose families have a long association with the goldfield (cf. Richmond State School 1990: 19). Frank Crapp's family, originally from Cornwall, brought the first stamp battery to the field and mined various claims for a number of years. Other members of the Crapp family (see Figure 6-2) as well as being involved in mining also ran the Woolgar's Post Office and general store until 1895. The store's general journal for the years 1885-95 was made available by Frank Crapp for digitisation (see CD 2), which proved to be a valuable
source for a number of the field's mining activities that provided the basis for a number of Agency's Duality of Structure interpretations.

Similarly, Arthur Barns and his brother Roger continued with their father's gold prospecting and mining of the Woolgar. Arthur, the elder brother, at the time of writing still lived a short distance from the Lower Woolgar settlement on the northern side of the river while his younger brother mined the Soapspar area (see Figure 5: 2) until he retired in 1988. Roger now lives with his wife on their property outside Charters Towers. While both the Barns brothers' and Frank's reminiscences about mining and past events in the Woolgar's history were helpful to this dissertation's research, some of their accounts did have hints of embellishment that gave cause for needed verification where possible from other sources.

An overview of the Woolgar Goldfield's initial pedestrian surveys
In contrast to the previously described open grasslands, the lower parts of the goldfield on either side of the Woolgar River are lightly timbered with a variety of eucalypts with coolabahs and melaleucas as prominent features of the river's riparian zone. The open woodlands extended to the heavily timbered piedmonts of the Gregory Range to merge with species of bloodwoods, ironbarks, yellow jacks and lancewood. The areas of depleted grass are often replaced by wide-ranging patches of spinifex that cover aggregates of chalcedonic quartz, silcrete and chert flakes (cf. Wallis 2004: 22).

Aside from the effects of severe weather patterns, horse drawn traffic and overgrazing, the archaeology of the Lower Camp had only a sense of a sociological structure presented by way of the surveyed MHLs to the nearby mill sites that date back to the
early days of the goldfield (Denaro et al 2001: 33-4). Middle Camp further up the river, established in 1883 as the centre for a number of surrounding mines (see Figure 5: 2), had the now familiar limited archaeology but with a difficult access to the surrounding terrain. More importantly from a base camp perspective, the uncertain water supply in this upper region had to be found by digging through the dry riverbed to locate the river's aquifers. In effect, Middle Camp as an industrial and community archaeological site became unappealing, whereas the Lower Woolgar sites had relatively easier access and a ready, albeit limited, water supply. This was an important factor, especially since western Queensland at the time was still in drought from three years back. Accordingly, in line with the main focus of the thesis, this chapter will be principally concerned with the industrial archaeology of the Lower Woolgar goldfield region while occasionally commenting on other notable areas in the upper regions of the goldfield.

**An outline of the industrial archaeology of the Woolgar goldfield**

The field's geology is an inlier formation of Proterozoic metamorphic schist, gneisses and pegmatite bodies that encase quartz and granite rocks similar to the predominant Einasleigh Metamorphics that encompasses most of the Gregory Range region (Haldane [1895]1932: 386). The eroding overlays on the older stratum are the relatively recent Jurassic sediments that have even younger intrusions of volcanic fine grained rhyolite from the Palaeozoic age. These Jurassic overlays were clearly seen in some of the upper layers of the stratigraphy during the pedestrian surveys, as was the protruding pegmatite in the occasional rock face. Such mineralisation in the gold bearing quartz was well suited to the limited separation techniques being used in northern Queensland during the late 19th century (cf. Menghetti 1982: 26)

The early Chinese and Anglo-Australian arrivals would not have needed advanced technology other than the standard pan, cradle and sluice box to work the headwaters and gullies of the Woolgar River (after Denaro et al 2001: 22). By February of 1880, the influx of miners is said to have numbered some unsubstantiated 800 (Denaro et al 2001: 40), many of whom had arrived dissatisfied from the relatively close goldfields of Croydon, Etheridge and the Gilbert River. They were also joined by other disappointed northern miners from the failing Palmer and Hodgkinson fields (Hodgkinson Mining News 10th March 1880, Queenslander 1st May 1880) as well as men from the southern Queensland goldfields of the Cape, Charters Towers and even further afield from Victoria (Denaro et al 2001: 40). Such a widespread influx to the prospective goldfield,
led Bolton (1972: 61-2) to call the Woolgar the last of the nomadic rushes in eastern Australia.

The Woolgar's rush was also a precursor to the 20th century major changes in some of the northern fields akin to that of the Victorian individual miners being displaced by deep-reefing mining companies with better finances and technology. Such technological diffusion became apparent in Charters Towers (see Menghetti 1980, 1984) but surprisingly had limited influence on other important mines in the far north region due to lack of capital and the geological and chemical characteristics of the northern ore bodies (cf Wegner 1980: 88-91; 1995). Though partially mirrored in the Woolgar's limited historical record but more notably the archaeological collage is that of an inflexible traditionalist doxa rather than examples of progressive gold recovery technology that were not to arrive at the Woolgar until the early 20th century and then for only a short period.

Apparently, in early attempt to follow the deepening leads in a number of mines explosives were used, but such efforts rarely exceeded depths of 5-10 metres before the veins pinched out. It was during this stage of reef mining that the first fatality occurred, when Henry Bemi, an apparently inexperienced miner from Bethnal Green in London's East End blew himself up by incorrectly setting his charge in the John Bull mine (QSA: JUS/N85 230/1882). Of the other eventually 162 Woolgar mines, only ten went deeper than 25 metres. The two deepest mines, the Mowbray, east of the Lower Woolgar settlement and the Perseverance at Top Camp produced a combined yield of 11,786 troy ounces (t-oz) to make up the bulk of the Woolgar's 1940 gold production of 20,746 t-oz (after Denaro et al 2001: 15-21). In value terms, the Mowbray and Perseverance mines provided £42,721 of the £75,201 collective winnings for 1940. The Woolgar's 1900 yield of 17,762 t-oz valued at £64,388 is insignificant when compared to Queensland's 1900 yield of £50,101,486 (after Maclaren 1901: 2). These comparative yields and valuations substantiate Bolton's (1972: 62) classification of the Woolgar as a 'small man's field' as opposed to the later harsher classification by Philipp (1987) and Lawrence's (1995; 1997: 5) studies of Victorian fields as a 'poor man's diggings.'

The Lower Woolgar’s industrial archaeology and technological commentaries
Not long after the discovery of gold, an area in this lower region became the official surveyed neighbourhood of the Woolgar, with the first mill site being established in
1881 when the Crapp brothers arrived and erected their stamp battery. The stamp's set-up seems to have only been geared for basic separation techniques in the Machine Area 94 originally set aside by Mine Warden Mowbray (Port Denison Times, 8th October 1881). Most of the industrial archaeological record is situated in this lower region with what was initially four other battery sites located along the eastern bank of the river within a 4 kms radius of the 40 nearby mines (see Figure 5:3).

The transition from alluvial mining to reef mining in the upper region of the Woolgar took place in 1882 with the opening of the Union Mine (see Denaro et al 2001: 20, 26). In 1883, Ludeman and Weber laid the foundation for a 10-head stamp battery, powered by a 24-horse power (HP) steam engine with two boilers, one Wheeler pan and two Berdan pans (eg. Appendix 7). This cost-effective American grinding invention, priced at £10 per unit (Maclaren 1901: 24) dates back to the Californian Gold Rush of 1848–52 and was for the most part a regular inclusion in the northern Queensland set-up (after Menghetti 1982: 8).

The Ludeman and Weber battery went into full operation in 1884 under the name of the Catherine Mill while Edmondson and McLean, the nominees for the renowned Burns Philp & Company of Townsville and leaseholders of the Soapspar mine (Denaro et al 2001: 26, 48), installed the 8-head Albion mill. The Albion broke down at the very start of operation and had to be returned to Townsville for repair via the railhead at Hughenden (Queensland Mines Department 1884: 37). The Catherine Mill, on the other hand, was considered by visiting Wardens as the best operation in the field, but only stayed for a relatively short period before being removed to the Croydon area in August 1887 (Denaro et al 2001: 46-7). By now, the Albion had been in full working order for at least two years, but three years later in 1890 moved to the Percy River. This left the Crapp Brothers' Pioneer mill as the only crushing facility on the field for the next ten years.

**Pioneer Mill 1881-1891**

The area along the eastern river bank marked by the discarded single phase steam engine (see Figure 6-22), dried white tailings and industrial artefact scatter was initially identified as the Machine Area 94 shown in Graphy's official survey laying out Lower Woolgar's MHLs (see Figures 5-10). The site was later featured in Mine Warden Saint-Smith's (1922: 95) report as the Crapp family's Pioneer Mill site, confirming its establishment in 1881 in Machine Area 94. With the aid of the historical record, it can
be seen as a palimpsest, with the Crapps' battery being the first on site and then followed by a succession of other mill operators discussed later. The Crapps' battery consisted of five stamps weighing 25 cwt (1270 kg), or 560 lbs (254 kg) per stamp powered by a ten HP boiler. This is assumed to have been a mobile compound boiler as no customary brick foundations for a stationary Cornish-type boiler were found on site. At the time, cited by Denaro et al (2001: 44), the visiting Warden Samwell considered the Pioneer Mill so poorly equipped that it probably lost more gold than the cost of milling.

Maclaren's (1901) study of north Queensland's milling practices together with a similar study by Johnson (1898) of New South Wales mills provide some insight into the finer workings of the Woolgar's batteries. The ability to comment on a battery's setup comes from Maclaren's (1901: 20) formula on how to synchronise the horsepower rating of the accompanied boiler and steam engine from his study of two batteries that averaged 975 lbs per stamp. Accordingly, a stamp dropping from a height of eight inches at 92.5 drops per minute would have required at least 1.72 effective HP per minute per head or 8.6 effective HP per five stamps per battery. Johnson's (1898 Section 12:5) comparable study of three batteries provided similar operating recommendations but added a resistance factor that took into account a loss of power due to drive belt friction. The other factors that could have affected the nominal HP output rating would have been such elements as climate, barometric pressure, pipe lagging and the state of repair of both boiler and engine.

With these considerations, including the lower averaged stamp weight per head used by Johnson considered to be more in line with the Woolgar mills, a 750 lbs stamp with an assumed 95 drops per minute from six inches would have required 1.17 or 5.85 effective HP per five heads. The Pioneer's boiler capacity of 10 HP would therefore seem to have been more than enough for an estimated 6 inch (15.24 cm) stamp drop at 95 strikes per minute. This may explain the agency that modified the battery's setup in 1883 to work on a smaller portable eight HP engine.

Therefore, based on both Maclaren (1901: 20) and Johnson's (1898 Section 6:12) calculations, a stamp battery's HP requirements are determined by the stamp's weight (W) times the height of the drop (H) times strikes per minute (N). Johnson's added friction factor (F) of one third of the total of W, H and N added to the sum then divided by the recognised one horsepower factor of 33,000 lb-ft./minute gives the effective
horsepower requirement for a five stamp battery's efficient operation. Accordingly, the formula for acquiring the necessary horsepower is set out as follows:

\[
\text{Optimum HP for 5 headed stamp Battery} = \left(\frac{WxHxN + F}{33000}\right) \times 5
\]

(Maclaren 1901: 20; Johnson 1898-Section 12: 5)

Although modified in 1883 the Crapp's renamed 'Invincible' mill continued with its primitive separation of letting the slurry flow over a blanket below the stamp's mortar box before being milled in a Berdan (cf Denaro et al 2001: 25). Other than citing visiting wardens' evaluations, the proficiency of the mill, without details of the height and size of the screening that regulate the splash from the mortar box (cf. Maclaren 1901: 24), the size of the granule in the slurry or how it was redirected to the Berdan pan is a matter of conjecture. Also not clear from the historical data is at what stage between the mortar box and the Berdan pan the amalgamation took place. The normal practice of creating an amalgam in the mortar box was considered bad practice and was later changed so that the amalgamation took place while the slurry flowed over the mercury spread on a copper amalgamation plate below the mortar box screen (Hardesty 2003: 90). Before retortion, the amalgam was fine ground again in a Berdan pan by drag weights or stones attached by chains to the supporting frame of the pan.

In comparison, the separation technology being used at Charters Towers had advanced and eventually became the benchmark for best practice in North Queensland's gold recovery (Maclaren 1901: 10). This in effect meant that the 1895 Woolgar Mills' battery set-up was the same as the bare essential technology of 1872 that relied upon a blanket or at best an amalgamation plate after the stamp (see Figures 6-3 through to 6).

The only advanced technology being used on the Woolgar after the stamps during the closing period of the 19th century was the Berdan grinder. Notably, by 1886 the Charters Towers workflows had dispensed with the blanket and modified the amalgamation plate to include two inlaid shallow lateral mercury wells to improve the continual amalgamation after the mortar box (see Figure 6-6). The separation process was also modified with the addition of a Brown and Stanfield concentrator, followed by grinding with a Wheeler pan and then a final grinding in a Berdan pan before
completing the gold recovery process in a chlorination plant. Instead, the Crapps’ separation procedures at Woolgar, criticised in the early days of the field by Warden Samwell (cited by Denaro et al 2001: 44) were still in use some 14 years later when Warden Haldane visited the field in 1894 ([1895]1932: 386). By 1901, further modifications were seen in the Charters Tower workflow (Figure 6-5) that placed an extra Brown Stanfield concentrator towards the end of the procedure before sending the remaining sludge and sand to a cyanide plant.

Figure 6—3: Menghetti’s (1982: 26) separation work flowsheets 1872-1878

Figure 6—4: Menghetti’s (1982: 27) separation work flowsheets 1886
In considering both the opinions of Kirkman (1980: 132) and Wegner (1980: 88) it seems that the workflows of the majority of other northern Queensland goldfields' were not as outdated as that of the Woolgar's separation setups. Apart from the classification of 'a small man's field', the Woolgar's minimalist separation techniques are considered from an agency's worldview as similar to the Cornish methods that were instrumental in bringing about the diaspora of the mid to late 19th Century. During this period the Cornish tin industry was particularly hampered by technological shortcomings, increased production from traditional Malaya and non-traditional exporters such as Bolivia and later Australia, that added production to an already depressed world tin market (after Barton 1967: 154-94: Taylor 2003:57-9, 78-9). Numerous Cornish mines were unable to compete in such adverse market conditions due to the high production cost caused by antiquated or inadequate dressing methods, especially with increasingly marginal tin ores. In short, the result of the ensuing systematic mine closures was a mass migration of mining communities seeking alternative overseas employment wherever there was a mining opportunity (passim Barton 1967 154-94).
the Cornish are steeped in a long mining tradition dating back two millennia in which they mined gold, silver, copper, lead, zinc, and even iron as seen in the Romano-Cornish workings at the Killigrew Round, Falmouth (cf. Bayley et al 2008: 5, 11). However, the Cornish tin industry did partially recover with greatly improved separation techniques in the rising market of the 1900s but never fully regained its former standing (Taylor 2001: 78).

During discussions with Frank Crapp about his family's history, it transpired that the Crapp family were part of the Cornish diaspora arriving in Australia in the late 1860s. The apparent unwillingness to invest in improving the separation methodology being used in the family's various stamp batteries is seen as the reason for the continued use of inadequate Cornish separation techniques. According to one of Frank's throw away comments, Crapp senior left the Woolgar soon after the termination of the family's cattle venture to try his hand in the Gordonvale sugarcane fields on the outskirts of Cairns. Evidently, Frank was burdened with the outdated Cornish mining logic as seen in his later milling set-ups at Middle Camp. The antiquated Cornish milling practice may well have also influenced the mindset of the other earlier small millers on the Woolgar until the arrival of the Mowbray Gold Mining Company towards the end of the 19th century.

**The Mowbray Gold Mining Company Limited mill site 1899-1906**

Following the removal of the Crapps' Invincible Mill to the Middle Camp area in 1891 (Denaro et al 2001: 48) the machine area lay vacant until a lease was taken up in 1899 by the Mowbray Gold Mining Company Limited (MGMC). Initially, the company was concerned with the ore from the Mowbray mine, which later included the nearby Ironclad mine (Saint-Smith 1922: 95), (see Figure 5-2). The financial background of MGMC was that it was registered on the Charters Towers' Stock Exchange in 1900 with a 20,000-share issue at a nominal value of £2,500 and a paid up capital of £2,041: 13: 4d. The following year the capitalisation increased to £5,000 with a subscribed capital of £3,125 that remained unchanged until the battery was removed in 1906 (Denaro et al 2001: 28, 52-3). All attempts to locate any further company records, such as mill records, financial returns or Register of Directors in any of the mining archival records held at any of the State Archives; the Excelsior Library in Charters Towers; James Cook University's North Queensland Collection, Townsville; or the Royal Historical Society, Brisbane, proved unsuccessful.
In 1899 the company installed a 10-head stamp battery on MA 94 weighing 80 cwts, 896 lbs per stamp (4064 kilos), driven by a 14-HP steam engine and boiler that had been acquired from the Croydon district (Denaro et al 2001: 52). In comparison with the other batteries operating in the field at the time, this could be considered the most effective set-up on the field since the Catherine Mill was installed by Ludeman and Webber in 1884 near the Union mine at Middle Camp. One of the few perceived critiques of the MGMC battery set-up was the inclusion of the simple but cost-effective Berdan pans that were found incapable of creating enough clean gold surfaces from the mundic ores to enable an efficient amalgamation process (cf. Menghetti 1982: 6). Accordingly, the two Berdan pans in the MGMC separation configuration were also found wanting in effectively grinding the refractory ores once the Mowbray mine reached deeper levels (Denaro et al 2001: 53). This realisation quickly led to an improved advanced separation technique being brought into the Mowbray mill's setup.

Besides clean surfaces it was also becoming essential to produce even-sized grains classified by an inverted pyramid 'spitzkasten' classifier (see Lock 1890: 346), the improved American classifier technology that had arrived in north Queensland around 1900 (cf Maclaren 1901: 24). Furthermore, belt concentrators, or vanning tables, such as the Frue and Luhrig vanners were by then being phased-out by the Wilfley table. The Frue vanner was a 19th century Canadian advancement (see Othick 1987) on the earlier simple Chinese cloth separation technique that was first used on Australian fields in 1855 (see Johnson 1898: section 7: 13). Accordingly, by 1901, some of the old separation technologies were replaced by the more efficient and cost effective American Wilfley table (cf Lees 1907: 12-4) which had established a favourable reputation in a number of north Queensland mills. Instead of blankets, grinders and concentrators such as the Watson-Denny and Brown and Stanford and the subsequent fine grinding by either a Wheeler or Berdan pans, the Wilfley was being used as a primary concentrator in such mining areas as Mount Leyshon and the Donnybrook mine at Ravenswood (after Maclaren 1901: 24-5). From the point of view of this dissertation's premiss, the intention of the MGMC to improve its recovery process by adding the Wilfley table to its workflow so soon after its introduction to Australia significantly challenges Todd (1995) and Wegner's (1995) theories of under-financed mining technology in Queensland's remote mining areas. Furthermore, the Company's agency also calls into question Hardesty's (2003: 89) argument that only moderate size mining companies
were prepared to take on the risks of new mining technology, whereas larger companies did not take risks with new untried equipment and the smaller companies like MGMC were unable to do so because of the lack of capital.

Such a major development in ore separation technology brings to mind Basalla’s (1988: 17-24) Neo-Darwinian theory that there is rarely an ‘heroic view’ in progressive technology with an instant invention but instead an historical synthesis of ideas encouraged or fostered by social interaction (cf Dobres 2000: 149-57). The development of the Wilfley is a prime example. The belt vanners worked in a way that separated the ore with a contra-flow of water or, in other words the water moves in the opposite direction to the belt carrying the ore. Though the Wilfley Table (see Figure 6-7) also uses water to process the ore, the fundamental difference is the continually shaking technique that brings about a more efficient separation (see working example of Wilfley Table CD 4).

![Figure 6—7: Example of a Wilfley table (Burt, 1982)](image)

The contra flow of water in the vanner process had the tendency to clog the process whereas the vibrations of a slightly tilted corrugated table top and the constant gentle downward flow of water separates the pulverised ore from the gangue according to the specific gravity. Ritchie and Hook's (1997: 25) description of the Wilfley as a basic shaking table, 'invented' by Rittinger in 1844 and developed later by Wilfley is somewhat ambiguous. In fact, although Arthur Redman Wilfley finished his modification in 1896 and achieved subsequent rapid commercial success, it took the
next 13 years of patent litigation to successfully attain the sole copyright (Trescott 1983: 536). The addition of the Wilfley into Queensland mining workflows seems to have taken a surprisingly short time as, according to Maclaren (1901: 24), the table was being used at the Scottish Gympie Mill near what is today the Sunshine Coast well before its 1901 introduction to the mills of northern Queensland.

In spite of Maclaren's (ibid), comments on Queensland's ready acceptance of innovation, the Wilfley table, according to Menghetti (1982: 29) did not become part of the Charters Tower workflow until after 1917 (see Figure 6-6). This could well be a typographical error, but it is worthy of note that despite the comparatively limited gold production, a Woolgar operator did use a Wilfley apparently some 16 years before Charters Towers, the acclaimed benchmark for north Queensland gold mining (after Maclaren 1901: 24; Menghetti 1980: 1). Though it is not clear at what date the Mowbray Gold Mining Company actually added the Wilfley Table to their battery set-up, there is mention of an abandoned Wilfley in relation to the next tenant on the old MGMC battery site, the Peter Pan Battery (Denaro et al 2001: 29-30).

It is noteworthy during this period of northern Queensland's rapid acceptance of technological diffusion that Menghetti's (see Figure 6-5 1982: 28) study of Charters Towers' mills does not show much mechanical innovation until 1917 (see Figure 6-6). The inclusion of rock breakers and grizzlies in the workflow to supply the stamp's self-feeding bins is seen as preparation for the later successive chemical separation technique of using the chlorination process. This new process required the crushed ore to undergo further reduction in the mortar box so that the resultant slurry could pass through a 200 mesh size filter. Thereafter additional intense grinding was called for by the usual Wheeler and Berdan sequence in readiness for the circular Brown and Stanfield's concentration and eventual percolation in cyanide vats as shown in Figure 6-6. The cyanide method of leaching, first used in Australia in 1892, replaced the chlorination process and became increasingly popular after the expiration of the copyrights in 1897 (Ritchie et al 1997: 19).

**Mowbray Mine 1882-1935**

The route from the MGMC's mill site at MA94 initially follows a north easterly direction away from the river to pass a discarded Barrows mobile colonial steam engine No. 2381 (cf. Powerhouse Museum 2006), manufactured in Banbury, England (see Figure 5-7). The Barrows engine supposedly marked the goldfield's first settlement
(Denaro et al 2001: 34), which may also explain the extensive washouts and land erosion in this part of the Woolgar (see Figures 5-9 and 12). Some 1.5kms further, the track turned to the south towards the two lines of reefs east of the settlement area (see Figure 5-3).

The first indications of the reefs are the mullocks from the Brilliant and John Bull mines ahead of the Mowbray's larger spoil dump (see Figure 6-8). The Port Denison Times (13th August 1881), which fortunately replaces the DoM lost data, provides details of Mining Warden Mowbray's "laying off" of the first claims outside the Lower Woolgar settlement on 21st July 1881. The first claim on the Mowbray mine was by Doyle and Critchley who obviously named it after the Warden. The next two claims laid off to the south of the Mowbray were for the American Frank Lucas's "Live Yankee" and Armour's "John Bright". Also in the same cluster, the "Spinifex" was the claim of Tracy and Blake (ibid).

Figure 6—8: The Mowbray mine's mullock heap with drystone retaining wall (photo Taylor 2005)
Though the slight inclined area around the Mowbray mine showed signs of the top layer of earth having been skimmed (see Figure 6-9), apparently producing 118 troy ounces.
and 17 dwt of gold (after Haldane [1895]1932: 387), a reasonable surface archaeological record was still visible closer to the mine shafts. The earthen loading ramp on the eastern extremes of the mine site seems to indicate that a more recent second skimming took place (see Figure 6-10).

Figure 6—11: The Mowbray Mine site map (drawn by Taylor 2005)

Figure 6—12: No.1 drystone forge with metalwork remnants (photo Taylor 2005)
Figure 6—13: No. 2 drystone forge (photo Taylor 2005)

Figure 6—14: No. 3 drystone forge (photo Taylor 2005)
The area around the mine shafts, all of which have now caved in, have- strategically placed - the remains of three drystone forges that either denote the Mowbray's various leaseholders or specialised metalwork carried out in that specific area of the mine site (see Figure 6-12). The forge east of the main shaft's mullocks alongside the supposed building foundation is the only one showing signs of having been used (see Figure 6: 12). The clinker and metal fragments on the surface of the forge's earthen core would seem to be of a relatively contemporary nature whereas the other two forge remnants, one alongside the shallow diggings to the south (see Figure 6-13) and the third and last forge to the west of Mowbray's main shaft (see Figure 6-14) would seem unused.

However, in view of the forge locations close to the various mine shafts it would seem a reasonable assumption that such structures were intended for the associated miners to re-sharpen their picks. This agency process involves annealing, the heating of the pick's steel head to attain ductility so as to re-sharpen the pick by hammering towards the point before quenching and tempering. The quenching process with cold water takes place quickly after reshaping or renewing the heated pick's point, which is then tempered by placing it in the earthen core of the forge to cool. Depending on the quality of the steel used to make the pick, the initial quenching may require an oil bath instead of water to avoid brittleness at the pick's point (cf Smith et al 2006: 289). Searches for substantiating hammer flakes in areas around the various forges sites proved unproductive, undoubtedly due to the Woolgar's past history of heavy rain falls.
The two prominent low drystone walls or foundations to the approaches to the main shafts' mullock dumps are seen as the remains of a building’s foundation housing the steam powered double winding and pump gear (see Figure 6-15) that had been installed by the MGMC in 1899. It is assumed the steam power was provided by the abandoned 8 HP Barrow engine seen on the way to the mine site (see Figure 5-7). Prior to Mowbray’s mine shaft reaching the deeper level of 262~ft or 80 metres horse-powered whims were used at the mine from 1884 (Denaro et al 2001: 22-3). The resulting mullock heaps surrounding the various mine shafts and a series of drystone retaining walls within the mullock heaps could be seen as some form of platform for the winding gear (see Figure 6-15). Part of this, a double winding drum, was discarded between the base of the mullocks and the shed foundations (see Figure 6-11 and 17).
Figure 6—16: Possible platform for winding gear on top of mullocks (photo Taylor 2005)

Figure 6—17: Mowbray mine discarded double winding drum (photo Taylor 2005)
The State archival records of Mowbray's leaseholders are scant and at times confusing when compared with Denaro (2001: 55-6). Apart from those miners mentioned below, there were no archival records available of other claimants working the Mowbray, though Denaro (2001: 55) states that the mine was in the hands of six tributers by the end of 1903 and a new syndication of eight men in 1905. Such a statement corrects or contradicts the visiting Mining Warden Saint-Smith report (1922: 95) that the Mowbray mine was only worked by the MGMC from 1902.

Furthermore, the QSA record reference: MWO 14B/36 1899-1909 -15th January 1902, page 55/16-Mine Leases of the Mowbray PC Extended, 600'x400' makes no mention of the mine lease being held by tributers, and therefore it would seem reasonable to consider those named below as being the syndicate that recapitalised the company in 1902.

Rudolph Lenfeld (Miners Right No: 40440) 1/6 dated 16th January 1902
Kenny Lenfeld (Miners Right No: 40439) 1/6 dated 16th January 1902
Fred Rahenehen (Miners Right No: 40442) 1/6 dated 16th January 1902
Chas Rahenehen (Miners Right No: 40441) 1/6 dated 16th January 1902
Simon Veal (Miners Right No: 40432) 1/6 dated 15th January 1902
Herbert Veal (Miners Right No: 40432) 1/6 dated 15th January 1902.

The earlier comprehensive field report on the Woolgar mines by Haldane ([1895]1932: 387) records the seven individual mines of the Mowbray reef with depth and yield, but omits to identify any of the miners associated with the claims.

The Mowbray's Reward or Prospecting Claim has two shafts, one measuring 70 feet (21.336m) deep and the other 100ft (30.48m) deep that gave a combined yield of 1,017 troy ounces (t-oz) at £3:12:6d per oz, as given by Saint-Smith (1922: 96) or £3.625 per t-oz to give a value of £3,686:12:6d. Interestingly, the gold price on the Woolgar was 4/6d cheaper per t-oz than the standard field price of £3:17s:0d fixed by the ad hoc agreement between the Banks of Australasia, New South Wales and the Queensland National (Bolton 1972: 58). The other mine yields were as follows:

The Mowbray mine's No.1 shaft went to a 80ft depth before reaching the water level yielding 296 t-oz 12 pennyweight (n.b. 24 dwt = 1 troy ounce) valued at £1,074:16:1½d
The No.2 mine has two shafts – one 70ft, the other 80ft deep yielding a total 529 t-oz 14 dwt valued at £1,919:14: 4¾d.

The deeper No.3 mine's shaft went to about 150ft deep yielding 1762 t-oz 10 dwt value £6,388:15:1½d.

In comparison, the No.4 mine shaft's depth went to about 160ft deep, but the last 70ft of the mine shaft became waterlogged, apparently covering some abandoned mining equipment left in one of the underground drives. The yield up to the point of flooding was 985 t-oz 6 dwt valued at £3,571:10: 4d.

The last in the Mowbray's series of mines was the No.5 shaft, which according to Haldane (ibid) was relatively shallow with 'only a depth of some 50 ft'. The yield from this mine was given as 97 oz 4dwt and valued at £352: 4s: 3½d. Haldane (ibid) makes the comment that due to the relative shallowness of the No. 5 shaft it was probably worked by a 'hatter', a lone miner impervious to the hazards of mining single-handed in a frontier situation or one that had been afflicted by past mercury fumes in the amalgamation process (pers. comm. Wegner September 2005).

In the conclusion of Haldane's ([1895]1932: 387) report, the total yield from the Mowbray mines up to 1888 were 4688 t-oz 14dwt; valued at the Woolgar's field price for gold of £3:12:6d amounts to £16,996:2:3d.

Fortuitously, the Crapps' store Sales Ledger supplements the Mowbray's earlier mining record given by Haldane (ibid) with sales entries in their Day Book for explosives sold to the various Mowbray mines or miners during the 1885-1888 periods. The itemised sales of gunpowder, fuses and sticks of dynamite are given below:

Mowbray No.1 Mine: The Doyle party purchased over the period of January 1887 to January 1888, 42 pounds (lbs) gunpowder, 3 boxes of dynamite sticks and 15 packets (pkts) of fuses.

Mowbray No.2 Mine: Louie Kowalski bought during the period May 1887 to December 1888, 20 lbs of gunpowder and 18 pkts of fuses.

Mowbray No.3 Mine made purchases during May-August 1885 of 24 lbs of gunpowder and 14 pkts of fuses.
Mowbray No.5 Mine: Donaldson and Brown (who would appear to be the miners after the lone miner) made purchases in May 1887 to January 1888 to increase the depth of the mine to 50ft with 16.5 lbs of gunpowder and 29 pkts of fuses.

According to Haldane's list (see [1895]1932: 387), most of the Mowbray mines date from 1882 with the exception of the No.1 mine that opened later in 1886. Haldane's (ibid) allegation that the shallowness of No.5's mine shaft is probably due to the mine being worked by a lone miner is not substantiated by the Crapps' sales ledger. For a lone miner to have sunk a shaft to 50ft, and lifted some 91.5 tons of rock to the surface singlehanded, as well as getting in and out of the mine would have been extraordinarily difficult. The purchases made by Donaldson and Brown recorded in the Crapps' ledger would seem to substantiate them as the miners of No. 5 mine who deepened the shaft. Also, of note is that Haldane's 1895 comments about the Donaldson and Brown's mine were made after the 1888 purchases at the Crapps' store strongly suggesting his comment was a result of a faulty memory.

Nevertheless, the total yield of 5369 t-oz for the Mowbray mines as at 1935 compared with that reported by Haldane in the above was 4688 oz 14dwt, certainly verifying Saint-Smith's (1922: 95) statement that the early miners had the richer returns. But Saint-Smith's added rider (ibid) casts doubt on the MGMC's stay at the Woolgar after 1902 whereas Denaro (2001: 28) infers that the Company did not leave the field until 4 years later in 1906.

Furthermore, the study of the Woolgar's official yields (see Denaro et al 2001: 15-21) shows a marked decline in the Mowbray and, significantly the other Woolgar mines from 1905 onwards with annual nil returns until 1914-6 when the production for the three years only totalled 171.685 t-ozs. Apart from the 1922 production of 156.25 t-ozs and 19.29 t-ozs in 1929, the Woolgar was virtually a moribund goldfield for the 14 years of 1917-1931. Even Denaro's so called revival period during the Depression was a time of lean pickings, the eight years to 1939 producing only 490.94 t-ozs valued at say, £1,780 to be shared amongst 40 or so miners seeking the customary financial independence during such hard times (after Denaro et al 2001: 16, 62).

The final phase of the Woolgar's study period: the Great Depression

The generalised effects of the Great Depression have already been covered in Chapter Four while Costar (1981a; 1981b) provides more in-depth detail of the political
background to Queensland's Relief Programmes that became available to the unemployed at the time. Dissimilar to other States, Queensland's economy was primarily based on an extensive sugar industry that not only supplied the rest of the country but was also an exporter of surpluses, so that most of the unemployed came from the State's relatively smaller manufacturing sector and mining industry. Though mining was an important contributor to the State's economy, by the beginning of the 1930s there was a serious global reduction in demand for base metals reducing both mining and allied industries employment possibilities so that that by 1931 Queensland's jobless rose to 30 percent of its workforce (cf. Costar 1981a: 162).

Unfortunately, Queensland's exemplary contributory Unemployment Relief Scheme that came into existence during 1923 to deal primarily with seasonal joblessness could not cope with the 1930s surge of redundancies. Compulsory contributions to the scheme's membership were made by an income tax deduction of 3d in the £1 that entitled members to 15 weeks of unemployment relief provided their membership had been ongoing for the preceding six months. During the second quarter of 1930, the World Depression really took hold in Queensland causing increased unemployment resulting in the Government revising the Unemployment Relief Scheme. Accordingly, the funds of the Unemployment Relief Scheme and a similar government insurance provision were used to create four major unemployment relief schemes known as the Unemployment Insurance scheme, Ordinary Relief Work, Intermittent Relief Work and an outdoor relief system (cf. Costar 1981a: 162-3). In practical terms, the outdoor relief structure provided rations to men and women unable to perform manual work (ibid). The financial strain of these various relief schemes on the State's coffers caused an increase in the Unemployment Relief Scheme's contribution to sixpence in the pound from incomes over £104 per annum while the benefit period was reduced to 13 weeks (Costar 1981b: 184-9). Though Costar (1981a: 163) explains that there were four major types of relief for the unemployed he only provided two rates of entitlement which are summarised as follows. The unemployment relief was paid at the rate of £2: 10s per 48-hour week for single men plus an allowance of 10/- for married men. Under the Intermittent Relief scheme, payments were made for a single men engaged in Public Works at the rate of 11/- per day for days worked per week. On the same basis, married men were due 17/- for one and a half days work and families with one child received an allowance of 21/6d for two days work per week. The scheme's family, relief continued
with irregular increments according to the days worked and the number of children in
the family with a final provision for a family with eight children totalling 44/- or £2: 4s
for four days work (see Costar 1981a: 164).

It is not clear what provisions were available for the self employed like the independent
miners, especially since the State did not pay dole or encourage camps for the
unemployed, which was considered the cause of sizable itinerant groups of unfortunates
searching the State for work. The possibility of work in Queensland's distant townships
often meant the unemployed took an unauthorized advantage of the State's train service
or even stowed away on costal shipping (after Costar 1981b: 282). Such free rides were
facilitated by the narrow gauge railways that restricted the speed of the trains traversing
the State, providing the unemployed easy access to getting on or off moving trains. One
such party of redundant miners seeking work made the train journey to the mining
outpost of Mount Isa and on finding no work returned to Townsville by the same means
unhindered by the police, much to the displeasure of the railway authorities *(ibid)*.
Though the railway line passes through Richmond, the nearest town to the Woolgar, it is
perhaps coincidental that some 40 miners joined the few fossickers that had been
working the Woolgar since 1930 (after Denaro et al 2001: 61-2). Under the Queensland
Government's extended Prospectors Unemployed Relief Scheme being administered by
the DoM, such miners were entitled, provided they proved their proficiency in detecting
mineral ores, to a weekly relief ration allowance of £1 for a single miner and £2 for a
married man that when added to their winnings provided a reasonable income (after
Anonymous 1931a, 1931b).

The Great Depression continued until the beginning of WW11 in 1939 and as already
pointed out the Woolgar's official gold winnings up until this date were far from
impressive (Denaro et al 2001: 62, 69-70). Probably because of the notable shrinkage
in winnings, Denaro (2001: 66) makes a point of highlighting 1935's production, despite
the drought, as the best yield since 1909 yet according to the actual mining records (see
Denaro et al 2001: 16), 1935 was a barren year! In fact so was 1909 which was among
the eight non productive years from 1906 to 1914; 1905's production of 626 t ozs 6dwt
was the best gold production since 1887 whereas the best yield in the Depression years
was 1936 with 231 t ozs 19dwt *(ibid)*. Perchance these spasmodic spurts in production
were the result of the mining equipment being leased by the DoM to the presumably
newly formed Woolgar Miners' and Prospectors' Association (WMPA). The mining
equipment on lease to the WMPA in 1933 was a three head stamp battery fully equipped and ready for milling (see Denaro et al 2001: 62-3). Notable items amongst the list of leased equipment were a vertical boiler, one driving spur wheel, various pumps, fuel and lubricating oils. In addition there were gold recovering items of an amalgamation table with copper plates and quicksilver wells, 20 lbs (9.01 kilos) of mercury and 2 lbs (0.9072 kilo) of cyanide.

Whether or not the gold leaching procedure with cyanide ever reached the Woolgar in 1933 is very much a moot point. This information caused some concern for the health and safety of the research team because of the dangers of residual cyanide in the ground or the contamination of some of the Woolgar's water tables. During an earlier research project on another north Queensland mining site, the author had learnt of the sudden death of livestock while grazing on an old remote gold mining site (pers. comm. Colin Robinson, mining consultant geologist June 1999). Such concerns were only abated after much conferring with Dick Cribb, the current grazier; Arthur Barns, whose long-term home was a comparatively short distance from the Middle Park homestead; and Strategic, the current prospecting company. Each confirmed that there had been no unusual deaths of grazing stock in the recent past. Consequently, areas of already mentioned bleached white sand around the recognised gold processing sites were taken to be the result of the stamp battery and past flooding when river sand was being deposited in the vicinity. Further consolation was also taken from the omission in Denaro's (2001) mining history of cyanide vats being made available by the DoM or installed on the Woolgar before or after the Great Depression. While on the subject of possible toxicity of gold mining sites, mercury used in the amalgamation process is equally insidious in the longer term as well as its detrimental effects on the human mentality and nervous system. The effects can damage the brain and lead to serious physical and emotional disorders (after "Mercury" 2012).

The Peter Pan Battery 1934-1946
The ongoing industrial archaeological record on MA 94 (see Figure 6-21) is that of the last mill on the site, named the Peter Pan battery. According to the historical record, this was partially removed from the site in 1939 by Propsting and Crapp to a site in the Soapspar vicinity. The completion of the transfer was not carried out until 1946 by Lacey who set the mill up to service the mines in the Top Camp area (Denaro et al 2001: 72). Lacey was in fact the last operator of the battery previously owned by Kerr
and Bromley from Richmond (Dunne 1933a: 359). This partnership later became Bromley and Crapp and operated between 1934-38 to treat the ore from the Federal and Peter Pan mine leases (Denaro et al 2001: 64). Accordingly, the industrial archaeology of the site is seen as that of the Peter Pan mill later forfeited to the Queensland DoM in 1938 as settlement of unpaid dues. This situation was presumably partly exacerbated by competition from the more proficient Aurora, discussed later (see Denaro et al 2001: 31, 70-1). As an indication of the profitability of the Peter Pan mine contrary to the initial encouraging crushings reported by Dunne (1934: 139), the 29.58 t-oz from 80 tons was in fact the total production for the period 1933-4 (see Denaro et al 2001: 18).

**Peter Pan's technology**

Little reference is made to the site's technology by Dunne (1933a: 359) other than that the battery consisted of a second-hand 5-headed stamp purchased in 1933 from Mount Coolon, a region some 500 kms east of the Woolgar. There was no record as to whether the purchase included a boiler and engine or the operational state of the mill that subsequently had to be repaired or improved in 1935 (Denaro et al 2001: 30). The two 1935 photographs (see Figures 6-19 and 21) show the steam engine without belts which probably signifies that the battery was first set up or modified by aligning the steam engine with the stamp. However, it could also be due to the practice of removing the leather drive belts from machinery in case of overnight adverse weather effects. The compound engine's flue and flywheel can be seen clearly just off centre (see Figure 6-19) and reasonably relate to the mobile engine being placed on a north-south axis that corresponds with the recorded ash deposit in the site map (see Figure 6-18). There is the possibility inferred by Denaro (2001: 13) that the compound Overend boiler seen further upriver in Figure 6-28 is that seen in Figure 6-19. If this were the case then the smaller drive pulley opposite the compound's flywheel would have powered the stamp, leaving the flywheel to drive the ancillary pulley and cogs on the left side of the photograph.
Figure 6—18 The palimpsest site map of MA 94 that accommodated the Crapp family, MGMC, and lastly the Peter Pan battery owned by Kerr & Bromley and finally by Bromley & Crapp (drawn by Stone and Taylor 2006)
Also at the southern end or left side of the photograph (see Figure 6-19) are two sturdy angled supports and a crossbeam underneath the drive shaft that strongly suggest a frame for an inclined Berdan pan set so as to spill the unwanted gangue from the revolving slurry. The pan's angle was as such to slop the lighter material over the side while the gold amalgamate was being further ground by two internal attached drag stones at the bottom of the revolving pan. The power rotating the pan's spur wheel spindle, similar to those located on site earlier (see Figure 6-20) was via the spur linkage seen in the middle of drive shaft. Best practice would have had the pan rotating at 28-30 revolutions per minute while two drag stones, recommended to weigh 2½ cwt each (127~ kilos) finely ground the slurry (Maclaren 1901: 24).
Although the height of the Berdan's drive shaft and pulleys seem aligned to comply with common practice of using the compound boiler's flywheel as an ancillary power source for other mill machinery, such procedures again question whether the optimum recovery techniques were being adopted on the Woolgar. The historical data suggest otherwise, in that the agency of the Peter Pan questions if the Berdan's suggested revolutions were being maintained without disrupting the stamp battery's momentum. It would also seem that the counterproductive practice of a continuous throughput was being used instead of the policy of separate batch grindings advocated by Maclaren (ibid). Such a procedure often over-mills the amalgamation to a point of sickened or floury mercury that minimises the amount of retorted bullion (Johnson 1898: [Section 7] 2). It would also seem according to Maclaren's (1901: 22-3) comparative study that such a faulty procedure was being applied to most of the grinding appliances in the region. Furthermore, the same study found that the Berdan was a poor second to the Wheeler pan. Nevertheless, the Berdan was more popular amongst some of the northern Queensland operators inferring that the price factor was usually the first consideration rather than performance.
Figure 6—21: Western perspective of the Peter Pan battery 1935 (Denaro et al 2001: 30)

The second photograph (see Figure 6-19) of the Peter Pan site also taken in 1935 illustrates a modified westerly prospective showing further ore waiting to be milled. The figure in the foreground is presumably Bromley, the mill owner-operator with a newly installed elevated water tank that should have provided at least 4,200 gallons (19,100~litres) per 10 hour shift (cf. Dunne 1933a: 359). Apart from the addition of the water tank, there were also two unusual sturdy angled wooden stays attached to the top of the stamp's frame, presumably stabilising the stamp battery, which may explain why there was no foundation block found in the confines of the battery setup (see site drawing Figure 6-18). The question is, was there some form of battery foundation? This opens up conjecture regarding the foundation's weight and the force of the flood water that caused such displacement and the large washout further downstream depicted in Figures 5-9 and 11.
Figure 6—22 MA 94 abandoned single phased, non reversible steam engine (photo Taylor 2003)

Figure 6—23 MA 94 abandoned steam pipe linkage, plus engine bedding with lugs (photo Taylor 2003)
The same question applies to the abandoned single-phased steam engine (see Figure 6-22) recorded below the second stone configuration on the levee (see Figure 6-18). Furthermore, the implied close location to the water tank could be seen as being part of the pump setup to draw water from an assumed aquifer soak in the dry river bed. But the engine's distance from the compound boiler seriously questions such an interpretation in view of Maclaren (1901: 16-21) and Johnson's (1898-section12:5) formulae for effective steam power for a stamp battery. After comparison with other sites in the region, like the 'Old Mary' set up (see Figure 6-24) seen during a 2000 explorative field trip to the Palmer goldfield, the steam engine was probably configured with a stand-alone boiler that was possibly part of the MGMC's mill set up. Also noticeable in both photos was the lack of firewood to fuel the compound engine. Johnson's (1898: [section9] 2) generalised notation on the fuel consumption gives a consumption rate of 7 lbs of timber per 1 hour of horsepower. In all likelihood therefore, 56 lbs of timber being burnt every hour probably explains the comparative young regenerated growth of trees in the area.

Another issue for consideration regarding the industrial archaeological palimpsest of MA 94, was the two spur-wheels (see Figure 6-20) seen during the initial visit to the site.
that have since disappeared. These components could well have been either abandoned drive mechanisms from the MGMC's battery or related to the Peter Pan's modification. The removal from the site is seen as affirmation of cannibalisation or the generally accepted practice of operators on remote north Queensland battery sites of replacing easily broken machinery parts. In all likelihood, the spur wheels would have been substituted with simpler drive pulleys and belts as a safeguard against expensive transport costs and loss of production during the anticipated lengthy periods of repair. The other industrial archaeology on the site, such as the 8 cm diameter short piece of elbow angled pipe together with two lug bolts set in a concrete bed well away from what is seen as the Peter Pan site were considered abandoned remnants from previous battery setups.

The Remaining Industrial Sites in the Lower Woolgar
Unfortunately, unlike the site just discussed there is a divergence between the archaeology of the remaining sites along the eastern banks of the Woolgar and the history and maps provided by Denaro (2001). The map shown in Figure 6-25 provides the location of two abandoned batteries labelled 1 and 2 in the northerly area of the Lower Woolgar. The first, according to the map's scale is some three kms from the Peter Pan battery whilst the second site is just over a kilometre further north. The more detailed map provided in Figure 6-26 gives the first and second site as no more than 600 metres north of the Peter Pan battery in MA 94 while a third site, not shown in Figure 6-25 is some two kilometres further along the eastern riverbank. This third site, given as the DoM battery site in Figure 6-26 and no more than 250 metres from the main access road to the Middle Park station was not found during any of the research surveys. However, the three battery sites found in this northern vicinity of the Lower Woolgar provide suggested alternative ownership substantiated by the relevant archaeology.
No. 1 Battery site or an industrial scrapyard

The first survey of the Lower Woolgar following the eastern riverbank after Machine Area 94 was immediately drawn further upstream by the uncommon sight of a seemingly intact stamp battery accompanying by a compound steam engine. Consequently, the site was labelled No.1 Battery that stands on the relatively higher ground of the riverbank amidst patches of the white sand. The unexpected industrial archaeology consists of an abandoned dilapidated mobile but wheelless Overend Cornish type boiler, alongside an equally rundown well-weathered stamp battery No 138, manufactured by Walkers Limited. In a matter of metres to the east of the assumed battery setup, was an abandoned "Marshall and Sons of Gainsborough, England" mobile steam engine with two front wheels missing and with no apparent role in the site's work flow (see site map Figure 6: 27).

Figure 6—25: Noting Lower Woolgar goldfield's questionable battery sites (Denaro et al 2001: 8 revised by Taylor 2006)
Figure 6—26: The Aurora Battery site now seen as that noted with the numeral 3 (revised by Taylor 2006).
Eventually, despite a reasonable number of nearby industrial artefacts, the archaeology did not fully support this location as having been a working battery site. The area near the stamp's mortar box was devoid of dry tailings or signs of knapping. Also missing were indications of a water tank ever having been erected in the area that would have been essential for both the stamp and finer separation technology. The stamp's camshaft with a full complement of tappets in place was substantiated as a modern or refurbished battery by the discarded broken tappet on the ground near the leaning compound boiler. The broken tappet was an older broken screw-on type whereas those on the stamp battery's camshaft were affixed by a pinion (see Figure 6-29). The shallow irregular oblong pit below the lopsided stamp's mortar box may suggest the placement of an amalgamation table or even the effects of flooding in the area. The effect of surging flood water was seen in the displaced heavy makeshift dragstone for a Berdan that was found well away from any milling set-up in the area, which more than demonstrated the possible cause of the hollowed-out ground under the battery. Also, any archaeological
indication of the reconditioned Wilfley table inferred by Denaro (2001: 65) as being on this site was dismissed as unlikely.

Figure 6—28: Dilapidated Overend Cornish style boiler with the main flywheel removed and an abandoned relatively modern stamp battery tappet under the axle (photo Taylor 2004)

Figure 6—29: Fragment of screw-on tappet found in the scrapyard near abandoned stamp battery (photo Taylor 2005)
Further consideration of Denaro's (2001: 13, 30) more detailed map of the Lower Woolgar's historical sites (see Figure 6: 26) together with these later observations affirmed the initial suspicions that the No.1 Battery site was in fact a scrapyard made up from the Crapp, Mowbray and Peter Pan batteries.

Before moving on to the next site up river it was felt necessary to at least try to identify the owners of the discarded mining equipment left in the scrapyard. To this end MacClaren's formula for a stamp battery's HP requirements proved useful in deciding that the small mobile Marshall boiler was part of the Crapps' Identity battery that had been condemned by the machinery inspector in 1912 (after Saint-Smith 1922: 98). Also for consideration was that MGMC had installed a ten-headed battery in MA 94 that required at least 12 HP, inferring that the larger broken-down Overend compound boiler was probably owned by them and perhaps latter commandeered for the Peter Pan battery. The relatively modern tappets on the weather-beaten 5 head stamp were probably also part of the 1935 refurbishment carried out on the Peter Pan battery before going into production.

The dubious No. 2 Battery site
The already noted inconsistent commentaries by Denaro (2001: 28-30, 62) and misleading maps illustrated in Figures 6:25 and 26 strongly suggest differing site interpretations based on the archaeology of other battery sites in the northerly part of the Lower Woolgar. The questionable analyses arose from comparing the two battery sites in Figure 6:25 marked '1' and '2', which according to the map's scale puts this second battery site some 1.25 kms northwest of the scrapyard. The measurement taken at the time of the fieldwork gave the distance of this second battery site as only 200 > metres further north. Furthermore, the detailed map (see Figure 6: 26) shows the two questionable sites as being opposite the Middle Park homestead; whereas the location of the sites determined during the initial survey was on the northern side of a small creek flowing into the Woolgar River from its eastern bank and just north of the cattle yards on the opposite bank.
Figure 6—30: Originally seen as the No. 2 Battery, this site map is now considered that of the DoM battery site (drawn by Stone and Taylor 2007)

Moreover, the archaeological surface scatter on this second battery site (see Figure 6: 30) now seen in a plan view is more in keeping with the historical photograph of the
DoM battery as shown in Figure 6: 31, supposedly further up river. The corrugated galvanised round water tank in the photograph's background, apparently reinforced with an outer covering of cement, now lies shattered in a similar position on the ground (see Figure 6:32). Even the battery's right-angled set-up to the river correlates to the battery's east-west angle in the photograph. The pigsty fencing in the foreground of the photograph corresponds to the fallen heavy wooden slat configuration lying alongside the ore dressing remnants or knapping area in the site plan in Figure 6:30. In comparison with the other reconnoitred Woolgar battery sites the artefact scatter of this site is very extensive, perhaps indicating a latter-day installation surprisingly not badly affected by flooding. The rest of the surface scatter included large patches of bone white dry tailings, similar to the other industrial archaeology of this lower region.
The Aurora Battery 1936-42
The archaeological site in the Lower Camp area, previously known as Hut 3, has been re-identified as the Aurora Battery Site that was in operation from 1936 until 1942. Along with the other Depression sites on the eastern bank of the river there was a need to reassess Denaro's (2001: 30, 62) site evaluations due to inconsistencies with some of the archaeology found in the area.
The inability to find the third battery's location shown as notation 2 in Figure 6: 26 and the misleading caption of Denaro's Photo 12, (2001: 30) 'Battery site, Lower Camp' required serious reconsideration of the upper part of the Lower Woolgar's sites. Furthermore, Denaro's (2001: 62) site description of the DoM set-up and the distance of the Aurora battery from the associated mines created confusion whereas the new location is more in keeping with the distance from the Aurora mine (see notation 3 in Figure 6:26). Accordingly, the DoM 3-headed semi-portable battery made available to the WMPA during the Depression is now identified as the next battery site after the scrapyard site whilst the two-headed Aurora battery location is now considered to be the previous Hut 3's site that is some 200 metres from the river bank.
Figure 6—34: Different perspective of the now considered Aurora Battery taken from the north facing south to illustrate the effects of the drought seen during the first visit to the Woolgar during 2004 (Taylor 2003)
Figure 6—35: Site Map of Aurora battery’s archaeological record (drawn by Taylor 2007)
Figure 6—36: Flattened ship's tank-Aurora battery (photo Taylor 2005)
Chapter Six

The Aurora mine, which Higgins bought into in 1934 is situated in the second line of reefs to the east of the Woolgar settlement (see Figure 6: 26). The yield of only 450 ounces from 1174.70 tonnes over a 15 year period (Denaro et al 2001: 17) is seen as reason enough for the Aurora battery to concentrate on public milling. In effect, the battery became the main ore dressing mill on the field during the Depression and remained on site until 1942. The battery was also quite unique as it was capable of crushing 8.2 tonnes a day with only a two-headed stamp, each head weighing 1200 lbs (544~kg) and only requiring an estimated 7 HP to drive the stamps (after Denaro et al 2001: 66). By 1939, the mill's basic separation and amalgamation with a Berdan pan was improved with the addition of another unidentified concentration process, presumably without the need to increase the boiler's HP output (ibid).
The re-designated Aurora site is skirted by deep land erosion on three sides and can only be accessed from the road leading to the series of mines further east. Originally, the site was thought to be relatively recent living quarters due to the signs of domesticity within the posts outlining a possible hut site. The partial garden borders made with metal vesta boxes, an improvised oven from a small metal drum and part of a collapsed ship's tank (see Figure 6: 36) were more obvious than any industrial remains on the site (see Figure 6: 38). Surprisingly, the oven made from a tin canister covered in hardened mud, seemed to be unaffected by floods (see Figure 6: 37) although, during the time elapsed between two previous brief explorative visits to the site, the garden outline had disappeared as a result of the land erosion. Fortunately, two similar metal Vesta boxes found nearby were collected during the initial survey and have since been identified as Bell & Black London circa 1864 (Anson 1983: 135, see Figure 6: 38) suggesting the confusing *terminus post quem* of some 69 years.
The adjudged derelict domesticated ship's water tank amidst the light industrial scatter made up of a stamp cam and assorted iron bars around the Aurora battery site was confusing. The sight of a ship's water tank on historical remote mining sites is not that unusual for as often as not they were used as domestic water containers. However, in an industrial situation, as inferred by the Aurora's sparse archaeological surrounds, the adaptability of the tank with such a limited capacity could questionably provide enough water for the Aurora stamp battery. The water supply for a 5 headed stamp battery and separation appliance is said to be some 19,000 litres per day, but with the Aurora's smaller battery's requirement estimated to be some 7,600 litres a day this is well within the estimated 10,000 litres capacity of the ship's tank.

**Lost World**
To the best of the author's knowledge, the workings at Lost World Vein System are situated in Mining Lease EPM9599 (see as in Appendix 12), some 3 kilometres due east from the main mining sites along the lower Woolgar River. The area was not included in past official reports by DoM, but was featured by Digweed's (1991) in his geological Masters Degree. The area contains extensive alluvial workings with stone pitching, intermittent drystone walls and a series of channels that appeared to be associated with a nearby low density occupation site. Initially the site was considered as having been worked by Chinese alluvial miners who came from either the surrounding goldfields of Gilbert or Cape River. But the lack of palpable supporting cultural material in the surrounding area and the subsequent information offered by Arthur Barns was that the area had been worked by the two miners, Glenwright and Guest, during the 1930's Depression. They were thus the more likely originators of the low density surface scatter. According to Arthur, the area was worked by both miners before enlisting in the army at the beginning of the Second World War. Only Guest returned to the field after the War and worked with 'the Barns', presumably Arthur and Roger, on the New Austral seam close to the Soapspar claim; Glenwright has never been heard of since (after Denaro *et al* 2001: 75-6).

**Alluvial Site description**
The topography of Lost World, sectioned by Digweed (1991: 23) as Zone 2 (see Figure 6: 41), was described as of a breccia nature with mainly savannah eucalypt woodlands and a thick undergrowth of spinifex covering the slopes of the vein system and valley floor (see Figure 6: 39). The alluvial mining's archaeology was the stone pitching in a
gully near the top of the vein system (see Figure 6-42), 420 metres above sea level (ASL) directly below what seemed an old drilling pad and the converging point of a crosscut bearing 150 and 300 degrees respectively. The worked gully continues down the slope for 280 metres to a level of 406 metres ASL with a mixture of drystone walling and random pitching (see Figure 6: 43) that in itself is indicative of a variety of alluvial miners and fossickers having worked the gully. The depth of the workings varies from 18 centimetres to 2 metres with a range of widths from 1.5 to 4 metres. It is likely, however, that some of the upper wider parts of the gully could-be subsequent 'washouts' or erosion caused by track clearance for closer vehicle access to the gully.

Figure 6—39: View of Lost World gully and surrounding landscape (photo Wallis 2004)
The general 90° downward direction of the gully veered some 25 degrees northwards for a short distance before returning to its original descending course. The downward flow of water must have been eventually interrupted at the flatter level by a distinct short right-angled drystone wall halfway across the gully (see Figure 6-43). On the other or eastern side of the wall is a small but not immediately obvious system of channelling (see Figure 6-44) covered by patchy spinifex and grass, and silting over the years from rainy season water-flow. Within the processing area is evidence of knapping, which in places is in close proximity to four separate channel configurations. These are confined by natural banking on one side and an intermittent low drystone walling that follows the inner bank of a natural watercourse to eventually join one of the many tributaries in the area of Sandy Creek.
It is feasible that the channelling and walling in the processing area at the base of the worked gully were designed to create some form of centrifugal swirl through parts of
the curved channelling so as to take advantage of the gold's specific gravity. During the washing process, the alluvial winnings would gravitate towards the centre of the swirl while the lighter unwanted matter, the gangue, was washed away on the outer current. However, this theory was somewhat undermined by the gap between the right-angled drystone wall and the other side of the dam that would have required some form of sluice gate to create race through a sluice box before being diverted to the channel system (eg. Ritchie et al 1997: 6-7). Consultation with Arthur Barns affirmed the specific gravity theory but surprisingly he was unable to shed any light on the design or purpose of this part of the alluvial workings at the bottom of the slope in spite of having worked with Guest on the Astral claim and having also fossicked the gully himself in the past.

**Lost World miners camp site**

Bearing 78° from the end of the processing area and approximately 60 metres across Sandy Creek is a raised area of some 1350 m² virtually clear of spinifex with evidence of occupation in the form of a light surface artefact scatter as annotated in Table (1) that corresponds with the site map's numerical references (see Figure 6:42). Apart from the relatively light scattering of mainly white glass intermingled with green and blue shards the rest of the limited cultural material relates to mining (see Appendix 13). Together with the ubiquitous steel inlay from the heel of a work-boot found on most historical mining sites, there was a well-worn gad and hand-held rock percussion steel drill that lay amongst the various glass fragments near the fireplace perhaps used for feathering rocks. The stamp-shoe close to the flagstones and light workings suggests a Dolly stamp having been used in the area to treat or test ore bearing quartz.
Figure 6—44: Lost World's processing area (drawn by Taylor 2005)

Figure 6—45: Lost World alluvial miners' camp site (Taylor 2005)
The flagstone configuration some 8 metres south of the fireplace was in all probability the accommodation area with a smattering of datable artefacts to give a *terminus post quem* supporting Arthur Barn's comments that the site was worked by Glenwright and Guest during the Depression of the 1930s through to the beginning of WW11. The white glass in particular gave a date nearest to the Depression, as it had not been 'zapped' by sunlight. Australian white glass manufactured before WW1 contained imported German magnesium and dependent upon the proportion in the glass makeup ionised to various shades of amethyst when exposed to ultraviolet sunrays. The Australian white glass formula after 1915 had replaced the magnesium with selenium oxide that is unaffected when exposed to sunlight (Thornton 2001). Other glass in the area, such as half a blue cobalt bottle, recognised as a castor oil bottle embossed with 'Jessop London', has a provenance of 1890 and later (*ibid*) and could still have been in production well into the 20th century. As for the rest of the scattered blue glass shards, seen as smashed apothecary bottles, these are perhaps indicative of a comparatively poorly balanced Occidental diet. The site, as with the rest of the industrial sites on the Woolgar, gave little archaeological supporting evidence of dietary habits, no doubt due the severe flooding.

**Lost World Summarised**

The archaeological signatures of Lost World initially defied an assured phenomenological assessment of the agency interwoven into this particular isolated landscape. The Lost World's gold deposits are definitely established by Strategic's subterranean survey of the area (as in Appendix 12) and so any alluvial mining in the gully would certainly have been rewarded. The limited drystone walling in the upper region has a resemblance to Chinese workings seen on other sites, as does the stone channel configurations after the possible dam wall at the base of the gully. Additionally, the limited amount of neat stone working near the top of the gully could be indicative of the length of the Chinese presence in the area that either moved on because the area had been temporarily worked-out or because of possible racial tensions. Overall, an early Chinese presence on Lost World cannot be discounted, bearing in mind Mrs Barns' collection of Chinese artefacts and Denaro's (eg. 2001: 45) mention of racial tension in 1885.

The white glass fragments at the campsite with the *terminus post quem* of 1915 are probably the only substantiation of the Lost World being a later Depression site. The
scant official alluvial mining returns for the Depression period plus stone pitching on
top of the drystone walling imply an undisclosed cash nexus underscoring Barrett's
(2000: 27) interpretation of agency as in this case a corporate body's expedient response
to the 1930's Depression. However, the agency of the site is still not absolutely clear.
The questions that remain will probably never be fully answered as the Lost World is
destined to be opencast mined at sometime in the not-too-distant future.

The Summary of the Industrial Archaeology of the Lower Woolgar
The scant material remains left by a cultural mix of miners on the south-eastern side of
the Gregory Range most certainly challenges a variety of written records and more
particularly Noël hume's [sic] (1964) proclamation 'that Archaeology is the hand maiden
of History'. This pronouncement is often questioned, as History is considered
subjective and influenced by many silenced facets such as demonstrated by Denaro et al
(2001). Dobres et al (1999:1-3; Dobres 2000:5-6) alternatively see Archaeology, as did
Childe (1956:1) many years previously, as the concrete expression and embodiment of
human thought and ideas. Accordingly, technology should also be seen as humankind's
subjective imprint of dasein, praxis and habitus subsumed as Giddens' double
hermeneutics that has traced the effects of agency throughout the Woolgar.

The two sites that bridge the gap between theory and practice (see Palmer 2005: 60-1)
are the palimpsests of Machine Area 94 and Lost World that highlight Johnson's (1989)
view of both public and private agency as opposed to Barrett's (1994: 5) opinion that
agency disseminates from governmental policy alone. Other faint complexities of
agency with its subset of doxa's stasis are understood in terms of the Crapps' relocation
from MA94 and the downsizing modification to their Pioneer/Identity mill setup
without improving the separation technology. Conversely, MGMC's innovative
inclusion of the Wilfley table not only highlights Basalla's (1988: 24-5) non-heroic
invention theory but also interlocks with the knock-on effects of social capital. The
recession sites of the Peter Pan and Aurora batteries together with the Lost World
alluvial mining site are seen as examples of governmental agency as are the possible
dangers signalled by dry white tailings seen at the identified Depression sites in the
Lower Woolgar.

However, what begs the question is the MGMC's profitability on such poor returns from
the Mowbray mine. Comparing the mine's production of 1887 with the total yield in
1935 - the last year of production totals - only 680 oz or £2,465 was won during the
remaining 48 years of mining. Such calculated estimates included the five year period of 1900 to 1905 when MGMC held the lease on the Mowbray. The Woolgar's total yield at 1940 of 20,745 oz, valued at £75,201 is small beer compared to Queensland's £50 million income from gold mining in 1900 alone, leaving the field undoubtedly with the classification of a 'small man's field'. Further consideration of the last two chapters' dialogue on the scant industrial and historical archaeology definitely requires comparisons in which to demonstrate what archaeology has been swept or removed from the Woolgar. Accordingly, the following chapter will provide an overview of a number of other archaeological sites in the lower Cape York that abuts the District of Burke in which the Woolgar is located, as well as some Victorian mining sites (see Appendix 11).
Chapter 7 : Comparative studies of the Woolgar with other mining operations

Introduction

The aim of comparing other historical mines' technology is to broaden the interpretive possibilities of the Woolgar's austere industrial archaeological record. In retrospect, the Woolgar goldfield comes under the classification of a 'poor man's diggings' or a 'small man's field' following the 1887 drop off in production. In all probability the Catherine and Albion mill operators came to a similar appraisal just before their departure in the same year. The term a 'poor man's diggings', though mentioned before without explanation is a seemingly derogatory classification that came from undercapitalised Derbyshire and Northern Welsh lead mining where small bands of autonomous miners shared the same ethos of pragmatic expectations as opposed to the larger scale better financed and equipped enterprises. Furthermore, as Philipp (1987: 46-7) explains, most of the early Australian goldmines were initially crowd-like in that they were in part transformed by general agreement into small bands of miners similar to the Cornish tribute system that mined to the mutual benefit of the group. Bolton's (1972: 62) 'small man's field' portrayal is more simplistic in that such mining operations were by necessity similarly organised due to poor finance so that the approach was generally one of expediency rather than the better financed and equipped mining companies.

Nonetheless, the point of evaluating the Woolgar goldfield with other mining operations irrespective of location, size and production is to compare the technology employed in the separation and more importantly the methods used against loss of vital minerals during the process. Likewise, what provisions were made to adapt the technology to the ore's environment as the mining went through different stages of development. Alluvial mining would be a case in point, which on face value requires little or no equipment other than a panning dish for working the prospective creeks for free gold or a cradle sluice box for dirt washing of near surface alluvial deposits (eg. Ritchie 1981: 66). The painstaking alluvial mining methods of the Chinese certainly brings to the fore the haphazard techniques of most Westerners, especially when abandoned claims have been profitably reworked by the Chinese. Likewise the second phase of a mine's development becomes more difficult when subsequent mine shafts are sunk and the ore separation process becomes progressively complex affecting the profitability and
consistent occupation of the mining lease. A case in point would be the observation made at the end of the 19th century by Logan Jack, the Queensland government geologist about consignments of ore being sent to the smelter still containing ironstone and other debris (after citation made by Bolton 1972: 113). No doubt the Woolgar goldfield's pre-crushing knapping followed a similar arbitrary pattern hampering an already outdated gold saving technique that drew condemnation from Mining Warden Haldane ([1895]1932: 387). Haldane's disapproval was later joined by further disparaging commentaries on north Queensland mining techniques; although such unfavourable field reports rarely provided alternative methodologies for the extraction of the gold (after Bell 1987: 117-21). It was not until Maclaren (1901) and similar comments by Menghetti (1982, 1984) and Philipp's (1987: 31) some eighty years later, describing in detail both Queensland and surprisingly Victoria's poor separation procedures, that the question was raised: what would have been the country's gold reserves had the gold saving techniques been better?

Possible Misguided Interpretation through Ephemerality
Besides the effects of extreme weather patterns similar to those affecting the Woolgar, Northern Queensland mining sites are also subjected to two other basic constraints. One of the primary reasons for departure from a mining lease, particularly during the nomadic period of gold rushes, was the news of a more promising location. The second motivation to abandon mining claims was disappointment in crushing returns and the ore bearing lodes pinching out. The first cause leaves a variant archaeological impression and the second, a sometimes rich archaeological record that is invariably subject to antiquarian rummaging. The degree of cannibalisation or even the removal of discarded equipment often depends on how far the sites are from modern roads and townships.

During the weekly trip to Richmond to replenish the research team's provisions, it was not unusual to see elderly circumnavigating holiday retirees known colloquially as 'grey nomads' picking over the mass of broken bottle glass and ceramics that made up the surface scatter covering an old pub site some 20 kms out of town. Even the more remote rural sites are not immune from such activities, especially where serviceable pieces of equipment have been discarded. For example, the steam engine at the Lower Woolgar's scrapyard site which had lost its wheels and the two spur wheels left lying on the Woolgar's first battery sites, just disappeared between visits to the site. However,
some of the removals from historical mining sites could even be of a custodial nature as in the example of Arthur Barns who had the Aurora battery moved from the Lower Woolgar's site for a garden ornament alongside the driveway to his home. Arthur also removed the mobile steam engine from the Mowbray mine and left it beside the track running through the Lower Camp probably because of the difficulties of moving it across the Woolgar River's dry sandy bed. Denaro (2001: 34) later used the same mobile steam engine as a questionable landmark for the Woolgar's original unofficial town site.

The owner of the small backpackers resort at Thornborough recounts with relish how a Cultural Listed stamp battery was removed from its foundation unchallenged and loaded on to a truck during the night. All such exploitation transfigures the already opaque gauze that hinders past stories and agencies of temporary settlements of an itinerant mining community. Two such examples are given later, taken from the explorative visits to the mining sites of Calcifer and Koorboora, that would have provided some idea of the settlement pattern and tacit tensions displayed in the archaeology of past frontier communes that are missing from the Woolgar's archaeological imprint.

Irrespective of primary resources being mined, another commonality of the northern Queensland mining industry is not only the abandonment of disappointing leases but also the usual removal of all equipment and housing. To some extent Hewlett's model of mining economies (see Fig 3:2) provides a schematic background to such archaeological lacunae, primarily brought about by diminishing ores or perfunctory mining methods. Not surprisingly, very few small mining operations in northern Queensland continued producing significant yields beyond the turn of the 20th century (after Bolton 1972: 315). In some cases such fields were left to become subsistence fields occasionally reworked by fossickers, a status inferring the equivalent to a gleaner in an already reaped cornfield (after Bolton 1972: 257-8). Significantly, Australia's gold production in the 20th century became reliant on mining companies in Western Australia whereupon, according to Bolton (1972: 257), many of the best miners still with the pioneer spirit of adventure continued their quest for the ultimate fortune, taking some of them even as far as New Guinea (sic) and South Africa.

With the end of what is seen as the pioneering stage of goldmining, Queensland mining companies attempted to rectify lost opportunities through improved mining practices.
and technology. Interestingly, the marginal Woolgar typifies such attempts by bringing the latest technology on to the field as in the case of the Mowbray mine, while the small miner still had to rely on manpowered windlasses or horse-powered whips or whims limiting the depth of the mine and the possibility of an increased yield. Consequently, it was common practice to abandon a mine once the current lode had pinched out or when the mine shaft reached the subterranean water table (cf Bolton 1972: 125, 260-1). Nevertheless, in spite of limited attempts to modernise, the Woolgar could never be considered anything other than a small man's field. This was a category substantiated by the official returns for 59 years total production for the study period of 1880-1939 which amounted to some 17,258 troy ounces based on Denaro's (2001: 15-21) questionable returns. Whereas, most of the major northern Queensland mines, in spite of criticism, nearly doubled the Woolgar's yield on an annual basis (cf. Bolton 1972: 124-5). Hence, the classification of a small man's field is well justified with the Woolgar's official total gold production valued in the region of £73,345 against an already cited Queensland's 1917 total of 19,330,803 troy ounces, valued at the Gold Standard's specie equalling some £82 million (cf. Bernays 1919: 382). Purely as a side issue, the price being paid to the Queensland miner or holders of bullion by the major Australian Banks was at the surprisingly high ad hoc price of £3: 17s: 0d per troy ounce (after Bolton 1972: 58).

Overview of the Comparative Sites
Therefore, though the various mine operations used in this comparative study are not all gold, there is a commonality with the Woolgar's initial technology. The various regions of Queensland and Victoria may be dissimilar but the various stages of Hewlett's mining economies model are recognisable in most of the comparable sites (see Figure 3:2). Accordingly, the Woolgar's historical cum industrial archaeology will be assessed against a number of goldfields in the Cape York region as well as the Bethanga goldfield near Wodonga and Albury on the borders of Victoria and New South Wales. Another comparative study will be with the diggings at Steiglitz Mining District of Victoria which includes Dolly's Creek, Morrisons and Tea Tree Creek south of Ballarat, Victoria. Most of these Victorian goldfields are small and were unincorporated operations with multicultural communities. For instance, as with the Woolgar, two of the comparative fields had a Chinese mining population while the Bethanga field had a Cornish settlement. To provide an added comparison, three other northern Queensland
Woolgar Goldfield

Chapter Seven

mining districts either researched or visited will be used as examples of temporality and marginality which over a period helped formulate my interpretive framework of structuration for north Queensland mining sites. The resulting interpretive framework used in this thesis was instrumental in revealing the paradox of Irvinebank, an important tin operation on the western side of the Great Dividing Range just beyond the Atherton Tablelands (see Taylor 2003: 141-3). It can now be seen that such a framework has been severely tested by the Woolgar's disappointing archaeology, requiring the comparative examples from other sites either visited or worked on to expand interpretive possibilities of a challenging archaeological record.

The Palmer Goldfield Far North Queensland 1873-83: A generalised description

The area of the Palmer goldfield in the lower Cape York Peninsula (see Fig.5:1) was still beyond the pale of Euro-Australian settlements when the pastoralist William Hann's government financed expedition of 1872 ventured into the region. Little encouragement was gained to settle the area from his subsequent report with harrowing accounts of hostile Aborigines, near impassable ranges and a rough terrain that crippled a string of his horses. Even the traces of gold found in the Palmer River, named by Hann after the Queensland government official who instigated the survey, was seen as insignificant until James Mulligan, the ubiquitous veteran north Queensland prospector, arrived back in Georgetown from the Palmer in September 1873 with 104 troy oz of gold (Bell 1987: 5). The ensuing rush eventually brought about the initial settlement of Palmerville and the later multicultural epicentre of the goldfield, Maytown. Over the next five years continual alluvial discoveries expanded the field's boundaries westwards to the confluence of the Palmer and Mitchell Rivers, and then to the south of the Mitchell and St. George Rivers. In an easterly direction, the field crossed the Great Dividing Range as far as the Normanby River to include areas to the north beyond the Conglomerate Range towards the tributaries of the Laura River (Bell 1987: 5).

This extensive area officially produced 1,024,394 troy ounces of gold between 1873-82 and gave rise to varying tales of successes and disappointments of an ensuing vast population movement, guesstimated to be between 20,000 to 30,000 people converging on the field by land and sea (Kirkman 1980: 113). The nearest port to the Palmer is Cooktown, which during the active years of the goldfield was the starting point for a hazardous journey of some 200 kms through rugged uncharted country. Those
attempting to reach the goldfield by the southerly route would have found the going equally difficult. The journey even today with reasonable roads takes a good 5 hours from Cairns to reach a point of access to the goldfield at Maitland Downs. Thereafter there is a very testing off-road drive to Maytown as experienced in 2001, taking at least another 3 hours and which gives some small inkling of the hardship, trials and tribulations of those travelling through unexplored rough country on foot. Besides the arduous journey, hostile Aboriginal tribesmen and the shortage of food throughout the mining area there were also reports of dysentery and typhoid. But even so, according to Mulligan's autobiographical articles on the Palmer, serialised in the *Queenslander* (see Pike 1998: 20-1), he found the area close to Palmerville so overrun that he and his party decided to move on quickly. It was this intensity and the continual rush that caused Kirkman (1980: 113) to describe it as the most dramatic episode of migration in Australia's history since the initial migration from the northern hemisphere (see particularly Toynbee [1884] 1985: 3).

The contentious newspaper report at the time on the Palmer in the *Queenslander* (13 December 1873) commented on the inconsistent but wide-ranging alluvial gold deposits which were seen as best suited to the meticulous methods of the Chinese miner. Such reporting and an initial coincidental arrival of Chinese miners from the worked out Cape River goldfields (Bolton 1972: 54) gave reason for disquiet amongst the Euro-Australian miners already working the field. Though the confrontation anticipated by the Mining Warden at the time did not materialise, there was a persistent undercurrent of xenophobia and minor altercation (Kirkman 1984: 169). In due course, an ongoing substantial increase in the migrating Chinese from the southern regions of China and various other Chinese enclaves on the Pacific Rim brought about an enormous shift in the Palmer's multicultural population (cf. Bolton 1972: 55-7; Kirkman 1984: 170).

Such a persistent resettlement taking place occasioned a number of shipping companies in the region to increase their sailings to Cooktown. This was in spite of efforts by the Queensland government to deter the ongoing immigration with a £10 per head entry tax and an unsuccessful attempt to reintroduce an Excise Duty on gold exports. The Queensland government also decreed substantial increases in the miners' right fee for Chinese as well as increasing the cost of a trading licence for new and already established Chinese enterprises (Drew 1982: 166-7). Despite these efforts by the Queensland government, the cumulative Chinese population on the Palmer rose to
18,000 in 1877 as against a 5,000 Euro-Australian presence on the field (Kirkman 1980: 125 f.44). Interestingly, Bolton (1972: 56) highlights the 1876 census population for far north Queensland to be 17,042, excluding Pacific Islanders and Chinese but inclusive of most of the women and children in this upper region of Queensland. Though both Palmer Chinese and Euro-Australian societies were insular by choice, it does stand to reason that there must have been some mutually constructive rapport by way of economic activities that overrode racialism bringing about a degree of commercial and social exchange in the main township of Maytown (as an example Giddens 1982a: 157). Though the township was dominated by Chinese merchants that were also shopkeepers and bankers to the Chinese mining community there was also a fair share of Euro-Australian vendors and a more than fair share of pubs and sly grog shops. Not all the Euro-Australian residents frequented such places at the weekend on account of two active cricket clubs, a rifle club and a number of regular equine activities. More luxurious social venues were also provided by the North Star and Carriers Arms hotels, both boasting a first class table with equally good cellars that stocked the finest imported wines (Kirkman 1984: 161). All in all, in spite of an undercurrent of racial tension, Maytown was a thriving cosmopolitan township and commercial hub for most of the mines in the area with paved sidewalks that still remain along the main thoroughfare (see Figure: 7:1).

The Palmer's Alluvial Mining synonymous with the Chinese

Although Kirkman (1984: 40) describes the Palmer as the epitome of a segregated small man's field that afforded miners lacking capital or experience an opportunity to get rich quick, such riches were in fact unattainable by nearly all those that attempted to mine there. Despite what was probably hyperbole, most alluvial Euro-Australian miners found it difficult to survive economically earning less than the average 'wages man' in the colony (Kirkman 1984: 320), which probably explains the radical change in the demography of the field. As pointed out by Smith's (2006: x) extensive study of Chinese miners in Australia, the weekly wage for an Australian unskilled labourer for much the period of 1850 to 1900 was about 14 shillings. In comparison, an unskilled labourer's income in China for the same period would have been approximately 4s 6d per week. Gold during that period, as already stated was being purchased by the Queensland Banks at £3 17s per troy ounce, which would have been the equivalent of just over five weeks wages for the independent Australian miners. For many Chinese
miners in Australia the same yield was equivalent to more than four months wages, providing more than a partial explanation for persistent Chinese immigration (after Smith 2006: x).
It has been acknowledged for a number of years that both Australian and New Zealand Chinese mining techniques and equipment not only show purposefulness but also a distinctive archaeology in their remains (see McGowan 2003:11; Smith 2006: 28). Smith (ibid) observes however, that Comber's (1995) study of the Palmer goldfield does not ascribe the distinctive stone stacking to the Chinese even though the field was being predominately mined by them. Perhaps this is an oversight or alternatively a prudent interpretation based on Ritchie's (1981) caveat cited by McGowan (1996: 37) that not all stone pitchings are necessarily Chinese. This is a reasonable observation seeing that historical drystone walling is a regular feature in rural Europe and North America. Furthermore, McGowan (2003: 11) differentiates between unstructured and scattered stone pitchings he classified as type "D1" and the neatly packed vertical mounds of stones characteristic of Chinese alluvial mining as "D2", and therefore infers that the "D1" type is not Chinese. The important feature of these at times low mounds is the configuration of the stones denoting it as part of the important technology used in working areas. The stone constructions were formed in such a way as to allow an area to be quickly drained of water, or to direct the flow to a larger water race. Creating such functional designs avoided the digging area becoming flooded and unworkable. As well as being regularly built or re-constructed to allow work to continue, these low elongated stone constructions were often re-arranged to act as dams for a regular water supply to the various mining areas and for the community's necessary needs (McGowan 2003: 12-5).

The Chinese communal approach had a distinct advantage over that of the Euro-Australian alluvial miner in that collective winnings were saved as a safeguard against the unpredictability of a future income. Conversely, most Euro-Australian miners were seen as individual operators whereas the Chinese worked in cooperatives, sharing longer periods of productivity and frugal living standards. Such communal arrangements were particularly applied to the work practices of a team of alluvial miners that were further split-up into pairs. Two would dig for the alluvial dirt which was then carried to a sorting cradle by two other miners while the process of locating the alluvial gold was left to the two operating the swinging cradle. The alternative separation technique of air-blowing using the same piece of equipment was mainly adopted during the dry spells of the year and also at night to process any remaining so called 'pay dirt' during the bagging and weighing of the day's winnings (Kirkman 1980: 126).
During the drier seasons of the year gullies, creeks and waterholes were first systematically raked for possible pay dirt, marking the area having been worked with the characteristic archaeological record of dry stonewalling along the sides of a creek. Similar archaeological records are seen in other gold mining regions of far north Queensland providing an example of Leroi-Gourhan's (1943) conceptual basis of chaînes opératoires of linking questionably tangible and intangible Chinese examples of technological diffusion to Euro-Australian miners (after Dobres 2000: 155). As noted in an earlier chapter, such possible Chinese agency could especially be seen in small segments of the neater drystone walling as well as the archaeology of a possible puddling operation in the palimpsest workings at the base of the Woolgar's Lost World.

In reviewing the alluvial aspects of the Palmer, they have consistently been synonymous with the Chinese who unfortunately did not leave many written accounts of their lifeways. This makes present day narratives reliant on past biased media and prejudicial governmental legislation. In spite of detrimental anecdotal publications and predictions of racial altercation there was only one serious confrontation on the Palmer between the Euro-Australians and a small Chinese community over a disputed claim at Lukinville in 1878. This was caused by irresponsible Queensland legislators (after both Bell 1982: 20; Kirkman 1984: 321). Otherwise the alluvial period of the field is primarily known as a period of high yield and efficient work-practices of the Chinese. In many ways Kirkman's (1984: 322-3) closing comments partially echo Rain's (2003: 35) appraisal of the Chinese sojourners in far north Queensland in that they resided in a foreign rugged and hostile landscape that held them in isolated enclaves similar to simple dormitory or transit centres and that purged them of dynamism. Rain's etic appraisal does not match the author's experience of the Chinese drive in any form of trading capabilities, their lifeways in erstwhile Malaya and modern Hong Kong. On the contrary, Chinese communities are far from being a lame society but vibrantly autonomous with the similar European prejudice towards foreigners that is expressed by the Cantonese gwailo meaning ghost or the harsher seigwailo label for a dead person. The only physical intimidation encountered by the Caucasian pedestrian is the mild symbolic walked through experience felt by being regularly bumped into while negotiating in communal thoroughfares.
The Palmer's Mines, Mining and Methods: Reef Mining

Bolton (1972: 115, 263) described the Palmer as 'a model in which a goldfield was plundered and mismanaged into virtual extinction during its reefing stage'. Such a harsh appraisal would seem to be vindicated by Bell's (1987: 115-22) later appraisal of the Palmer's mining and milling archaeology still in situ, which had a similarity to Jack's (1899: 1) earlier report after his visit to the Palmer in late 1896. Apart from a lack of capital investment, high transport costs, a scarcity of timber for shoring the mines and as fuel for boilers to power the pumps, stamp batteries and winding gear, the actual mining was also hampered by a common lack of knowledge of how to treat the mundic stone below the waterline. Notwithstanding, the crushing records in Jack's (1899: 17) report show that efforts were made by the operators of the Anglo Saxon mine to overcome such shortcomings by sending 4 ton 13 cwts of mundic ore to England for treatment. This eventually yielded some 362 troy ozs and 7 pennyweights. Nevertheless, it would seem that the impatient culture persisted of '...any reef not showing coarse gold on being smashed up with a hammer was not worthy of a second thought' prevailed in most of the Palmer mines (Jack 1899: 2).

The technology of underground mining in Australia was derived from both Cornwall and Germany with such methodologies being passed on as if they were guild secrets (Bell 1987: 116). However, by the late 19th century most of Australia's southern mining technology had progressed with technological transfer to far north Queensland still being impeded by distance and the lack of investors (passim Wegner 1995; after Rands 1895: 180). This was a particular problem for the Palmer as much of mining machinery being installed at the new mines during the second phase of the field's development was inappropriate due to inexperienced management. Apparently the seemingly standardisation of most of the machinery set-ups seen on the Palmer were based on illustrations seen in the agents' and importers' catalogues marketing overseas-manufactured mining equipment (after Bell 1987: 116). The archaeological record surrounding some of the mines in the Maytown district particularly bear witness to this over-sanguine approach with a noticeable lack of stone breakers, centrifugal mills, cone crushers, ball and rod mills and pneumatic stamps which were already being used in southern Australia. Similarly, as indicated by the limited archaeology, fine grinding and gold saving provisions like settling dams for the stamp's slurry were normal exclusions. According to the historical record, what Berdans and Wheelers pans that were available
on the field were often passed around with the processed slurry including the mercury regularly being allowed to flow into any nearby creek (Bell 1987: 188-9). Jack's (1899: 2) report was probably the first to comment on such inappropriate equipment following his visit to the field in 1896, with particular reference to the lack of surface drainage of past alluvial workings that were flooding some of the most productive mines in the vicinity of Maytown. Apparently the Ida, Comet and Louisa together with the Queen of the North mine were constantly being flooded during the rainy season. According to Jack (1884), this could have been easily averted by a simple channel draining away from the mining area.

Irrespective of the poor and inadequate technology, the main mines of the Palmer showed reasonable returns for just over a decade of production. The Comet mine yield was 5,979 troy ozs, the Hit and Miss 3,852 troy ozs while the two mines being worked in the Ida reef produced a total of 13,346 troy ozs. None however compared to the Queen of the North's 12 mines that totalled 16,515 troy ozs. The remainder of the other mines making a total of some 160 mines working the field in 1896 generally had yields of less than 1,000 troy ozs for the decade (Jack 1899: 17-28).

In many ways the experience of the Palmer is similarly reflected in the Woolgar, which is not so astounding seeing that the two goldfields are relatively close, with a number of both Chinese and Euro-Australian alluvial miners being some of the earliest arrivals to the upper regions of the Woolgar. Dublin Bob and Greasy Bill were two of the early newcomers from the Palmer and had staked their claims in two separate gullies in the Soapspar area south of the Woolgar River. Roger Barns' wife (nee Bulmer) who spent her childhood in the Upper Woolgar, confirmed in a conversation with the author visiting Charters Towers, that the area north of the Woolgar River was the domain of the Chinese miners and that the archaeology of their community occupation sites and workings had long been destroyed by flooding over the years.

In summary, Kirkman's revelation of the Chinese miners' meticulous work practices provided significant insights into their methodology as did Smith's research of the Chinese community in New South Wales that helped improve the hazy background of the Woolgar's Chinese population. While the Woolgar can be seen as the coming together of the last of the age of nomad gold miners (see Bolton 1972:62) so too do
some of the Woolgar's battery set ups reflect the inadequacy of the Palmer's general social capital.

**Hodgkinson goldfield**

Ironically, the two Hodgkinson townships, Thornborough and Kingsborough were considered as ideal to demonstrate the adaptability of structuration as a research framework but were abandoned due to the Cultural Heritage listing of the Kingsborough's General Grant's mine and difficulties in obtaining research consents from the towns' absentee multi-ownership. The main attraction of this possible site was the archaeological technology descending the hills close to each township of the small gauged railways for transporting the ore from the mine's adit to the ore separation plant below (see Figures 7: 2, 3). One of the best examples of using the landscape to improve the battery workflow is the Kingsborough's Tyrconnell mine. The proprietorial homestead is set on the prominent hill in the landscape as a panoptican overseeing the industrial environs with the drop in the steep slope from the mine head being used to feed the battery's hoppers below (see Figure 7: 4). In between these two townships is a smallholding that has a significant archaeological imprint of a miner's dilemma once a goldfield begins to fail. While the Hodgkinson goldfield does not relate directly to the Woolgar, it does portrays some of the vicissitudes of the unfortunate opportunist caught in a poverty trap that could well be the narration of any number of adventurous miners caught in similar circumstance in far north Queensland. It is the story of Carl Ergerström.
Figure 7—2: Kingsborough General Grant mine’s small gauged railway (Queensland Oxley Library)

Figure 7—3: Thornborough mines small gauged railways (Queensland Oxley Library)
The Hodgkinson goldfield, which lies to the south of the Palmer (see Figure 1:1) is a prime example of the possible effects of a nationwide gold rush with a significant number of the Palmer miners also abandoning their claims in the hopes of better prospects in the close-by new field. Within two years of its discovery in 1876 the Hodgkinson's disappointing patchy alluvium had been worked-out and the field was found to be mainly deep leads needing more expertise than that of the alluvial miner. Even the small undercapitalised hard-rock miner found the deep narrow gold 'pipes' too difficult to trace, causing many claims to be quickly abandoned in preference for other new mining ventures opening up in the region. Even the relatively nearby extensive tinfield in the Herberton area that was being worked at the time of Hodgkinson's dilemma was given serious consideration (Kirkman 1982: 171-4). Jack's (1884) survey of the Hodgkinson cited by Jensen (1939: 2) laments that the field's difficulties were too expensive an undertaking for the small miner with the narrow shoots cutting out at depths of 100 to 200 feet (30-60ms). As a result little mining or development had taken place since 1884 (Jensen 1939: 3).

Among those in the rush making their way north was Carl Alex Ergerström, a Swede whom had left his homeland many years ago and would seem to be the epitome of the adventurous miner of the Gold Rush Age. A précis of Carl Ergerström's life history
starts with him deciding at the age of 19 on a military career. This was his springboard into a life of travel often associated with a sojourner's dream of seeking a fortune in some far off land (Holtsmark 1999: 1). The archaeological record of Ergerström's home on the Hodgkinson is accompanied by his life story.

**Ergerström's House Location: (HI3281: 2000 Cultural Heritage Studies)**
The archaeology of the house sits on a slopping tongue of land at the merging of Caledonia Creek and an unknown gully (see Figure 7: 5). The surrounding hills slope down to the gully and creek on the west and southern aspects of the property. The neighbouring soil's texture is thinly gravelled covering metamorphic shale that is more obvious nearer the creek that also contains a number of greywacke boulders from the adjacent hillsides. The tree growth of the area is considered Savannah woodland with predominate *Eucalyptus* spp. and *Grevillea* spp. while the riparian growth along the banks of the creek typically consists of *Melaleuca* spp., *Lophostemon graniflorus* and *Ficus* spp.

The badly eroded road running alongside the southern low retaining wall is part of the old Port Douglas-Thornborough road that crosses the creek at the SW corner of the Ergerström's site to continue on its westerly path across a well constructed Baker's Burn crossing of large flat stones (see Figure 7:6). The stone causeway on the western side of the creek measures some 60 metres by four metres wide, while on the eastern side of the creek the comparative causeway's paving is not so well constructed with many of the flat stones having been dislodged, presumably by passing traffic and surging flood water during the rainy season.

![Figure 7—5: Burns Creek causeway (photo Wegner 1999)](image-url)
The main feature of Ergerström's home and garden is a series of terraces with stone retaining walls in a landscape that slopes towards the western boundary edged by a gully and creek. The flatter eastern terrain and the northerly higher ground characteristics are enclosed by low wide rock walls of up to 2 metres thick. The southern perimeter is also defined by low rock walls with entrances to the property through two gaps in the walling, one on the western well terrace (see quadrant Q2 in Figure 7: 5) and the other larger entrance providing access to a reasonably flattish surface in Q1. According to the archaeological scatter, this area is interpreted as Ergerström's workshop. Just outside the entrance was a hardened bag of cement showing an impression of the original hessian bag, while immediately to the left of the workshop's entrance is a stone flagged square measuring ~2 metres by ~4 metres with a short iron picket in the middle followed by four posts as shown in the site map. One of the two posts nearest the workshop's eastern drystone walling has an upturned horseshoe nailed to it, presumably still awaiting any forthcoming good luck! Close by,
an assemblage of indiscriminate iron scrap and several unidentifiable parts of heavy machinery, including stamps and dies were probably scavenged from the local abandoned mines and mills. In the bottom western corner of the workshop, a lone stamp head is set apart from the main collection of industrial artefacts and could well have been part of a dolly used to crush ore samples that probably relates to the nearby ash deposit as the result of smelting or even a small blacksmith's forge. The scattering of pre 1914 'zapped' discoloured glass and ceramic sherds found in the area was seen as of no interpretive value by the investigators other than as a dating medium.

The first L-shaped, higher terracing in Q1 leads to the northwest corner of the workshop area where a set of steps ascends to a slightly higher terrace perceived from the archaeological record as being the living area and garden. The rough flagstone configuration in the region of the northern and eastern boundaries is indicative of the house site while the stone arrangements approximately in the centre of the living area and nearer the entrance to Q3 could have been flower-beds. Artefacts found in the living area consisted of a wire meshed bed frame, kerosene tins, fragments of corrugated galvanised iron sheeting, door hinges, bolts and ties as well as a collection of different fencing wires. The other domestic artefacts in the area included a damaged bucket, part of a cast-iron camp oven and a small ceramic scatter. Further examples of domesticity are seen in Q2 and Q4 with Q2 having a pit outlined by collapsed stone walling, which according to local anecdotal evidence suggests a well. The badly corroded corrugated storage tank was some 15 metres away on the narrow terracing in Q4 suggests an arduous task of drawing water from the well then carrying it halfway down the steps to the narrow terrace in Q4. Obviously, such effort was worthwhile to have gravity fed water laid on to the household, substantiated by a short length of piping with an attached tap found in the living area.

An overall feature of the garden area was the number of remnant and escapee plants, among them yellow bell flowers (*Srenolobium stans*), and clumps of the ubiquitous rubber vine (*Cryptosegia grandiflora*), a common feature of any abandoned utilised plot of land in this part of Queensland. The more prominent of the garden relics is a large mature Poinciana tree (*Delonix regia*) and self-sown saplings in the top eastern corner of Q2. Another relic is a large sisal plant (*Agave ssp.*), in Q1 that is also reproducing with a number of aloe plants along edges of terracing alongside the creek in Q2. The large sisal standing at the bottom of Q1 is presumed to be the same as that shown in the
old photograph of Ergerström (see Figure 7: 7). Poignantly, outside the northern boundary wall is a cleared space surrounded by boulders where Ergerström dug his grave. Symbolically pointing north-eastwards towards Sweden with his headstone chiselled and fashioned by himself from a slab of local greywacke rock, it bears a metal plate reading "In memory of Carl Axel Ergerström Born in Sweden 1829 Died in Thornborough 1900" (see Figure 7: 8).
A chronicle of Ergerström's life
During his time at the military academy a conflict between the Danes and Prussians erupted over Schleswig-Holstein, an area at the base of the Jutland peninsula. Ergerström with a number of his fellow Swedes volunteered for the Danish Army and in due course was honourably discharged with a field commission of second lieutenant. On enlisting with his own country's 2nd Life Grenadiers in 1849 he was given a non-commissioned rank that much aggrieved his peer group, so much so that he eventually procured a release from his enlistment in the May of 1852. Still bent on a military career he travelled to England to enlist with the British Army but was rejected. Undaunted, for tenacity seems to one of his attributes, he then set sail for India in the hope of enlisting with the British East India Company's army, which at the time was embroiled in a conflict with Burma. In spite of letters of recommendation from his London Freemasons' contacts he was again rejected for active service (Holtsmark [1908] 1999: 1).

Three negative responses must bring into question some of Carl's personality traits and how he presented himself at this stage of his life. According to primary sources on file in the Ergerström Papers (1852-1900: No.41) at James Cook University's North Queensland Collection he had been a Freemason since 1851 but even with such testimonial he was unable to gain admission to the East India Company's army which, perhaps suggested an awkward personality. Whatever the cause, India was a mere fork in the road of resolution that only needed a decision as to what direction to take next.

News of the Californian gold rush encouraged a circuitous route to the West Coast of America via Boston and Cape Horn to eventually team-up with two other compatriots in a prospecting partnership on the Sacramento River area, north east of San Francisco. This turned out to be neither a long-term joint venture nor a successful one. Unfortunately, because of this venture into the wilds, Ergerström became seriously ill with several bouts of fever which seemed to have drained him physically and economically. There had been no mention or hint of a prolonged source of income in the collection of papers being held at JCU except of course from his army career; and if there were savings, they could have been well depleted by now. After hospitalisation and convalescence, he turned his hand to farming, an alternative that was to become a regular standby in periods of disappointment in his future mining ventures. However, following the period of farming came some respite in his series of ill fortunes with him
joining another mining partnership of anomalous backgrounds. In spite of the strange affiliation of a lawyer, a Jew, a priest of unknown denomination and a Swede, they did seem to have had some success. Unfortunately, the arduous work and having not fully recovered from his last bout of fever caused him to take refuge in the Hawaiian Islands for five months, which in itself was an indication of some success in his mining venture (after Holtsmark 1999: 1). On rejoining the partnership, Ergerström made efforts to improve his knowledge of gold mining techniques that perhaps sheds some light on his next phase of life.

News of extensive gold strikes in Ballarat, Victoria again whetted his wanderlust and hopes of affluence as he set sail for Melbourne in early 1856. What followed was now the familiar story of an unsuccessful period of mining and another bout of illness, after which Ergerström again resorted to farming as a source of income. From this came the opportunity of steady employment with a merchant in Dubbo, New South Wales. What type of business is not clear from the historical data on file, but after such a bout of ill fortune it must have seemed a godsend, especially when he later became a partner in the business. This again was short-lived as the news of his father's death meant a return to Sweden and the termination of the business arrangement. By now he was 31 with little to show for his travels other than the material for a book which he set about writing while endeavouring to support himself with menial spells of employment. Despite the warning in Ergerström's (1859) book about leaving an attractive homeland in search of fame and fortune, he set off to do exactly that after what seems to be another unrewarding episode in his life.

Whatever his faults Ergerström's persistence and adaptability must be admired, for the next phase of his life is centred on a cotton and coffee plantation on one the Fijian Islands. At face value, according to his commentator Schöldström (1908), cited by Holtsmark (1999), this seems to have been a very successful period in his life with a thriving business, a parliamentary seat, governmental appointments and marriage to a well-heeled Englishwoman. In reality, the island where his plantations were situated became beleaguered by land disputes. First, between the indigenous inhabitants and European usurpers, some of whom were slain, a tribal unrest of some magnitude so that the British took control of the situation with their customary 'gunboat diplomacy' of the times. Coupled with the eventual loss of his plantation was the tragic loss of his wife.
and son in a shipwreck off one of the nearby islands leaving him with little option but to again relocate (Ergerström 1852-1900: letter No. 18).

Following the liquidation of what was left of his accrued assets from some thirteen years in Fiji he moved back to Australia and for a while continued to gratify his wanderlust with trips to Papua New Guinea and New Caledonia. Such tentative digressions availed him nothing as did another business partnership when he began to resettle in Australia. Inevitably another period of stability had to come to an end on the death of the senior partner of the coal colliery he was managing (Ergerström 1852-1900: No. 18). Understandably, his correspondence at the time is fraught with loneliness and homesickness reflecting the void in life caused by the recent discouraging events. It would seem his next decision could be seen as an attempt to negate such sadness by adopting an orphaned boy, whom he named Edwin (Ergerström 1852-1900: letter No.20).

As though undaunted by his new parental responsibilities and more in keeping with an inveterate gambler with everything riding on the throw of the dice, Ergerström could be seen as still obsessed with finding that elusive pot of gold. A renewed urge, undoubtedly brought on by the 1876 reports of a new goldfield discovered by J.V. Mulligan in the Hodgkinson Basin. In far north Queensland was probably too much of a possibility to be missed, especially since it was said to be equal to the adjacent Palmer (after de Havelland 1989: 397-400).

On his arrival at Thornborough with his son Edwin in 1877, he must have been encouraged by a seemingly thriving township of two banks, an assay office, two jewellers, two butchers, nine general stores and 20 public houses, not to mention a school and a police presence so far off the beaten track (after de Havelland 1989: 400). But, unbeknownst to him the alluvial gold had already gone so changing the nature of the field where Ergerström had just taken a lease on a small mine and homestead equidistant from the General Grant and Tyrconnell mines outside Kingsborough and 1.5 kms from Thornborough (Ergerström 1852-1900: No. 20). In this same letter, dated 1887 reviewing the last 14 years of setbacks of his life he also tells of 'The Ergerström line of reef’ having a complex geology. In fact the Ergerström's line of reef mine shaft had been sunk to a depth of 200 feet that met the inevitable water table which needed expensive winding gear and pumping equipment that he could ill afford. In effect
Ergerström's mine was a 'duffer', not producing enough to support him and his son and meaning in no uncertain terms that he had to find alternative sources of income or sell up. In the meantime, the local population had dwindled with the economy making it even harder for Ergerström to find local employment. From an estimated 10,000 inhabitants at the height of the Hodgkinson's boom only an estimated 100 remained. With such a waning population it is no wonder that Ergerström was also unable to find a buyer for his property. A home that had taken up most if not all his investment capital of some £600, revalued on the basis of the 2009 Retail Price Index it would have been in the region of sum £44,000 (Officer 2008) net buying power. Such comparable liquidity would have provided some relief from the harrowing situation that Ergerström had now to face, a state of affairs not entirely of his own making (Ergerström 1852-1900: No. 20).

Similarly, the death of his son Edwin in 1886, after two weeks of catching malaria while employed as an apprentice surveyor with Post and Telegraph in Northern Australia was not the result of any action by him. Ergerström's (1852-1900: Nos. 20-7) letters at the time to his brother Wilhelm had understandably become more morose, not helped by the state of the Australian economy. Ergerström’s letters (ibid) describe most of what has already been discussed in Chapter Four, with narrowing economies, high unemployment and strikes in most of the colonies along with the long drought affecting his income from market gardening. The aging Ergerström, now in his 60s had concerns about his own health with daily bouts of rheumatism and a tumour growing on the left side of his neck. His lack of funds did not allow him to have it medically attended to, but surprisingly he make a point of seeing a Chinese herbalist he previously knew in Sydney that seemingly cost him the equivalent of travelling back to Sweden (ibid). Along with reports to his brother of his failing health and homesickness, were the abysmal prices being offered for land and houses in the area that rarely seemed to exceed £10 for established properties. The extremes of the Australian tropical climate are also a regular theme in his letters with temperatures as high as 120° Fahrenheit and random bushfires that alternated with heavy rain storms creating excessive flooding. News of the tumour moving up his neck makes for even more depressing reading (see Ergerström 1852-1900: 28-31).

Occasionally though, the tone of his letters brightens with news of perhaps another misguided Nordic couple moving into the area or renewed hopes based on new mining
companies looking at the prospects of the Hodgkinson. Even better was the news of a small honorarium as an auditor of the Woothaka Divisional Board and District Hospital together with his appointment as a 'casual' liquidator of a local bank's collateral against various past loans to the now totally defunct Thornborough mining operations. The disposal of various steam engines, stamp batteries and buildings provided him with a small income for a while. Still yet to come was the Danish Jubilee Gift for his services rendered during the Schleswig-Holstein campaign for which he was awarded the Dannebrog Medal of Honour plus an unexpected monetary gift on his 72nd birthday, presented to him by a group of visiting Freemasons (Ergerström 1852-1900: Nos. 32-41).

The last letter written to his brother and dated 10th October 1900 was short, in which he thanked him for his kindness and explained that he was suffering from paralysis of his arms, hands, legs and feet accompanied by constant cramp attacks. Just under five weeks later Carl Alex Ergerström died at 2 pm, 4th November 1900 in the Thornborough Hospital and was laid to rest in the grave that he had prepared much earlier for himself in the northern part of his garden behind his house. The chiselled Greywacke headstone that had also been prepared by him still remains in place with the brass plate affixed by his nearby Danish neighbours still symbolically set at a slight angle to the north, thereby facing Sweden.

The Atherton Tablelands: Irvinebank

The Irvinebank tin battery and smelter, John Moffat's later flagship of his mining consortium had the similar separation technology applied to gold and is being used here as an example to demonstrates not only the inadequateness of the Woolgar's earlier set-ups but also to give some idea of the limitations of the Cornish tin industry. The narrative of Irvinebank as the successful tin operation on the westerly extremes of the Atherton Tablelands is a far cry from Moffat's formative years on the banks of the river Irvine in Ayrshire, Scotland and as a machine fitter's apprentice in the industrial city of Glasgow. Presumably attracted by the local Queensland emigration agent's promotion of the State's incentives and opportunities he arrived in Brisbane on New Year's Eve 1863. Moffat was soon to experience the rudiments of Australian bush life while herding sheep on the Pikanjinnie Plains west of Roma, South Queensland. After completing his three year's contract with the Mount Abundance sheep station he found employment in a series of retailing establishments in South Brisbane before starting his
own similar business. The news in 1872 of a tinfield opening close to the New South Wales and Queensland borders was inducement enough for Moffat to relocate his business to the town of Stanthorpe, the supply centre for the new field (after Kerr 1979: 2-3).

In spite of a bullish world tin market, Moffat was unable to sustain his tin smelter due to a variety of major technical difficulties and high transport costs. Coupled to these factors was his undercapitalisation that left him with no option but to declare himself bankrupt in 1876 with debts of £9,851 or at today's real cost value of £723,000 (after Officer et al 2011). To his credit Moffat was discharged from insolvency in 1880; no doubt enabled by his two fellow Scots, cousin George Young, an accountant by profession and John Holmes Reid of good experience and reputation in tin mining and smelting (after Kerr 2000: 4 and 6).

Later that year the Moffat triumvirate moved to Herberton, far north Queensland's extensive tinfield on the western fringes of the Great Divide with a view of starting another tin dressing operation. It was during 1882 while Moffat was fund raising in Scotland combined with a technological fact-finding tour of Cornwall and Germany that he learnt, much to his consternation, that Young had bought a tin claim some 15 miles (24 km) further east of Herberton. The purchased lease known as the Gibbs’ claim incorporated the confluence of the Gibbs and McDonald Creeks that created a sloping tongue of land found to be ideal for the stamp battery and later smelter (see Figure 7: 9). The flow from the creeks were soon held in the newly constructed dam to provide a regular water supply for the stamp battery that was positioned thirty feet (>9 metres) above the concentrating vanners tables with a Blake's stone breaker and hoppers placed at another twenty feet (>6 metres) above the stamp battery.
To accommodate the later development of Irvinebank, further terraces were cut into the hillside for a tramway to supply self-adjusting feeders for the separation plant and to convey the resulting black tin to the smelter complex. Most of the smelter’s equipment was driven by steam but the lower terraced jiggers and separating tables of thirteen feet (< 4 metres) diameters were powered by a twenty foot diameter water wheel. The early separating process shown in the following schema (see Figure 7: 10) were later superceded by bundles that had been forged and assembled by the company’s blacksmith (after Kerr 1979: 19).

According to Kerr (1979: 19), an early visitor to the dressing mill extolled its engineering grandeur and noted that only two men were required to handle the smelter. All in all the combination of stamp batteries and smelter works employed 100 men made up of blacksmiths, carpenters, wheelwrights, stone masons and builders, workshop fitters and a teamster for the large stable of horses that collected both firewood and tinstone from outlying independent miners. The rest of workforce was employed where necessary at the Californian stamps or moving the semi-processed cassiterite or black tin for refining in the blast furnace. During the first year’s production the Loudon mill crushed 3840 tons of ore producing 651 tons of black tin which, after smelting returned 438 tons of metallic tin (ibid). Not all the refined tin was owned by Irvinebank as Moffat encouraged a policy of preference for treating public
ore and thereby guaranteeing crushing facilities to all the local individual miners. The open policy was far reaching as it maintained both the Irvinebank battery and Loudon smelter's throughput as well as consolidating the local mining industry, especially since the individual miner was paid promptly after the known refined results of the cassiterite ore (after Kerr 1979: 19-21).

The Loudon Mill, named after Moffat's mother's maiden name was claimed by Kerr (1979: 19) to be the most complete reducing and tin saving plant for its size in Australia and superior to anything in the British Isles. Equally exceptional was the Irvinebank trading abilities, probably attributed to Young's prowess, so that the company was a paradox of its time in that it was continually profitable in a declining world market by hedging the tin inventory with forward sales on the London Metal Exchange (after Kerr 1984: 146-8; Kerr 2000: 227, 240). This was a trading strategy that is particularly advantageous in a falling market but pointless in a bull market unless it is felt necessary to lock in a profitable trading position with a forward sale. Consequently, Moffat was able to expand his mining operations into other metals in the region underpinned by the successful tin operation at Irvinebank (see Taylor 2003: 142).

Even more intriguing was the turn of events that followed, albeit certainly in accordance with one of this dissertation's underlying premises of impermanency. By the year 1900, world tin prices had moved from the nadir of £63 per ton ex warehouse London to a
price level of £135 per ton. The antinomy that followed is the reverse of the paradoxical circumstances that were noted at the outset of Irvinebank. The upward trend of the world tin market continued, with a few interim market corrections to a level in 1918 in excess of £300 per ton ex warehouse London whereas, in spite of the still rich Herberton tinfield, Moffat's diversified mining consortium had already began to crumble (see Taylor 2003: 142-3). By 1912, on the insistence of Queensland National Bank, the aging Moffat was replaced by Reid who was left with the liquidation of the other unprofitable mining ventures being financially supported by Irvinebank. Eventually Irvinebank was sold to the State shortly after Moffat's death in June 1918 (Kerr 1979: 109). In contrast, though never to reclaim the past status as a major producer, the Cornish tin industry improved the extraction technology to counteract the possible loss of semi-processed tin pyrites or cassiterite and the natural phenomenon of diminishing ore returns to once again thrive in favourable market conditions (Taylor 2003: 142). As it were, the Irvinebank's concluding defiant statement is seen in the results of an offshore salvage company dredging the Irvinebank dam in the 1970s that producing some A$ 6,000,000 net profit. While such results could seriously question even the most meticulous ore's saving techniques it should also be borne in mind at the time that the ill-fated International Tin Council's buffer stock was holding the world price for tin in a trading range of £10,000 - £12,000 per ton ex London warehouse (after Taylor 2001: 72; passim Mallory 1990).

The Irvinebank's archaeology of Structuration is reasonably identified in the hilly landscape that surrounds the treatment works and smelter with Moffat's house and assay office as the overseeing panopticon (see Figure 7: 11). The other Authoritive Resources recognised in the Irvinebank complex from the historical record, though not shown in Figure 7: 11 are the hospital, Queensland Native Mounted Police barracks and school below the barracks that were set in the hills to the east of the dam and works. The Queensland National Bank building shown in Figure 7:11 still exists and is seen as being in the same Structuration category as the barracks and school, but due to the financial accommodation made to the company was in a position to demand an immediate change in Irvinebank's senior management.
The Allocative Resources of Irvinebank are seen as much of the works with the dam, the School of Arts along with the surrounding mine sites. The most prolific and prominent of these was the Vulcan mine, just south of the dam overflow with its tall poppet head indicative of the some 427 metres depth of the main shaft. The poppet head is also seen as heuristic to conflicting ideologies, between the Irvinebank's management and the union representatives' attempts to establish the first branch of the Australian Workers Association in far north Queensland. Symbolically another case of
doxa is seen in the contra-philosophical structures that had been established on opposing hills, with a Catholic church in close proximity to the police barracks and school on one side while the Presbyterian Church and a Masonic Lodge occupied the opposite western hills.

Irvinebank's social capital was continually being enhanced by community activities around the dam and School of Arts to counter the impression of a wild frontier town. Viewing the building placements on the hill that circumscribed the township could be seen in stratigraphical terms with hierarchy taking the high ground while most of the workforce lived in the valleys (Taylor 2003: 143). In reality, it was a township equalling any of its coastal or tableland counterparts with improved communication and railway, banks, stockbrokers, estate agents, mining agents, accountants and stores such as mercers and tailors (O'Callaghan 1974: 83-6). By the turn of the 20th century, Irvinebank boasted most of the Authoritative and Allocative Resources of any well-established township. Irvinebank even became the seat of the local government for the Walsh Shire Council until 1933.

All that remains of this vibrant industrial township is the archaeological record as given in the Queensland National Trust map. The miner's cottage by the side of the approach
road from Herberton was occupied at the time of the archaeological research, as was the National Bank of Queensland building, by the self-appointed custodian of the Irvinebank battery and smelter. The battery building houses the remains of the Krupp and Luhrig vanners while the smelter site is just rubble with the protruding capped pipes of the bag room that collected the tin oxides from the smelter fumes that were sold on to potters for glazing. Moffat's house which still overlooks the works sites is now the museum and on the Queensland Heritage Register and the Australian Register of the National Estate.

The township of Koorboora
Another of Moffat's mining sites lay close to a modern day road and therefore was of meagre material culture well picked over or washed away by flooding over the years. At times the lack of water was of concern to mills processing the tin and wolfram ores from the nearby mines on the northerly side of the Chillagoe–Mareeba road. The Koorboora town and allied mines established in 1893 were part of the John Moffat mining domain that had spread over much of far north Queensland (Kerr 1979: 92-3). The township behind the ten head of stamps and dam in the photograph taken in 1900 (see Figure 7: 13) is no more and has left not the slightest impression in the surrounding landscape, while the railway between Mareeba and Chillagoe finally established in 1901 still runs through the southern aspect of the town's site.

Figure 7—13: Koorboora township with the dam and battery in the foreground (Kerr 1979:92)
At the time of the initial survey in 2002 the township site had been overrun by a tight growth of ironbarks (*Eucalyptus crebra*) in between the Chillago-Mareeba road and the railway line. The only evidence of habitation in this inner area of the town site was an excavated bottle dump on the south-westerly perimeter. On the other side of the railway line, the landscape is more open with mango, peach and plum trees but no other indications of a garden in the vicinity.

The most significant and poignant reminder of Koorboora is the small graveyard on the northern side the main road. It is an ill kept cemetery with broken wire fencing around 'God's Acre', but there were no signs of damage to the graves. What was noticeable was the number of small graves in relation to the larger-sized graves. One in particular epitomised the parents' grief at the death their child from presumably an under-privileged family based on the nature of the tombstone. The headstone for the child's grave was made from a gallon kerosene tin can fashioned into a four pointed coronet with a makeshift scrolling decoration on the sides of each peak made from strips of metal that had been rolled in a decorative manner. The significance of this small cemetery is still a poignant reminder even at this later date hardships were still being endured providing a seemingly apt comparison for the missing Woolgar grave sites washed away by flooding over the years.

**Calcifer**

The forerunner to the later established Chillagoe smelter was a piecemeal smelter project by Moffat in 1894 to handle the copper from the nearby Boomerang mine. The Calcifer was the only treatment plant erected by Moffat that was without a dam presumably because the small creek running through the smelter site was only fed by an insignificant spring (Kerr 1995: 19). In any event the lifespan of the small smelter and the fading ore bodies of the Boomerang mine curtailed the Calcifer's production to a mere 6 years before the better financed and equipped Chillagoe smelter was established nearby (Kerr 1995: 20-1). The history of Calcifer's smelting is well documented by Kerr (1995) and has been particularly chosen to demonstrate the marginality of frontier mining towns. The field diary's notation is of the opinion that the archaeology of this small settlement is probably that of a palimpsest that includes the 1937 reworkings of the Boomerang, Harper and Christmas Gift mines. The presumed remnants of the smelter would seem to be an engine bed besides a concrete pad on the northern side of the creek. The part of a boiler's steel chimney mentioned by Kerr (1995: 21) had
disappeared by the time of the author's short visit in 2002 armed with a copy of a photograph of the area that was said to have been taken in 1900 (see Figure 7:14).

![Figure 7—14: Calcifer Smelter and township circa 1900 (photo John Oxley Library)](image)

Access to the site is via a well marked 'Private' driveway which passes the remnants of a stone building on the way to the homestead. The archaeological features of an area near the smelter site features what looked like four inlaid flagon stone entrances to possible huts and a very noticeable scattering of intact torpedo shaped glass lemonade bottles with no traceable trade mark. Bottles of that shape usually date from the late 19th to early 20th century and seeing that the glass was unblemished indicates a post 1914 manufacture (eg. Arnold 1990: 136-38). In addition, the brick scatter seen in the area included the occasional Gartcraig brick later found to be of Scottish origin after conferring with Kerr (1995: 21).

From the aspects of a shared landscape, the vicinity of Calcifer after leaving the Chillago–Mareeba road for about a kilometre leads to a small graveyard situated on the east of the dirt road. Within a short distance of the burial ground and on a pledge not to divulge the actual location, the author was shown what was said to be a secret feminine Aboriginal rock art site well hidden from the road. Moving on past the town and smelter site towards the northerly extremes of the Calcifer area, the dirt track led to a
small area of mature Mango trees said to be the site of a Chinese market garden. What could be channelling was running away from the small stream to an area said to be a garden that was overgrown with native grasses. Archaeological interpretation was impossible except that the growth and height of the mango trees amongst the eucalypts could represent trees planted some time ago. However what was significant about the site, at least to this author, was that most of the site was inaccessible to the public, therefore leaving an intriguing archaeological imprint of possibly three different material cultures; a luxury in itself when compared to the Woolgar.

**Victorian Mining Fields**

As already noted, in spite of Hargraves' (1855) doubtful claim to have been the first to discover gold in New South Wales, ergo Australia, Victoria was the epicentre of the Australian gold rush and therefore the nucleus of technological transfer and experimentation. Such crushing devices as the Chilean Wheel were being used early on in Victorian fields (Bannear n.d, 1999a) and seemingly an unusual stamp battery described by the Earl of Liverpool (1868: 72-81) in a restricted circulation publication that implied at first glance that he had been a jackaroo for three years in Australia. In fact Cecil George Savile Foljambe, otherwise known as the Earl of Liverpool, was serving on a Royal Navy man-of-war that at the time was moored in Philip Bay enabling him to visit the Ballarat goldfields in north-west Victoria in August 1864. His narration starts with the description of two other ships at anchor in the bay, the impressive, shortly to return to Liverpool, SS *Great Britain* and the P and O Royal Mail carrying liner *Madras*, which was also homeward bound. Although the Brunel designed *SS Great Britain* was at this stage of its career a luxurious emigrant ship at the height of the Australian gold rush, it is doubtful though whether any of the north Queensland miners from the British Isles could afford a passage, at least an outward bound passage on such a vessel. Foljambe (1868 72-3) went aboard both ships, noting the excellence of the *Great Britain* before making the 97 mile rail journey to Ballarat.

Taking advantage of his main contact in the area, the manager of the local branch of the South Australian Bank, Foljambe was able to visit Ballarat's 'largest goldmines' owned by the Prince of Wales Company. He describes his descent down a 500 ft mineshaft that was divided into three sections, one down, one up and the third for water that was being pumped out of the mine. He was also amazed at 13 drives off the main shaft. However, it would seem Foljambe was no stranger to goldmines for he had also visited
the Great Extended, Kohinoor, Band of Hope and the Armies Company mines. In comparison, based on his visit to a mine in Forbes NSW, he considered the Victorian outfits to be technologically superior. He also seemed well versed on alluvial leads and that quartz reefs always run east to west.

Based on such background knowledge, Foljambe’s account of an unusual stamp battery operating at the Prince Wales mines would seem to have some credence. The battery at the Prince of Wales mine was unusual in that the gold's host rock was crushed by a series of very heavy bars rather than by a Cornish or Californian stamp battery that dropped the iron stamp heads in sequence. His small drawing of the stamp battery is very simplistic (1868: 73) and only shows a cogwheel against an upright that lifts the iron bars. Whilst walking round the mine and mill he always seemed to be accompanied by a supervisor or superintendent, so one assumes he was being 'technologically advised'. However, there is no description of the sequence of bar drops, or how many made up the stamp or its power source. Interestingly the crushed quartz fell into a trough which was initially being sorted by 'lots of men, most of them Chinese' whereby the obvious gold is picked out before the slurry goes to the puddling process (Foljambe Earl of Liverpool 1868: 73-4). The presence of a Chinese gang working for a mining company seems out of the ordinary, though there is no reason why a Chinese gang should not be contracted through their headman on a piecemeal basis.

**Bethanga Mines, northwest Victoria**

Philipp's (1987) portrayal of a poor man's diggings already explained in the introduction to this chapter could well apply to any of the Australian goldfields. However, the Victorian mining legislation does spoil the impression of small gangs of miners harmoniously working a reef to the mutual benefit of all. According to Bannear (n.d: 2), claimholders had labour covenants attached to their lease stipulating how many miners were allowed to work a claim, which was also dependent on the size and nature of the ore deposit. For instance, where gold and copper occurred in the same ore a separate lease was required for each metal. A gold lease would have cost ten shillings per lease per acre whereas the mineral lease price was two shillings per acre with both leases having a prerequisite of, say 6 miners per lease requiring twelve men when the work involved only justified half that number. This would surely have strained any accord amongst the group. While appreciating some form of comparison could well have been forthcoming in such a situation, the supposition that post-Eureka there were
contented bands of miners working the Victorian goldfields is somewhat questionable. This is especially so when compared to Queensland's goldfields that were without such an authoritative resource, and explains tensions around the Victorian goldfields.

Likewise the topography of Bethanga bears very little similarity to that of the far north Queensland's goldfields. The Bethanga goldfields, some 15 kms from the twin townships of Albury and Wodonga and with the significant ranking of a Regional-Heritage Inventory listing (see Bannear 1999c), is easily accessible via an attractive modern tourist route. The surrounding settings feature lightly-covered timbered high hills with impressive views of the Murray River and the Hume Reservoir. The industrial archaeology of the area has good clear interpretive signage provided by today's Cultural Heritage Division of the Victorian Department of Planning and Community Development that proved useful during a recent visit to the various industrial archaeological sites in the area that are removed from being considered a poor man's diggings.

Primarily, the Bethanga was not an alluvial field; it was a reef mining area with a complex geological matrix that was not readily identifiable in 1876. The customary quartz host was supplanted by a 'kind of quartz rubble' containing a good deal of other minerals. Later, the 'rubble' was identified as gossan, a surface oxidised ore bearing gold that only requiring free milling by the then customary Californian stamp with an amalgamation process to procure the finer gold particles (after Philipp 1987: 30-1). At the time the Victorian assayer Thomas Carpenter was cautioning against the extensive use of the amalgamation as quartz could also be charged with metallic sulphides of iron, arsenic and copper pyrites with substantial traces of silver, lead and zinc rendering the mercury ineffectual with gold a loss of up to 35% of the possible yield. Carpenter goes on to attribute gold loss to a number of bad practices, the worst being the lack of classification of the ore before treatment and the standardisation of the ore not being ground fine enough to be freed from its host. Then again, the use of blankets, copper plates, ripple tables and mercury troughs were found inadequate with a high percentage of gold being washed away in the volumes of water used in the process. Furthermore, better and more sophisticated metallurgical principles were already being used in overseas mining operations that according to Carpenter could have been easily applied to the Australian mining industry.
Nevertheless, the first stamp battery with the accustomed sequence of separation arrived on Bethanga powered by an 8 hp steam engine that crushed 50-60 tons of ore a week and in April 1876 crushed a similar consignment of ore from New Years Gift claim that yielded 70 troy ounces of gold (Philipp 1987: 32). Within a year, 50 heads equalling some ten stamp batteries, nine steam engines with a 98 hp capacity to work both stamps and supporting winding and pumping appliances had been installed on the field. Within a further 2 years the Bethanga gold production had ceased and the field was eventually taken over by Wallace and Company who concentrated on the copper deposits in the field rather than the complex gold ore. The field's history then becomes complicated. The sophisticated plant that remained in operation to at least the third phase of Hewlett's mining economies model (see Figure 3:2) became a classical Critical Theory study with the ever-increasing tensions between Wallace's monopoly of both mines and smelter, the township, the Wesleyan Church and the unions (Bannear n.d: 3-4; Philipp 1987: 127-68).

**Dolly's Creek in the Steiglitz Mining District of Victoria**

The reason for choosing this site as a comparison with the Lower Woolgar is because the large mining companies like the Prince of Wales and the Australasian Gold Mining companies in the 1850s took up large leases covering the whole area to crush and puddle the shallow cemented gravel deposits. Such an operation would entail the excavation of the surface gold bearing gravels leaving a scarred landscape that could explain the eroded areas of the Lower Woolgar. However, both companies found little success and decided to move on to prospect and work deep quartz leads instead (Bannear 1999b: 38). At this point it is worthy of note that the unusual crushing procedure described earlier by Foljambe (1868: 73) being used at the Prince of Wales Company separation plant was probably similar to that used on the even more friable cement gravels of the Steiglitz Mining District.

The richness of these cemented leads at Morrisons and Dolly's Creek, plus the nature of the topography in this northern part of the district eventually determined that sluicing would be the appropriate extraction process. This was a technique that would have disfigured the landscape as but was a procedure that became central to the subsistence communities that had established themselves around the areas of Dolly's Creek, Morrisons and Tea Tree Creek featured in Lawrence's (2000) study of a poor man's diggings. A term seemingly slightly modified by the Victorian Mining authorities to a
'poor man's field' presumably inferring without the background explanation portrayed by Philipp's (1987: 45-59) that the Dolly's Creek area was only suited to being worked by individuals and small parties of miners looking for no more than the equivalent of a reasonable wage (Bannear 1999b: 39). By the early 1860s the field was being mainly worked by Chinese miners to a depth of 4 feet and the auriferous material treated in sluice boxes. Water was a particular problem in the area. This had been overcome by using the Moorabool Water Company's 12 mile water race that enabled the Chinese to extract, according to the Mining Surveyor's Report dated October 1863 cited by Bannear (1999b: 39), 'a profit from the minute particles of Dolly's Creek'. By 1866 the alluvial workings at Dolly's Creek, Morrisons and Tea Tree Creek had gone into decline and although revived in the 70s for a short period and again at the end of the decade, mining in the area completely finished in 1883 (Bannear 1999b: 39).

Besides any comparison of the mining operations of Dolly's Creek with the eroded landscape of the Lower Woolgar, Lawrence's (2000: 184-8) study of the material culture is of significance. Particularly when comparing the entire Woolgar's total ceramic assemblage to that of Dolly Creek's collection for four houses, the assortment of ceramics based on a Minimum Vessel Count or whole vessels excavated from the various house sites, was found to be much less at the Woolgar site.

**Summary**

In keeping with the last section of this chapter, the aim has been through comparison to replace what has been lost in both the historical and archaeological record of the Woolgar. The Palmer goldfield Chinese population, principally through the eyes of Noreen Kirkman and Lindsay Smith has given an insight into the possible work practices of the Chinese alluvial miners during their temporary stay on the Woolgar. Ergerström and the Hodgkinson goldfield are seen as examples of Keynes *auri sacra fames* that could have represented the plight of any number of Woolgar miners. All in all this chapter of comparisons is grist for the next chapter's discussion and interpretations in relation to the premisses of this dissertation.
Chapter 8 : End Insight

Introduction
The outcome of Chapter Two's investigative role was the affirmation of a revised archaeological research methodology based on Giddens' theory of Structuration that has been formulated to seek the clear conduit between the cause and effect of agency in the Woolgar's archaeological record. The foundation of the applied methodology being used was initially motivated by Schiffer's (1975 and 1988) *Archeology as a Behavioural Science* and his later *Structure of Archaeology Theory*, which opined, among others at the time that there was no place in the discipline for Processualist theories. Accordingly, Anthony Giddens social theory of Structuration is seen as the appropriate methodology rather than a Critical Theory framework to provide the worldview background to the archaeology of a small man's goldfield in North West Queensland. Furthermore, to align this thesis with a Postprocessual perspective it was seen fit to dispense with speculative hypotheses concerning the challenging archaeological and historical records of this remote goldfield. Instead, this assessment relies on a series of conclusive declarative statements based on agency to substantiate arguments raised in the thesis. This intention has a similarity with Salmon's (2007: 13) statement that Charles Darwin's book, *The Origin of Species* was one long premiss needing one single conclusion: 'the truth of evolution'. Before offering a not so resounding conclusion, it also seems appropriate, due to the nature of the Woolgar's archaeological record, to cite Salmon's (1978: 182) earlier opinion that while theoretical frameworks provide 'flashy vocabulary' they more importantly facilitate new viewpoints of past lifeways. This was the precise intention of reviewing Archaeology's epistemology in Chapter Two so as to find an investigative framework that was more likely to tease out a narrative from the Woolgar's sparse archaeology. Interestingly the exercise produced outcomes not dissimilar to Basalla's (1988) findings that 'heroic' innovations are rare, substantiating the view of the author that most of Archaeology's methodologies are Lamarckian in that they are adaptations from other disciplines or improvements on previous adopted concepts that do not change the basic structure of the discipline. A case in point would be the Binford's New Archaeology, readily accepted in principle by both American and Australian Historical Archaeology seen here to be an advancement on Phillips's (1955: 246-8) hybridisation of archaeological and anthropological methodologies. In similar fashion Renfrew (1983: 4-5) noted the
scientific undertones of this 'cultural revolution' were the direct influence from another relatively new discipline emerging at the time, the philosophy of science that was being promoted by Karl Popper, Richard Braithwaite and Ernest Nagel. Similarly, David Clarke's (1968) response to New Archaeology was a variety of Systems Theory based on models of cybernetic research that originated from Ashby's (1965) *An Introduction to Cybernetics* (as cited by Hardesty 1972: 76-8). In reviewing the prevailing theories of the period, Shennan (1989: 635) noted that the processes of both the Binfords and Clarke did not sustain the test of time. But as Sherratt (1998: 700) observed, and a point worthy of note, Clarke was not setting out 'a concrete prescription for the rest of time but the value of using developing methodologies to treat specific archaeologies with more than common problems'. As reflected in Renfrew's later description of Postprocessualist Cognitive Archaeology (cf. Meskell 2001: 21), the continuing endeavour of Archaeology as it attempts to improve its interpretive methodologies without changing its core structure, is to recognise the context in which 'things and people work'.

**Themes**

Apart from the American and Australian Historical Archaeological disciplines being predisposed towards most of the Binfords' theories, other factions of Archaeology were not totally accepting of the so called new research procedures with underlying scientific subtexts. For example, Crossley (1990) and specifically Newman *et al* (2001) later reactionary archaeological focus on the years between 1540-1900 of British Post-Medieval Archaeology, which Newman subsequently refers to as 'Historical Archaeology', found no need to theorise on a period with such a rich and dynamic interactive change in material culture. After all, it was an age that witnessed the Enlightenment and the Industrial Revolution with its transition from governmental mercantilism to *laissez-faire* capitalism. This was a period particularly distinguishable by advanced technology, resulting in improved production and, at times, extensive speculation and consumerism (after Kynaston 2011). The technological advances seen in Great Britain were gradually transferred to its extensive global colonial intra-trading bloc characterised as a World System but were often unsuccessfully modified or minimalised to suit local habitus (eg. Evans 1975). In essence therefore, any suggestion of theory being applied to this period was set aside as the personal preference of the researcher (after Newman *et al* 2001: 4-9).
Equally puritanical attitudes towards generalised theory are noted in Australian Archaeology's dismissal of generalised theoretical designs being applied to the hunter-gatherer aspects of its archaeological research. Such targets were particularly those couched in Post-Modernistic terms that drew Megaw's (2004: 26) droll comment in his exaugural review that such proposals were as 'indigestible as a frozen pie floater'. For the fortunate uninitiated, this comment refers to the South Australian indulgence of a meat pie floating in a pool of mushy peas. It could be seen as a tacit parody discouraging theoretical frameworks from being readily accepted or published in Australia.

This is also a mindset often noted in British Industrial Archaeology with its tendency to ignore the more appropriate Critical Theory contextualisation and social analysis that could improve the mainly descriptive archaeological commentaries on periods of the Industrial Revolution (eg. Hudson 1979: 20; Palmer et al 1998: 3-8; Gould 2001; Hudson 2001). Thus, it constitutes a branch of scholarship often berated for remaining on the cusp of academia and antiquarianism despite Great Britain's vast wealth and depth in Industrial Archaeology. Notably however, recent attempts have been made to refashion the discipline's outlook with roles of innovator, interpreter and preserver of the past (after Palmer et al 2001; 2005; Orange 2008: 93; Falconer et al 2011: 2-8). The new directional emphasis was part of a series of contemporary industrial archaeological studies published in the Industrial Archaeology Review 2004 (see Holden 2004; Hughes 2004; and especially Lamb 2004) that pre-empted McAtackney's (2007) publication 'Historical Archaeology of the recent past'. Hilary Orange (2008: 94) concludes her narrative of Industrial Archaeology's improved role as the researcher and guardian of the nation's rich heritage with a viewpoint similar to Cunningham's (2002: 38) that 'the incremental returns of theory... add to the value of a critical review'.

Likewise, many stimulating neo-Marxist theories emanated from Adorno's Frankfurt School of Critical Theory and to a lesser extent, the equally thought-provoking research aims of Giddens's Structuration presenting alternative research agendas (cf. Macey 2001: 3-5, 9-10, 189-90; Scott et al 2005: 104). It was Giddens' inspired research format that stimulated the deconstructive approach to Irvinebank and this thesis on the Woolgar that seeks out postfoundationalist contexts, contradictions and justifications. The already adopted mode of modern Critical Theory archaeological studies focuses on Capitalism, World Systems, Class, Conflict, and Gender promote progressive
opportunities to freshen aspects of Historical Archaeology that in recent years have been encouraged by the widening focus of Contemporary Historical Archaeology in Theory, aka CHAT (Beaudry 2007: 3; McAtackney et al 2007: 5-6). Notwithstanding such a progressive initiation, Ivor, Noël hume's [sic] (1964) canon that advocated Archaeology as 'the handmaiden to History' is seen as a dubious norm, especially since Archaeology's armature from the sixteenth century onwards merely requires subordinate primary historical data to contextualise the archaeological record (after Gosden 1999: 94; Newman et al 2001: 5). Therefore it is the expressed conviction of this thesis that primary sourced history in its secondary role should induce Industrial and Historical Archaeology to challenge a wider arena of economics, political agendas and even ideological prejudices implied in such records that are seen in part to have silenced an uneducated workforce's lifeways (after Trouillot 1995; Palmer 2005: 60-1).

...and Issues

Beaudry's (2007: 1-3) observations of the enhancements taking place in the discipline goes on to cover a situation that she described as a 'mindless enforcement of State legislature and an embryonic conservatism that has led US Historical Archaeology into a cul-du-sac'. This is a blind alley according to Beaudry (ibid) that continues to espouse Processualism, resulting in a conservatism that is resistant to change and so restricts the intellectual breadth of the American discipline. A similar trend seemed to be developing in Australian Historical Archaeology until the recent announcement of a workshop on Contemporary Archaeology in Australia 16-17th February 2012, hosted by Sydney University. Hopefully such interest foretells of Australian Historical Archaeology embracing new avenues of research rather than more attempts to valorise old 'fibro' homes, ubiquitous ceramics and glass shards that have replaced the original intention of using such artefacts to identify the functions of particular areas of an archaeological site (after Gosden 1999: 97). Today's practice is seen as non-factual in isolation as such artefacts can only really be considered as possible dating mediums or at best, indications of past owners' preferences that hardly corroborate a gentrified status, particularly in frontier mining situations (eg. Thomas 2007: 16, citing Foucault 1970: 43; Hodder 2000: 22). In contrast, the current innovative thrust of the Anglo-American and Scandinavian CHAT tends to concentrate on a variety of contemporary studies including urban derelict landscapes, vernacular architecture, public housing, the homeless, mobility, graffiti, underground railway systems, more recent battlefields, the
archaeology of contemporary protest and even street parties in celebration of a royal wedding (eg. Harrison et al 2010; see CHAT website). The more recent academic stimulation is Dillon's (2011: 10-22) standpoint that confronts the perspectives of the cultural afterlife eras of the recent past with the following statement. 'Such sociological ruins provide a portal onto modern history with its decline of cities and landscapes that have become "non-places" and "drosscape" to symbolise the entropic and decay in today's critical environmentalism so as to highlight past bad practice as forebodings for the future' (ibid). This is an evocative proposition that is seen as urging present day Contemporary and Historical Archaeological studies to bring to the fore a deeper understanding of the past as a causative rationale for the present (after Harrison and Schofield 2010: 147-9). It is a refreshing standpoint that can be seen as an endorsement of a section of this chapter, under the heading, "Financial Instruments" that focuses on the failings of the Gold Standard as a possible presage for present-day European economic woes that again blindly followed the American economic babbidity of 2008.

**Aims**

Beaudry (ibid) concludes her review of CHAT with Grossberg's citation (1997: 262) '...in which modern cultural studies aim to gain an understanding of context because the context itself has in part, already been constructed by theory'. This mildly enigmatic reminder perhaps echoes Sherratt (1993: 119-28) that all archaeological deductions are a product of speculation. This is further emphasised if seen in combination with Leone's (2010: 52) proposal of using a deductive methodology, particularly when aligned with Thomas' (2007: 55) application of theorising sparse archaeology, which is often commodified and overlooked and therefore abates new avenues of research. Hence, the overview of this thesis has proceeded in accordance with the rubrics of the chosen framework based on the principles of Structuration outlined in Figure 3-1 to engage in a series of dialectics, so implied by the terms Allocative and Authoritative Resources, as an audit and contextualisation of the Woolgar goldfield's worldview. It was an exercise that continued to take a polemic stance to produce declarative explanations in answer to premisses discussed during the course of this thesis. In essence, the *gestalt* of the Woolgar's limited archaeology and sparse historical background as a worldview might be considered in certain respects to be of some prophetic value.
A General Review of the Woolgar's Landscapes Archaeology: The Woolgar's Allocative Resources

Landscapes are clearly central to most archaeological sites and therefore, according to the methodology outlined in Chapter Three, the Woolgar's landscape is assessed as a basic element of both Allocative and Authoritive Resources. However, from a mining perspective, the Allocative Resources' schematic subsets of Landscape and Proprietary are closely interconnected with the geological assets to be the essence of a *duality of structure* appraisal.

To assist in such review, a satellite image records the GPS waypoints of various pedestrian surveys (see Figure 3-2) based on Denaro et al (2001: 4) geological map (see Figure 3-3) and Haldane's (1895) sketch map of the Woolgar goldfield (see Appendix 10). Such forays attempted to locate the archaeology of the Woolgar's community and mining activities other than those already recorded near the river. The ensuing field surveys of the upper regions of the dry riverbed alluvium were taxing for both the four-wheel-drive vehicle and the subsequent pedestrian surveys searching for flood-depositioned artefacts and remnants of past mining activities. Even sections on the higher ground proximate to Denaro's (2001: 8-14) recorded settlements and mine sites were archaeologically deprived by past climatic conditions, leaving much to speculation over the occasional stone formation and small rock configurations found near or amongst the various gullies' colluviums.

Further efforts to find the Victorian, Thomas Close's attempts at building a water race (see Keid 1937) were started as near as possible to the head waters of the river that concentrated on the alluvium of the Cenozoic period (see Figure 3-3). The slightest suggestion of a race, possibly inspired by similar Victorian sluicing operations described by Lawrence (1997) and Bannear (1999a, 1999b) were frustrated by the archaeological barrenness of the area. According to Haldane ([1895]1932: 386-7) Close's water race was intended to sluice Greasy Bill's Gully area but after some 6 miles (say 10 kms) entailing a considerable amount of tunnelling, the project was abandoned due to the lack of funds. Later efforts by Mining Warden Haldane to safeguard the project while Close attempted to find more funding to complete the work were thwarted by further flooding that totally washed away the incomplete project. It would seem, in spite of Haldane's (ibid) published encouragement, the pattern of flooding over the years has more than likely deterred any further undertakings to sluice the upper Woolgar for
gold. According to Roger Barns (pers.com. July 2006), who mined the area from 1964 to 1988, any evidence of previous mining ventures in the upper region of the Woolgar would have been washed away by the time of our surveys. Mrs Barns told of being isolated for weeks at a time as a result of the extreme flooding. She also recounted when she was young adding to her collection of Chinese artefacts from such scatterings around the area as result of flooding. Also, much to her regret was that she did not listen to her grandmother's accounts of living in the upper Woolgar during those early days of the goldfield.

The lack of conclusive signs of other workings further downstream from Top Camp and the Soapspar region became a regular disappointment. The occasional circular stone camp fireplace was usually adjudged as some modern day fossicker or ringer's (drover) temporary campsite based on the occasional discarded unplugged tin can found in the area. The older tin can of 19th century provenance has a soldered plug on the bottom of the can whereas the modern tin can does not feature such signs of sealing (Rock 1984: 99). The later pedestrian survey of the Upper Camp and the Laidlow's Camp area did find minimal cultural transforms (Schiffer 1975:836-48) like possible channelling, the remnant of a small dam and the sunken characteristics of a grave site, all of which left much to conjecture. Overall, it was an exercise in a difficult landscape that at most affirmed the arduous lifestyle of past miners and their efforts to procure a better lifestyle in such a formidable landscape as the upper Woolgar. The comparatively gentler landscape and the limited archaeological record of the lower Woolgar with large areas of erosion, perhaps indicative of a higher occupancy, were just as perplexing in that so little was found to substantiate the Woolgar's multicultural presence.

The use of landscape as an approach to identifying human behaviour dates back to the end of the 19th Century and is symptomatic of the ongoing change in popular archaeological thinking about landscapes. Knapp and Ashmore (1999: 2; cited by Anschuetz et al 2001: 158) characterise the evolving difference from the once-theorised passive backdrop to Archaeology, to that of being a determinant in present-day Cultural Studies. Nevertheless, contrary to Anschuetz's et al (2001: 157) research which traces the origins of landscape study back to Durkheim and Ratzel at the turn of the 19th/20th centuries, Fleming (2006: 267) contends that landscape study came into being with Aston and Rowley's (1974) Landscape Archaeology as a progressive development from Crawford's (1953) Field Archaeology. Furthermore, in Fleming's (ibid) opinion, Post-
Modern landscape studies are seen as disturbing and abstruse with unhelpful embellishments by Thomas (1993, 1996), Bender (1998; 2001) and particularly Tilley's (1999: 133-238; 2004a, 2004b) phenomenological similes. Admittedly, such alarming ethereality comparisons as 'beach in the sky', 'coombes in the sky' and the incredible 'stones that float in the sky' are all judged as particularly unrealistic (Fleming 2006: 268). Irrespective of any study period, the features in the geography of an archaeological site are often the most challenging. Especially when attempting to evaluate an abandoned and ephemeral mining site's faint agency there is a definite need for more practical approaches. Though generally not dismissive of Post-Modernism, more realistic landscape assessments are called for, particularly in the case of the Woolgar; where a reliance on comparative real world experiences was found to be more instructive than the untoward adventuristic embellishments of Post-Modernism.

For example, Schiffer's (1975: 838-41) categorisation of changes in the landscapes are noted as cultural or natural transformations, stated as 'c' or 'n' transforms. These classifications together with Merleau-Ponty's (1962, 1968) earlier phenomenological appraisals are thankfully less fanciful as a means of acknowledging the possible intentionality reflected in the landscape. The analogous explanation of Merleau-Ponty's (1968: 132) supposition is simple, in that everyday life experiences and consciousness are recalled as a mental comparison; such as when seeing the colour red, all known shades of red in most instances become part of the consciousness and therefore assist in some form of conclusion (Merleau-Ponty 1968: 115). In similar fashion, the recollections of previous visited mining-scapes are avenues of possibility that enable the recognition of comparable mining agencies embedded in the contours of an industrialised landscape. Likewise, both historical and archaeological texts such as Agricola (1912 [1556]), and Hardesty (1985; 1988; 1990, 1998; 2003), provided further realistic options for evaluating the archaeology of a miningscape.

The ancient studies of Agricola (1912 [1556]: 281-8, 296-301) particularly provide illustrated examples of innovated mining procedures. He uses the landscape of the Carpathian Mountains to demonstrate stamp batteries similar to the Cornish taking advantage of the precipitous terrain and being operated by a controlled water-flow from higher levels that also went on to classify the winnings from the gangue being swept downstream into separate settling areas. Such methodologies are said to be the inspiration of 13th Century Cornish and German technology (see Agricola 1912 [1556]: 202
editor's footnote p.282-3). These techniques also serve as a reminder of the various Mining Wardens' criticisms of the inadequate mining practices adopted on the Woolgar, especially since a number of the long-term miners working the field were either Cornish or German. There again, such lackadaisical procedures are perhaps indicative of inexperienced miners or the expediency of a 'small man's field' limited by insufficient capital. This was a state of affairs that out of necessity promoted such inadequate mining practices that are best left for discussion in the later section subtitled 'Technologies'.

**The Lower Woolgar's Industrial Archaeological Landscape**
For the comparatively modern approach to industrial landscape evaluation, Hardesty (1998: 94) looks for hierarchical structures in mining townships that display strategies in the terrain's palimpsests that express negotiations by mobile individuals and groups. Such archaeological imprints of the Woolgar's itinerant multicultural mining communities are unfortunately rarely visible due to the oft-stated character of the Woolgar's environment. The Lower Woolgar's large areas of land erosion that gave temporary credence to the notion of a sluicing operation having taken place were abandoned were later abandoned by the author (see examples Figures 5-9, 5-11, 5-12, 6-34).

While flooding is the primary cause of the Woolgar's land erosion, consideration should also be given to the assumed number of horses required for travel and cartage in such a remote location. Also, since the 1890s the Crapp family had turned their hand to cattle. By 1922 their eventual partnership with Close and Gordon, managed over a 1000 head of cattle grazing the flatter areas of Middle Camp and the Lower Woolgar (Pers. Comm. Frank Crapp May 2005). This was an ongoing practice with the subsequent landowners and leasees of the Middle Park station free-ranging their livestock even during the harsh drought periods that surely increased the land erosion in the area. On the other hand, the extensive deep gouging south of the Government surveyed community settlement (see Figure 5-9) is seen as the result of the market garden being run by seven licensed Chinese (see QSA: MWO/14BX3). Those areas that do have a discernible Governance's (see Figure 3-1) archaeological imprint in the Lower Woolgar mainly bear witness to the Queensland Government's initial support to mining communities by way of planned settlements, mining claims and machine areas. Within this industrialised domain there are no remains of ecclesiastic, governmental or managerial panopticons.
overseeing the Woolgar industrial landscape, as seen in other northern Queensland mining sites such as that in the tinfields of Herberton and Irvinebank on the western side of the Great Divide (see Taylor 2001, 2003). Comparative to the Woolgar, the Hodgkinson's gold mining sites of Thornborough and especially the Kingsborough's Tyrconnell mine, do however provide excellent examples of adapting the workflow to the hilly terrain (see Figures 7-2 to 7-4). In particular, the Tyrconnell mine's proprietary homestead is placed as a panoptican overseeing the mine's poppet head, workers' quarters, the stamp battery and ore concentration operations.

The same could be said of the Lost World campsite. Though the workings were alluvial and the campsite was in a much lower profiled landscape, the miners Glenwright and Guest are seen to have taken the precaution of camping near their workings. On the other hand, the clusters of mines near the Lower Woolgar settlement had no signs of a sentinel type of accommodation. This is an intriguing observation, since the Mowbray, the oldest, deepest and most prolific of the lower Woolgar mines and by far the most demonstrative archaeological agency, is devoid of any panoptican structures. The mine's surrounding landscape with a southerly backdrop of low-lying hills overlooking the Mowbray would have seemed an ideal site for a homestead but for the depleted subsoil and only a casual nearby water supply. In summary, evidence for the hierarchical structures and use of the Woolgar landscape to improve productivity is marginal. This is especially demonstrated when comparing the mining sites of Thornborough, Kingsborough and the nearby Tyrconnell mine (see Figures 7-2 to 7-4).

**Technological transfer: Agency**

The brevity of the sub-heading often used in both historical and archaeological texts implies the expansion of innovative technology but rarely explains the implications of such a process in an Australian context. It is therefore seen fitting at this juncture to bring into perspective the very nature of Australia's historical technological transfer that was greatly hampered by time and space. That was a realisation that became more apparent when travelling the Flinders Highway towards the Woolgar, that one hour's car journey at the speed limit of 110 kms per hour (68.3 mph) exceeds one day's average travel on horseback by at least 18 miles or 29kms. Though horses are known to continue until they drop from exhaustion, the general rule is for them to be rested for at least 2 days after travelling for 5 days at speeds of 7-12 kms per hour (Pers.comm. Catherine MacArthur affiliated to Equine Australia). This approximation is also
implied by Haldane to the effect that it took 5 days to travel 456 kms on horseback from Charters Towers to the Woolgar (see Denaro et al 2001: 50). Consequently, the best rate of technological transfer to far north Queensland, prior to the early 1900s, from either overseas or within Australia, was obviously determined by the length and time of a sea voyage and a horse's endurance travelling from any of the seaboards. Another comparison would be the norm for moving heavy machinery to the outback by bullock cart until the end of the 19th century. Such a form of transportation would have been hard pressed in most situations to make more than two miles (3.2 kms) an hour, especially when taking into account weather conditions and the state of available tracks or roadways going into the Queensland hinterlands (eg. Taylor 2001: 67).

Some of the advanced technology resulting from the Australian Gold Rush was even slower in arriving when taking in to account the rate of transfer of the American telegraphic development made known in 1845. Some eight years later in 1853, a limited telephone service was introduced into the ceded colony of Victoria as a probable technical attribute from the Gold Rush. Similar telegraphic technology took another eight years to reach the other eastern regions of Australia and a further 11 years before international telegraphic communications were possible through a submarine cable from the then Dutch East Indies. No doubt the low populations in the rural regions of Australia were a factor in this gradual connection which required a series of repeater stations across the country to the underwater cable landed in the region of the Bay of Carpentaria (after Gribble 1981: 1,108,316; Sheeny 1987: 5).

Along with other aspects of the continual advance of modernity, such as capitalism and industrialisation, were the benefits of a modernised communication system that brought governmental despatches and up to date financial, agricultural and industrial market information. These were benefits that provided advantage to certain base metal operations that were then able to hedge their inventories and consignments on the London Metal Exchange (see Taylor 2001: 28-41; 2003: 142). Although the same advantages were available to the gold and silver miners, it was of no real consequence as such markets within the British World System had been constrained by the Royal Mint pricing formula since 1717. Although such fiscal unions brought about an initial economic stability, such price constraints were equally seen by some of the northern Queensland mining fraternity as limiting, particularly with the relatively nearby buoyant Asian precious metal markets usually trading at higher levels than the Gold Standard's
rigid species (after Bolton 1972: 58). Such a factor could well have been the incentive for the large influx of Chinese miners to most of Australia's mining areas, bringing with them meticulous gold saving methods that are possibly reflected in the Woolgar's Lost World and are more obvious in some of the Palmer goldfield's archaeology.

**Northern Queensland Mining Technology**

In Hardesty's (2003: 89) comparative exchange of ideas regarding creative mining technology and its transfer, he cites Wegner's (1995) study of the Endsleigh, a goldfield approximately 100 km to the northwest of the Woolgar as a counter argument to his supposition that moderate sized mining companies were the most likely to risk capital on new mining technology. Wegner's research, on the other hand, suggested that the acquisition of capital together with the geological and chemical structure of the ore body were the more likely factors to influence innovative gold extraction processes. Hopefully, both opinions would have given consideration to the economic climate at the time, especially since Wegner's (1995) study of the period from 1885-1915 for the most part covered long periods of economic depression and cautious overseas investments in Australian mining operations. Financial ventures were often deterred by elements in the industry, not necessarily confined to the Victorian goldfields, that went to great lengths to dupe capital investment with deep bogus mines (see Foljambe Earl of Liverpool 1868: 79; Taylor 2001: 46).

Though the Woolgar, based on the early Mining Wardens' reports, was an undercapitalised field of rudimentary separation techniques, the majority of the following discussion on technological transfer is based on the goldfield's separation technology. Despite the fact that the Woolgar miners would seem to be of diverse origins and had probably come from a variety of other goldfields, the stamp battery setup had a pre-determined praxis similarity to Bell's (1982, 1987) description of the Palmer goldfield. Battery setups with simple ore crushing methods were seemingly replicated in other northern goldfields that have been visited but are not discussed in this thesis. These processes seemed to be the prescribed gold recovery methods employed by a small man's field separation plant with a Californian stamp activated by steam from either a Cornish boiler or mobile steam engine of varied horse power. Invariably, such battery configurations included a single or small battery of angled revolving Berdan pans as part of the concentration process, while the less discriminating millers were content with just a blanket below the stamp's mortar box. In contrast, the Berdan
procedure involved transferring the amalgamated slurry produced in the stamp's mortar box or as it flowed over the attached mercury treated copper plate into a waiting Berdan for further grinding. The finer sediment brought about by drag stones at the bottom of the spinning pan were gradually drained by increasing the angle of the Berdan leaving the amalgam ready for retorting the gold. Any residual mercury extant after retortion was reused in the next batch of crushings.

Other than the lack of capital already mentioned, there was a rationale seen by Menghetti (1984: 208) as impeding the northern technological advancement in the 'Queensland miners' disdainful attitude towards book learning'. The more generous compromise is reflected in the archaeology of agency in two of the Woolgar's battery sites that demonstrate the practicality of having uncomplicated machinery that can be easily repaired or cannibalised so as not to seriously interrupt the workflow. A case in point would be the later alternative to the Californian stamp found in William Husband's pneumatic stamp available from 1870 onwards that was said to be faster, quieter and eight times more efficient (Jones 2006: 356). Apart from cost considerations, the oscillating crushing head of the Husband stamp seemed a much more complicated piece of machinery needing a higher degree of skilled maintenance or repair than that required by the regular stamp. This in itself would have been the deciding factor explaining why the Husband was not seen in northern Queensland. Examples of the necessity and ability to carry out repairs and improvisations to a remote battery on-site are certainly demonstrated by the Woolgar's industrial archaeology. Such agency is seen in the discarded spur wheels and belt-drive replacements at the Lower Camp's palimpsest site of the Mowbray Gold Mining Company and Peter Pan batteries in Machine Area 94. The further demonstration of agency is also seen in the archaeological record of a 1930s proposed Depression site at Middle Camp. There we find the unusual placement of a concrete engine bedding in between two steel upright stamp frames, interpreted as the intention to replace the normal steam engine with the more efficient and economical diesel engine to operate a stamp setup that is fully discussed later (see Figure 8-1).
Concomitant with the Woolgar's earlier outmoded work practices is the comparison of the technology available in northern Queensland during the study period. The core of North Queensland's advanced mining technology was Charters Towers, a thriving mining township that produced gold winnings during the period between 1872 and 1917 well in excess of six million troy ounces, over a million ounces of silver and four thousand tons of lead (Menghetti 1982: 1). It was also Queensland's most capitalised field through the local stock exchange that enabled extensive advances in gold extraction methods, most of which were applied to the difficult mineralised mundic ores that enhanced the Charters Towers' reputation with the rest of the State, so claims Menghetti (*ibid*). Even eight years before the discovery of the Woolgar, the technology being used at Charters Towers was far beyond what seems to have been the standard Queensland setup of a modified Cornish type stamp with minimal gold saving devices. From the start of operations in 1872 until 1886, a Charter Towers' battery usually consisted of an attached copper plate below the stamp's mortar box with two strategically inlaid lateral mercury wells so as to create the amalgamated slurry of gold and mercury as it passed over the plate (see Figures 6-3 to 6-5).
The ensuing slurry was then processed by a Buddle or Wheeler pan, after which it was left to settle in a specialised tank before the eventual retortion process. Any residue tailings were finally processed in a Berdan (see Figure 6: 4). By 1886, the sweeping motion of the Buddle in the earlier process sequence had been replaced by a Brown and Stanfield circular concentrator, and the tailings from the subsequent Wheeler pan were sent to a Settler prior to the finer milling by the Berdans. The final stage of the gold recovery process was carried out in a chlorination plant, the latest process at the time that percolated any remaining particles of gold left in the tailings (see Figure 6: 5). This combined mechanical and chemical extraction method continued until 1901 when notable major changes are seen in the workflow. For instance, an additional Brown and Stanfield concentrator was used between the Settler and the Berdan to extract sand. The extracted sand was sent to a second Settler before joining the sludge from the Berdan for leaching at the recently introduced cyanide plant (see Figure 6-5, 6 after Menghetti 1982: 26-8 workflows).

Queensland's major technological advances at the beginning of the 20th century would seem timely after the long economic Depression of the 1890s (see Maclaren 1901: 24-5). Gold production during the decade of recession steadily increased and stabilised, possibly resulting from the improved or new techniques and from the unemployed seeking a subsistence income by fossicking or actual mining. However, by 1905 some 15 years later, Australia's general gold yields began to show signs of diminishing in spite of the very latest gold winning techniques. Indeed, Queensland's overall gold production reinforces such a premiss as it peaked around 1905 before declining into the third and fourth stages of Hewlett's model for mine output (see Figures 3: 4). The Woolgar in fact, had peaked earlier in 1887, but continued mining on a reasonably consistent lower level of production in line with the Country's overall trend until 1900 when there was a noteworthy increase in winnings over the next six years. The surge in the Woolgar's gold recoveries could be seen as the result of improved recovery techniques being introduced to the field by way of the Mowbray Gold Mining Company's Wilfley table. This was an American innovation that had been successfully trialled at Ravenswood, a goldfield in between the Woolgar and Charters Towers, that had replaced the vanner concentrator being used by several mining companies in the area (after Maclaren 1901: 24-5). It marks an event in the Woolgar's history that happens also to substantiate Hardesty's earlier mentioned theory that the smaller mining
companies were more likely to introduce innovative technology than the largest mining operations. Accordingly, the small new mining company registered in Charters Towers took up leases on the Mowbray mine and the original Machine Area 94 where a ten-head battery including a Wilfley table was installed as part of the Company's milling setup (Denaro et al 2001: 28, 64).

Surprisingly Charters Towers, the acknowledged epicentre of northern Queensland's advanced technology workflow for 1901 (see Figure 6: 5) did not include the acclaimed Wilfley table. An innovative appliance with a 30 per cent improved recovery capability that had been available in Queensland for at least the previous 2 years (after Maclaren 1901: 24). It would be reasonable to presuppose that the millers of Charters Towers were aware of the success of the Wilfley at Ravenswood no more than 90kms away. Nonetheless, the assumed reluctance of the Charters Towers' millers is based on the unsatisfactory experience and inability to work with the less efficient Frue Vanners. This was a concentrator with a continuous belt that worked against a constant water flow but had the tendency if not used efficiently to emulsify and clog the throughput that went on to disrupt the settling tanks causing at least a 25 per cent loss of the auriferous ore (eg. Mantell 1949: 89). Under such circumstances, the management seemed to have had little option but to revert to the relative trouble-free but outmoded technology of the circular Brown and Stanfield (cf Menghetti 1982: 13).

Curiously, for periods after 1901, Menghetti (1982: 26-9) discontinued supplying precise workflow schemas for specific periods showing the major changes to the Charters Towers' milling techniques. Essentially, what followed was a schematic summarisation of the previous sixteen year period ending in 1917, the year in which the Charters Towers mines ceased production. The data presented failed to explain the sequence of events over the period in which Charters Towers had made major transformations to its work processes. The milling setup for the period shows, with the exception of the stamp, that all the old machinery had been replaced by a simplified but more sophisticated separation process; a Grizzly sizer to classify the ore in readiness for a rockbreaker which in turn supplied self-feeding bins over the stamp's mortar boxes. The amalgamation table under the mortar box had an increased number of mercury wells with the resulting slurry being processed by the shaking Wilfley table that also used a steady water flow to sort the mineralised ore according to its specific gravity. Depending upon the classification, the profitable extractions went on to either the
smelter or further sizing so as to separate out the sand in the tailings before the final process of leaching by cyanide (see Figure 6: 5, 6).

On face value, this unclear chronological development of the Charters Towers' separation process seems to leave the remote Woolgar's small man's field with a reasonable distinction of not only hosting the last rush in the nomadic age but also being the first goldfield in the area to have a Wilfley table operating as part of its milling setups. It seems an incredible phenomenon that a small man's field should have installed such an advanced piece of ore separating equipment before Charters Towers, the benchmark of northern Queensland's mining technology.

The Challenges of Depression site locations and technology: 1930-1939

The MGMC's partial imprint on Machine Area 94 lasted long after its departure in 1906 and possibly intermingled with the later archaeological record of the Peter Pan battery that was installed during the 1930s Depression. Based on the Peter Pan battery being driven by the mobile steam engine with a series of belts as seen in Figures 6: 19 and 21, the abandoned Overend steam engine in the scrapyard is therefore recognized as a remnant of the MGMC's 10 head battery (see Figures 6: 28). The concrete battery bedding with protruding lugs and the discarded large bore steel piping elbow in Figure 8: 2 are assumed to be part of the MGMC battery setup that included the already mentioned Wilfley table. The scant reference to this innovative piece of machinery gave the impression that it had been removed from the Woolgar when the MGMC left. Apparently not, according to Denaro; the table was destined to become part of the 1933-34 Woolgar Miner's and Prospectors' Association (WMPA) battery being jointly funded by the DoM and the Unemployment Relief Scheme (after Denaro et al 2001: 28, 62, 65). The disjointed site information supplied by Denaro (ibid) concerning the location of the Lower Woolgar Depression battery sites is already unclear without the mention of a further Relief Scheme battery being considered at Middle Camp.

In effect Denaro's (2001) publication exemplifies Palmer's (2005: 60-1) earlier cited caution in Chapter Two regarding the possible biased and unreliable information transmitted by government agencies. The number of inaccuracies throughout Denaro's Woolgar data strongly implies a lack of peer review that most certainly suggests that edicts similar to Noël hume's [sic] (1964) be changed to Archaeology is paramount to history! Accordingly, to counter Denaro's (2001) somewhat unclear historical record, the archaeology of the field became the dominant factor in identifying the Government
Depression site installations during the 1930s. The first Government battery was at Lower Camp in 1933 erroneously said 'to be on the western bank of the river 800m from the Ironclad mine' (Denaro et al 2001: 28). Archaeologically there were no battery sites on the western bank of the Woolgar River, or for that matter on the eastern bank at the given distance from the Ironclad mine shown in Figure 6: 29. The nearest battery site to the Ironclad mine on the eastern side of the river is the amended appraisal of the Hut 3 site, which is now considered as the Aurora battery site. After further consideration, it became apparent that the assumed unknown site casually referred to by Denaro (2001: 30) as 'Battery site, Lower Woolgar, June 2001' had been subjected to excessive flooding. This would explain the faint industrial archaeology surrounds in the area of the then mislabelled Hut 3. The improvised oven, the partial garden outline with metal Vesta boxes and only the occasional industrial artefacts, like a stamp's cam, was insufficient reason for the site to be considered as industrial site and therefore labelled Hut 3. The fact that this was the original Government funded Depression Relief battery site that had been submerged in the 1934 floods when the river exceeded its normal level by 7.6m also explains the extensive land erosion around the Lower Camp (after Denaro et al 2001: 64). Seemingly, the erosion was a continual phenomenon as the garden's outline in Vesta boxes gradually disappeared between visits to the Lower Woolgar, giving more cause for the uncertain interpretation.

The second proposed WMPA battery site with the DoM reconditioned diesel engine is equally unclear but interesting from two aspects. First, the Roman Crown mine at Middle Camp was yielding sulphide ores needing specialised concentration, giving reason for the suggestion that the nearby dilapidated Crapps' Identity battery refurbishment included the Wilfley table to overcome the separation difficulties of mundic ore (Denaro et al 2001: 65). However, a question at the time of the Wilfley's unclear ownership hampered the plans for a second Government battery in the area resulting in no further mention of the separating table or its destiny.

Appended to this thesis is a CD copy of a edited holiday movie taken by Richmond Councillor and cattle station owner John Forster, which includes an out of sequence few frames showing an improvised Wilfley in operation somewhere on the Woolgar (see CD 3). Unfortunately, John Forster in making the loan of the film for copying was unable to provide an exact date, time or location on the Woolgar other than the early 1970s.
The final point of interest concerns the clear archaeology of agency related to the Crapps' Identity battery at Middle Camp (see Figure 8: 1). Was the concrete engine bedding modification meant to include a diesel engine to run their stamp battery and the Wilfley before the WMPA suggestion or was the change to the battery setup made after the discussion of ownership? Subsequent discussions with Frank Crapp were inconclusive. What is known is that the WMPA battery never materialised, leaving the Peter Pan and Aurora batteries in the Lower Woolgar to carry out the milling for the out-of-work miners remaining on the Woolgar under the Unemployed Relief Scheme. This was a government assistance program that leased a three headed stamp to the Aurora battery, plus allied equipment and spares, together with 30 pounds (lbs) of mercury and 2 lbs of the deadly cyanide. The mere mention of cyanide in relation to historical gold mining sites is a reminder that extreme caution should be exercise around areas where the later stages of ore separation used this extremely dangerous chemical. The often telltale signs of such use is blanched white sand in areas away from the stamp battery that also produces a similar coloured sand from the pulverised gangue.

The more subtle Agencies of the Lost World
With the knowledge of an early Chinese presence on the Woolgar, there was a constant lookout for signs of their mining techniques. Disappointingly, the only possible example of Chinese alluvial mining practices was found in the upper levels of the Lost World alluvial site. The lower level alluvial workings of indiscriminate stone pitching gave no reason to question Arthur Barns' assertion that it was Glenwright and Guest's workings during the 1930s Depression although the stone construction at the end of the gully did have a similarity with the stone forges at the Mowbray and Perseverance Mines. However, the series of neat and regular drystone walls at the top of the narrow descending gully's bed could be considered as originating from the early Chinese presence on the Woolgar. In addition, the inlaid stone configurations after the supposed damming construction give cause to maintain the assessment that the Chinese were the original miners of the Lost World. This is particularly so, considering the comparative descriptions of Chinese alluvial mining methods in Chapter Seven in which channelling was often altered to take advantage of water flows; which perhaps explains the variety in the size of gaps in the inlaid stone configuration. It was an area that unfortunately could not be investigated further due to time limitations, as the Lost World site is again being reconsidered for open cast mining now that the current world market price of gold
is well in excess of US$1500 per troy ounce (Pers.comm. Kevin Richter of Strategic, October 2010). Likewise, the Mowbray Mine and the rest of the field is also undergoing further considerations by Strategic for a more intensive mining program that would mean losing the oldest and only clear archaeology of reef mining that spans the existence of Woolgar (see Appendix 12).

Since conferring with Kevin Richer, the volatile Gold Futures in New York continued in its role as a hedge against economic uncertainty to reach to a high so far on 24\textsuperscript{th} August 2011 of $1910.00 per troy ounce. The market will no doubt continue to fluctuate reflecting any economic instability like the Euro zone until some economic miracle or even the Euro's disbandment.

Financial Literacy
Hardesty (1988: 12-17) observed that most industrial archaeological commentaries lacked depth, implying that there is more to an industrial site than machinery and derelict buildings. Market forces and capitalisation are important adjuncts to the technologies of an industrial site, a line of reasoning made clear by Wegner's (1995: 75, 485-6) cultural heritage studies of frontier gold mining operations in far north Queensland. However, the opinion expressed here is that market forces are of primary importance over and above the capitalisation as the determining factor of an industrial site and should conjoin the economic background to an industrial archaeological study. Without such data, both the narrative and reason why the site exists remain hidden in the archaeology (Taylor 2001: 27). This might be an obvious statement but the study of the relevant market dynamics using past financial data broadened the case study of a tin mining operation's success in a depressed market by hedging raw material inventories with forward sales on the London Metal Exchange (see Taylor 2003). Such base metal and commodity markets' intelligence are available in a variety of forms from the Metal and Commodity Exchanges in both London and New York together with Schmitz's (1979) historical metal price data dating back to the 18\textsuperscript{th} century. A generalised analysis of market trends recognises trading configurations in a day's trading range that can be indicative of future price movements (see Kolb 1994).

Gold's economic impact on the study period has been generously historicized, first as the principal factor in Great Britain's World System that effectively motivated the transition from state intervention mercantilism to that of capitalism in which individuals became free to own the means of production and maximize profits (after Bannock \textit{et al}
1998: 52 and 271). Isaac Newton's 1717 efforts to simplify the mercantilist's primitive monetary system by standardising the gold price and the price differential for silver was part of Great Britain's 18th Century effort to expand the nation's wealth that eventuated in the Gold Standard. This was in accord with economic stability and an easier currency exchange amongst trading partners. The latent effects of this period, already explained through the lens of the Woolgar, was Australia's enormous debt brought about through the easy access to long term funds in the foreign Bond market to expand the eastern States' infrastructure and railways. Unfortunately, the debt stymied the country's economic recovery until it came off the Gold Standard (cf. Bernanke 2004).

Due to hyperinflation, the limited mobility of capital and workforce coupled to inflexible wages and prices produced fragile business cycles that eventuated in recessions as seen in Australia's Long Depression of the 1890s and the Great Depression of the 1930s. Eichengreen's (1985; 1992b, 1992a; 1994) main criticism expressed in his various publications was the Gold Standard's inability to provide 'quantitative easing', a process of increasing the money supply so as to cushion the blow of a recession. The Gold Standard had a recessionary bias in that currency could not exceed the gold holdings held by a country's central bank so that the burden of adjustment to counteract a slump or recession was for the individual economies to scale back expenditure, recognised today as deflation. Inevitably, such economic policies of retrenchment typically increased unemployment due to wages not falling quickly enough to deal with the reduced demand (Mauldin et al 2011: 217). This one way adjustment mechanism created a deflationary bias which was not easily reversed until the countries in difficulties decided or were forced to abandon the Gold Standard, devalue the exchange rate and trade themselves back into equilibrium (see Richardson 1969: 3-4; Bernanke 1995: 8-12).

The Gold Standard as an economic alliance effectively went out of existence in 1933 but despite the historicity of the event and various adages warning humankind of repeating similar errors of the past, some 60 years later, on the 2nd November 1993 a single European currency came into existence with the ratification of the Treaty of Maastricht. Only 15 years on, the Euro in 2008 began experiencing the same effects as the final days of the Gold Standard (after Mauldin et al 2011: 215-92). The Euro currency adjustments to counter economic imbalances are in real prices and wages instead of exchange rates and as with the Gold Standard the burden of adjustment falls.
on the weaker economies, like Greece, Ireland, Italy, Spain and Portugal. Those countries outside the Euro are slowly showing signs of recovery from the effect of another American greed-driven financial debacle, this time in the form of unregulated derivatives and subprime mortgages (see Das 2010, 2011). In the manner of Dillon's (2011) wide-ranging critique, this has created drosscapes in a number of Western economies. Many such economies in the Euro zone, though unable to leave or alter the exchange rate so as to trade out of the debt-ridden situation will eventually, like the members of the Gold Standard, be forced to seek an alternative to such restrictions. Such a scenario serves to highlight Santayana's (1905) apocalyptic caution: 'those that forget the past are forced to relive it'. Such inherent memories can be seen more explicitly as the considered habitus portrayed in a community's preservation of assets and social relationships across time and space (ibid: 261).

Authoritive Resources
The Resources have a parallel significance to their asset counterpart in that they also have a major role in the distanciation metaphor that envelops the storage capacity of the past events to assist with the progressive transformation of social life and technological advancement (see Giddens 1986:171,181).

Social Practices cum Social Capital
Although technology and tardy technological transfer have already been covered by a previous section in this Chapter, social capital is another facet of technological diffusion that still plays an important role even though the evidence of such found on the Woolgar is as faint as the archaeological record itself. Unfortunately, the examples are not of a positive nature, with possible uninformed battery set-ups emanating from the Palmer goldfield and poor Cornish separation techniques from the Crapp family. The sluicing attempts around the Soapspar area would seem to have come up from Victoria with Young but there was no archaeological evidence of any other attempts. Any such notions based on land erosion were dismissed when considering the weather patterns affecting the Woolgar. The innovative Wilfley table being brought to the field was most significant, especially since it was used well in advance of the Charters Towers goldfield considered the benchmark of technology for far north Queensland. Nevertheless, it was an example of technological diffusion adding to the social capital of a mining community.
Likewise, before the arrival of the Wilfley table the only faint parallel to the Woolgar's social capital corresponding to the field's technology can be seen in the ceramic assemblage excavated from Mowbray Street in the Lower Woolgar settlement. Save for some isolated pieces of fine china the overall collection was as mediocre as reflected in the goldfield's technology. Other limited archaeological evidence of social interaction is the amount of empty beer and wine bottles and glass shards in most of the known Middle and Lower Woolgar sites.

**Governance**

Contrary to any aspect of the term *Terra Nullius* (Connor 2005: 3-16), the Woolgar Valley Aboriginal Corporation are acknowledged with thanks as the traditional owners of the Middle Park Station for allowing the Industrial cum Historical Archaeological research on the Woolgar goldfield. The background to the early days of the goldfield also acknowledges the marginalisation of the traditional owners taking place at the time that ended in tragedy with the massacre of a number of the local Aboriginal tribe.

At the request of some of the local graziers and factions of the Woolgar mining community two detachments of Queensland Native Mounted Police commanded by Sub Inspectors Kaye and Nichol arrived 12th September 1881 to disperse groups of local Aboriginals in the proximity of the mining settlements in the Lower Woolgar. Sub Inspector Kaye was fatally speared in attempting to move the group on. At the inquest held at Georgetown (QSA, JUS/N77/259), Sub Inspector Nichols informed the coroner that there was no intention of violence until after the initial contact when Kaye was killed. There was no mention of Aboriginal fatalities during Nichols' deposition to the coroner, nor in his later statement, dated 1st October 1881 reference QSA, A/38864/4600 to a colleague in Townsville. What Nichols did mention, was that shortly after the demise of Kaye, he combined the two troops in an attempt to track the offending members of the Wanamara tribe for four days in the surrounding hills.

Local anecdotal testimony provided by Arthur Barns in 2005 suggested Skull Camp at Strathpark, a property to the west of the Woolgar, which he once owned, was one of the massacre sites. The following survey using a backhoe and ground penetrating radar found no supporting archaeological evidence (see Wallis *et al* 2005). This is no surprise in view of the environmental history of the area that is still prone to excessive flooding.
Some three years later in 1884 Nichols was involved in another Aboriginal massacre at Graveyard Gully just outside the tin mining town of Irvinebank. This time he and four of his troop were accused of murder. Although they were all acquitted of the capital crime, Nichols was immediately discharged from the Queensland Native Mounted Police (Richards 2008: 99).

**Ideology**

As pointed out by White (2007 [1959]: 26-8) long before Dobres and Hoffman (1999: 1-3), technology plays a dominant role in society. Moreover, White's (ibid) analysis is seen as more in keeping with the Duality of Structure appraisal by pointing out that technology is at the behest of social systems but, equally, not all technologies are readily seen as an improvement or welcomed by all the factions of a society. As an illustration, White goes on to use the English Luddites and eventual Trade Union movements as examples of physical and ideological opposition to technological advances. Notwithstanding such ponderables, the period from 1850 until the end of the 1880s is considered as the long boom (see Buckley et al 1988: 8; Catley et al 1981: 5), with the penultimate decade of the 19th Century being when the Woolgar featured as the last gold rush of the nomadic age. There is some reason to believe that some of the more distasteful ideologies outlined in this thesis were also prevalent at Woolgar. The usual anti-Chinese racism was being expressed in May 1885 at a 'roll-up' at the Soapspar Company's Albion Mill that was found to be employing Chinese miners. The subsequent strike that permeated throughout the field was quickly stopped once the two Chinese millmen were stood down (Denaro et al 2001: 45). Was the strike action a question of mateship or just personal greed at the time when the goldfield was at the height of its production?

**Summary**

Has the archaeology of the Woolgar told a story? In spite of the recurring revelations about what was missing rather than what was evident, the methodology did tease out factual archaeological statements. Therefore, Giddens' Structuration of assets and controlling elements enabled a systematic audit of the Woolgar's Historical Industrial Archaeology to affirm the classification of a small man's field due to antiquated technology. Giddens' theory of Structuration used as a methodology seeks agencies to substantiate the archaeology's story that is not reliant on speculative or philosophical appraisals. More surprisingly this isolated field, although distinguished as the last in the

218
age of rushes became the first in its category of a small man's field in far north Queensland to take advantage of advancing technology. In like manner, encouraged by the contemporary elements of a broadening research agenda in both Industrial and Historical Archaeology, this thesis has adopted the role of any good financial analysis that uses the available historical data to predict future outcomes.
Chapter 9: Retrospective

Gold, despite being demonised by Keynes' (1924 and 1930) as a barbarous relic and the root of all evil eventually regulated the majority of the world's known economies for the better part of 254 years. Furthermore, in terms of this thesis' research methodology gold manifests as an example of Agency's Duality of Structure in that after Australia's 1851 gold rush the country's eastern colonies morphed from penal outposts in a World System to become part of the World's third largest gold producer and a vital economic dynamic to the then British Empire. Australia as such personified all the elements of this thesis' investigative framework based on Giddens' theory of Structuration. In spite of certain misgivings as to its adaptability to the Woolgar's limited archaeology and as well as being a small man's field, Giddens' theory of Structuration has shown to be a flexible methodology to deliberate on the Woolgar's worldview through its Archaeology of Capitalism. More to the point, Structuration's centre of attention was on society's fluidity and evidence of change and not variant nebulous tensions sought by conflict analyses.

Furthermore, the recurring caveat was Leone's (2010) advice to select a factual interpretive model as opposed to philosophical or speculative frameworks, which in reality have little or no realistic conduit to the archaeology or elements of Agency. More so because, contrary to first impressions, the Woolgar's archaeology was found to be both marginal and transient, and therefore interpretations could be susceptible to such embellishments. Ephemerality is a common feature of far north tropical Queensland mining sites, especially those of the nomadic age when reports of a new opportunity in the region caused another rush which brought about the quick evacuation of personal effects, housing and technology that only left behind varied impressions of cultural transformations. In the case of the Woolgar, situated in the rugged and complex landscape of the Gerogery Range, there was the added effect of natural transformations caused by flooding that left the goldfield with a gouged barren landscape demonstrated by Figures 5-9, 5-11 and 5-12, as well as the comparative Figures of 6-33, 6-34 and 6-37. Moreover, the lack of historical data lost over the years by individual Mine Wardens' offices, Queensland Mines Department, State's Archives and the fire of 1921 that totally destroyed the Richmond Shire's municipal buildings with all its community records left an unneeded void in the primary data source. While Denaro et al (2001) Queensland Department of Mines' report did provide some of the essential historical
production figures, certain site locations and sequence of events were misleading affirming the contradiction to Noël hume's [sic] (1964) proclamation that the archaeological record is the primary catalyst to the past and therefore no handmaiden to history. Accordingly the Woolgar's archaeology was accepted as it presented and Structuration the most suitable methodology to provide archaeological interpretations similar to those produced in previous industrial archaeological studies using Giddens (eg. Taylor 2001 and 2003).

Following the various surveys of the goldfield, the Lower Woolgar's archaeology though sparse in places did proffer more potential examples of the Agency's Duality of Structure's subsets of Allocative or Authoritative Resources rather than sites in the Middle and Upper regions of the goldfield. This was especially so once the outline of Geraghty survey map (see Figure 5-4) was overlaid on the relevant section of a Google Earth's map of the lower Woolgar River (see Figure 5-10), that helped identify specific sites that were probably related to the artefacts found in situ along the eastern bank of the Woolgar River. Accordingly, three potential cultural excavation sites were assessed as Authoritative Resource while the industrial palimpsest in Machine Area 94 along with the other industrial sites' Technologies further up the river were assessed as Allocative Resources. Although, both the battery sites further up river and Hut 3 had to be renamed after reassessing the respective archaeologies. The so called Battery No. 1 was without doubt a scrapyard made up of the technology removed from the Machine Area 94 (see Figure 6-27). While Battery No. 2, after comparing the photograph in Figure 6: 31 with the archaeology was re-evaluated as the Department of Mines battery on loan during the 1930s Depression (see Figures 6-30 to 6-32). The same reassessment was applied to Hut No.3's archaeology, which was initially misinterpreted as a domestic site but after reappraising the light surface scatter, it was found to be more of a technical nature and therefore reassessed as a battery site accordingly. Therefore, Denaro et al (2001) unnamed battery site seen in Figure 6-33 was confidently seen as the missing Aurora Battery.

The main excavations carried out in the Lower Woolgar were on William Bray's MHL No.11 in Section I and J. J. Moore's MHL No. 6 across the street in Section II. Moore's MHL was later transferred to Thomas Lewis after 1902. The other MHL's being occupied by Mary Brown at 1-2, Section III and Kate McGovern at 3-4 in the same Section were sterile save for a large broken Denby stoneware of dubious provenance.
lying alongside Mary Brown's kitchen (see Figures 5-17 and 18). While such kitchenware would have been confirmation of the site's function, the closeness of a known flood area certainly gave reason to question such evaluation.

The same approach was taken during the survey and excavation of William Bray's Lease that runs alongside the river's eastern levee. Even so, the surface artefacts and those excavated made this site the most informative regarding the miner's Social Practices and a personal ailment while also providing further verification of the Woolgar goldfield's Governance. In addition, the Woolgar's Worldview was further enhanced through the small clay pipe assemblage excavated from a toss zone at the rear of area believed to be Bray's home. Through the name stamped on several pipe stems the Cork family, was established as the pipe manufacturers as they had featured in Woollard's (2003) extensive research of Cripplegate Without, London for the years 1561-1907 affirming a further linkage to the World System.

The two other excavations in the Government Miners Home Lease area were not so informative in that the Moore's hotel in Section II, 1-2 Albion Street sustained fire damage while the ceramic excavation around the Gilbert's lease at 11-12 Mowbray Street, Section III left more questions than answers. The subsequent excavation grid determined by a series of test pits started in the area of Kate McGovern and Mary Brown Leases continued across Mowbray Street to the four unoccupied lots below the Moore/Lewis and Howell's double plots. Further consultation with Geraghty's survey map found that the greater part of the ceramic assemblage was in the middle or towards the right hand side of Mowbray Street that led to the Machine Area 94 and river crossing. The location of the ceramics would explain the extreme fragmentation, which according to Alice Beale's study eliminated any recognisable segments of crockery as a dating medium or indication of specific Social Practices related to any of the supposed rooms in the area. More to the point, who dumped such a sizable assortment of chinaware that was far more than a 'one pot' collection seen in the Bray's excavations? The possibility did arise that it was later discards by the various tenants of the homestead just across the river.

The remaining industrial site in the Lower Woolgar and one on the fringe of Middle Camp along with the alluvia mining at Lost World were by far the easiest definable sites in terms of Structuration's framework. The Mowbray mine site set in the primary
piedmonts of the Gregory Range some 300 metres directly east from the river was the oldest and deepest mine as well as producing one of the field's highest yields. The mine's archaeology offered assemblages of Agency's Duality of Structure by way of the subsets of Technological and Landscape features surrounding the three mine shafts. The archaeology through-out the site clearly defined the mining activities in the nearby terrain and around the mine heads that had strategically placed drystone forges and discarded remnants of metalworkings. Unfortunately, the site along with the adjacent mines will probably be subjected to opencast mining along the defined fault line identified by Strategic Minerals (2012) subterranean surveys (see 12).

It would seem from the same mineralogical surveys (ibid) that a similar fate awaits the Lost World, a site not mentioned by Denaro et al (2001) presumably because of its location and unclear mining activities. The Lost World is an alluvial mining site some three kilometres northeast of the Mowbray set in thick spinifex on the mid-level slopes of the Gregory Range (see Figure 6-39). The first indication of an Allocative Resource in such a landscape was the large drystone structure near the bottom of the descending creek (see Figure 6-43). The ensuing surveys found well formed drystone walling at the top of the creek suggesting Chinese mining (see Figure 6-42), whereas the lower random stone cum rock pitching was, according to Arthur Barns the labours of Glenwright and Guest during the 1930s Depression. The drystone structure at the bottom of the creek was eventually seen as a stonewall to protect the alluvia processing area from the descending flow of the water and at the same time direct it over a Long Tom's corrugated shuttle to collect the gold winnings. The water's flow would then be directed to the processing area's channels to the assumed circles implied by the stone configuration so as to create a centrifugal force enabling any remaining winnings to be collected from the middle of the now fragmented stone circles (see Figure 6-44).

The final site demonstrating the Woolgar's clearest example of Technological Agency is on the southerly fringe of Middle Camp where a Battery still remains set up so that a diesel engine could drive either Berdans or a Wilfley Table instead of the usual boiler and steam engine. This site is assumed to be that of the proposed 1930 Depression Battery that was later found to have uncertain possession rights (see Figure 8-1).

Much of the analysis and interpretations of this thesis have been influenced by Beaudry, Schiffer, Hardesty, Matthew Johnson (1999b), Leone and Archaeology's new directions
seen in Contemporary and Historical Archaeology in Theory, otherwise known as CHAT. While the authors of *After Modernity* advocated new avenues of research with some predictive value, the effects of the recent Global Financial Crisis of 2008 happened to coincide with this thesis' examination of the Gold Standard's consequential affect on the Woolgar's Worldview. The comparative global effects from the 1890 and 1930s Depressions were seen to have mildly similar economic backgrounds whereas the backdrop to the 1930s and 2008 economic crises were too alike to be ignored. Both crises were started by overextended market economies. The strength of the American economy in the 1920s came to a devastating halt with the Wall Street Crash in 1929. The disastrous outcome was such that any economic parity and stability gained from the Gold Standard disappeared. It was not until well after WWII that the world economy seemed to enjoy a comparative stability with the Boom Bust syndrome being seen as an evil of the past Gold Standard. Over the years world markets expanded on the watchword of Globalisation with market liberalisation and deregulated banks that offered easy credit. The result, once again, was highly speculative behaviour as in a quest for wealth businesses and private individuals' accrued huge amounts of debt. The 2008 collapse of the banking sector revealed the lack of capital needed to support such ambitions. In this case, any economic parity and stability the weaker European economies had gained from adopting the Euro disappeared. Instead, countries tied to the Euro were restricted in their ability to devalue their currency as a means to holding their market's competitiveness and retaining employment.

Therefore, to conclude, the adaptation of Giddens' theory of Structuration as a research methodology proved to be more than capable of interpreting the frugal archaeology of the Woolgar. The methodology was equally adroit in arriving at the premiss that the European Economic Union will eventually diffuse like other past fiscal unions.
References

The Hodgkinson Mining News: 10th March 1880

The Northern Miner 31st January 1880

The Queenslander: 6th November 1880

The Queenslander: 13th December 1879

The Queenslander 14th December 1880

The Queenslander: 21st February 1880

The Queenslander: 20th March 1880

The Queenslander: 1st May 1880

The Queenslander: 4th September 1880

Port Denison Times 8th October 1881

The Queensland Police Gazette 1881, 1882


BANNEAR, D. 1999b. Steiglitz Mining Division: Dolly's Creek, Morrissorns and Tree Diggings. Historic Gold Mining Sites in the South West Region of Victoria Melbourne Department Of Natural Resources & Environment.


Woolgar Goldfield

References


BUTLIN, N. G. 1964. *Investment in Australian Economic Development 1861-1900*

Cambridge, Cambridge University Press.


CONNOR, M. 2005. The invention of Terra Nullius: Historical and legal fictions on the foundation of Australia, Sydney, Macleay Press.


DE LA PEYRÈRE, I. 1655. Theological System that there were men before Adam, Paris.


FENENGA, F. 1967. Post 1800 Mining Camps. Historical Archaeology, 1, 80-82.


FOLJAMBE EARL OF LIVERPOOL, C. G. S. 1868. Three Years on the Australian Station, For Private Circulation, London, Hatchard.


JAMES, P. E. 1972. All possible worlds: History of geographical ideas, Indianapolis, Odyssey Press.


KENNEDY, K. H. 1978. The Mungana Affair: State Mining and Political Corruption in 1920s, St. Lucia, University of Queensland.
KERR, R. 1984. Irvinebank, Mining Community and Centre of an Empire: 'God Bless John Moffat'. The Royal Historical Society of Queensland Historical Papers, 12, 141-164.
KEYNES, J. M. 1924. Monetary Reform, New York, Harcourt, Brace & Co... 
LAMARCK, J. B. 1963 [1809]. Zoological philosophy: an exposition with regard to the natural history of animals, New York, Hafner.
References


LEONE, M. P. 2010. Critical Historical Archaeology, Walnut Creek, California, Left Coast Press Inc.


LUBBOCK, J. 1865. Pre-historic times, as illustrated by ancient remains, and the manners and customs of modern savages London, Williams and Norgate.


MCBRYDE, I. 2006. RE: Discussion about Tapp at UNE.


MEGAW, J. V. S. 1984. The archaeology of rubbish or rubbishing archaeology: backward looks and forward glances. The Australasian Society for Historical Archaeology, 2, 7-12.


ORANGE, H. 2008. Industrial Archaeology: Its place within the academic discipline, the public realm and the heritage industry. *Industrial Archaeology*, 30, 83-95.


QPG 1881. Horse thief Queensland Police Gazette, 18, 85.


QUEENSLAND POLICE GAZETTE 1883. Social overview from Police Gazette. 20, 129.
QUEENSLANDER. 4th September 1880. Warden Hodgkinson on the Woolgar.
QUEENSLANDER. 13th December 1879. Mining Notes.
QUEENSLANDER. 14th February 1880. Sub Inspector's report
QUEENSLANDER. 21st February 1880.
QUEENSLANDER. 20th March 1880. Woolgar.


STAFF REPORTER. 13th December 1879. Mining Notes. *Queenslander*.


SWIFT, C. circa 1990s. Keeping up appearances. London: BBC.


Woolgar Goldfield


WHITE, L. A. 2007 [1959]. The Evolution of Culture: The development of civilisation to the fall of Rome, Walnut Creek, CA, Left Coast Press.


Appendix 1: Artists impressions of the Australian Gold Rush

Figure A1-1: with tents in the fro-to-middle ground is 'Mount Alexander' by J S Prout. Source: Gleanings from the Gold (an Australian Journalist, ca 1852); reproduced by permission of the British Library [1049.b.11]

Figure A1-2: fossicking a stream entitled 'Summerhill Creek' a sketch by J S Prout. Source Gleanings from the Gold (an Australian Journalist, ca 1852); reproduced by permission of the British Library [1049.b.11]
Figure A1-3: 'Ophir': a sketch by J S Prout. Source *Gleanings from the Gold* (an Australian Journalist, ca 1852); reproduced by permission of the British Library [1049.h.11]
Appendix 2: Relevant excerpts from Murray 1897:29-32 to provide analysis of Australian Colonies trade balances

Mr. Chamberlain and Colonial Commerce

Appendix 2

For the quinquennial period 1885-89 the annual average value of Canadian imports amounted to 22 millions sterling per annum, and this amount had increased during the following five years to over 26 millions sterling yearly. The exports amounted for the first period to an annual average of 18 millions, and this increased in the second period to 22 millions per annum. In regard to the subdivision of its trade Canada differs, owing to its geographical position, from most of the other colonies, inasmuch as the mother country is not its principal customer, except for exports. The United States of America is the principal outlet for Canadian trade, but in exports the mother country has been steadily leaving the United States of America behind, and now takes fifty per cent. more of Canadian produce than its more immediate frontier neighbours. This fact may partially explain Canadian support of Imperial Federation; for it is apparent that the consumption of Canadian produce by her American neighbour does not increase in proportion to the growth of its population, whereas her exports to England (whose population is much more stationary) is distinctly on the increase. The figures of the import trade are for the five years 1885-89: an annual average of 8 millions sterling from the United Kingdom; from the United States 9·7 millions; and from Germany 0·6 millions. For the years 1890-94 the average amounts per annum are: from the United Kingdom 8·6 millions; from the United States 11·1 millions; and from Germany 0·9 millions. In regard to her exports Canada has a record of an annual average of 8·5 millions sterling to the United Kingdom for the years 1885-89, increasing to 12·1 millions annually for the years 1890-94. The corresponding figures for the United States are 8·2 and 8 millions.

Turning to the Australian colonies we find that in New South Wales the population has increased from 1,132,254 in 1891 to 1,257,450 in 1894. The trade figures for the same quinquennial periods already mentioned are for this colony 21·7 millions sterling annually of imports in the first period, falling to 90·5 millions in the second. The exports mark an increase for the same dates, the amounts being 19 millions sterling during the first, and 32·7 during the second period. The analysis of the figures of the imports of New South Wales indicate that she derives the incoming merchandise mainly from the United Kingdom, then from other Australian colonies, and from foreign
countries almost exclusively from the United States and that not in increasing quantities. The exact amounts are: from the United Kingdom an annual average of 9 millions sterling during the first quinquennial period, and 8·3 millions yearly during the second. From Victoria the imports average 2·8 and 2·2 millions; from South Australia 1·8 and 1·6; from Queensland 3·3 and 4·6; from the United States 0·9 and 0·8 millions. So the intercolonial trade has developed during the ten years, whilst the British and foreign has slightly decreased. There is also an almost uniform diminution in the export figures. To the United Kingdom, New South Wales shipped an annual average of 7·0 millions during the first period, and of 7·6 during the second. To Victoria the values are 4·3 and 4·5; to South Australia, 3·6 and 1·8; to Queensland 1·0 and 1·9; to France 0·7 and 0·1; to Germany 0·7 and 0·1; to Belgium, 0·1 and 0·6; to the United States 1·2 and 0·6.

Next in importance amongst the Australian colonies ranks Victoria, with a population which is nearly stationary, the figure for 1891 being 1,140,405— that for 1894 only 1,179,703. This movement is reflected in its trade returns, which are retrogressive in the imports and with a nominal increase only in the exports for the entire period of ten years. The Victorian imports progressed from 18 millions sterling in 1889, to 24 millions in 1895, giving an annual average of over 20 millions for the five years. From 1890 to 1894 these amounts regularly decreased from 23 millions at the first date, to 12 millions at the last, giving an annual average of 17·5 millions. The exports show a mean annual value of 13 millions sterling for each of the first five years, increasing to 14 for the second period. The countries from which Victoria derives her import merchandise are mainly England, New South Wales, New Zealand, and the United States of America—the latter to an infinitesimal amount only. The figures for the two periods under review are: from the United Kingdom 7·7 and 7·2 millions sterling yearly; from New South Wales 5·3 and 5·2; from the United States 0·9 and 0·6; from New Zealand 0·7 and 0·6. As regards exports, the United Kingdom, two Australian neighbours, and France are the principal consumers of Victorian produce. The amount of trade was stationary during the ten years. The United Kingdom purchased an average of 7 millions sterling throughout both the first and the second five years. New South Wales took respectively 2·6 and 2. France is interested for 0·2 and 0·8, and South Australia for 0·6 and 0·6.

New Zealand follows Victoria both as to population and
healthy commercial position than the larger Australian colonies. As her ten years' trade shows decided improvement in both import and export branches, although the financial troubles from which the new states at the antipodes have suffered are traceable in a diminution of the South Australian returns since 1891. But the averages for the quinquennial periods indicate improvement. On the import side the annual averages for the ten years are $6.5$ and $8.3$ millions; on the export side $5.9$ and $8.6$ millions. South Australia imports no foreign goods, its supplies being drawn exclusively from the United Kingdom, New South Wales, and Victoria. For the double period of five years, the United Kingdom is credited with $2.2$ and $2.8$ millions per annum; New South Wales with $1.8$ and $2.6$; and Victoria with $0.8$ and $0.8$ millions. South Australian exports go to the same countries which supply her imports, the United Kingdom taking $3.2$ and $3.7$ millions yearly; New South Wales $1.2$ and $2.3$ millions; and Victoria $0.5$ and $0.6$ millions.

Tasmania is a small colony with a population of little more than the town of Sunderland (154,000), but its trade only amounts to three millions annually, and is divided almost equally between the United Kingdom, New South Wales, and Victoria.

West Australia ranks last in order of importance amongst Australian colonies for the year 1894, the last for which returns are to hand, but it is probable that the large investments of British capital which the development of the gold industry in that colony have attracted will very soon cause it to assume a position of much higher importance. Meanwhile, West Australia had in 1894 a population of only 157,450, or approximately that of Cardiff (a small number, surely, to receive the concession of separate government!), and records a trade which hardly exceeds an average for both exports and imports of three millions sterling. These exchanges are effected with the nearest country, Victoria and South Australia.

Next to Australasia our most valuable colony is that of the Cape, with a population of 1,711,547. Its trade is steadily on the increase, the figures of 1894 being in both exports and imports nearly double those of 1885. The annual average for the first of the two periods of five years which have been under review are $6.5$ millions and $10.3$ millions, on the import side; and $8$ millions and $12$ millions on the export side. The United Kingdom, Germany, and the United States of America are the three main sources of supply of imports into Cape Colony, the figures being $8.5$ and $8.3$ millions annually from the
### Appendix 2

**Australia's intercolonial and international average trade figures per £ millions for the period 1884-1894 in two five-year periods**

(See Murray 1897:29-33)

<table>
<thead>
<tr>
<th>Colony or Country</th>
<th>1884-89</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Annual</td>
<td>Annual</td>
<td>Annual</td>
<td>Annual</td>
<td>Annual</td>
<td>Annual</td>
<td>Annual</td>
<td>Annual</td>
<td>Annual</td>
</tr>
<tr>
<td></td>
<td>Average</td>
<td>Average</td>
<td>Trade</td>
<td>Average</td>
<td>Average</td>
<td>Trade</td>
<td>Average</td>
<td>Average</td>
<td>Trade</td>
</tr>
<tr>
<td></td>
<td>Imports</td>
<td>Exports</td>
<td>Balance</td>
<td>Imports</td>
<td>Exports</td>
<td>Balance</td>
<td>Imports</td>
<td>Exports</td>
<td>Balance</td>
</tr>
<tr>
<td>NSW trade figures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>9.00</td>
<td>7.90</td>
<td>-1.10</td>
<td>8.30</td>
<td>7.60</td>
<td>-0.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIC</td>
<td>2.80</td>
<td>4.30</td>
<td>1.50</td>
<td>2.20</td>
<td>4.50</td>
<td>2.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA</td>
<td>1.30</td>
<td>1.60</td>
<td>0.30</td>
<td>1.60</td>
<td>1.80</td>
<td>0.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QLD</td>
<td>3.30</td>
<td>2.30</td>
<td>-1.00</td>
<td>4.60</td>
<td>1.90</td>
<td>-2.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>0.90</td>
<td>1.20</td>
<td>0.30</td>
<td>0.80</td>
<td>0.90</td>
<td>0.10</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EUROPE</td>
<td>1.50</td>
<td>1.50</td>
<td></td>
<td>0.80</td>
<td>0.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSW Totals</td>
<td>17.30</td>
<td>18.80</td>
<td>1.50</td>
<td>17.50</td>
<td>0.00</td>
<td>1.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VICTORIA trade figures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>9.70</td>
<td>7.00</td>
<td>-2.70</td>
<td>7.20</td>
<td>7.00</td>
<td>-0.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSW</td>
<td>4.30</td>
<td>2.80</td>
<td>-1.50</td>
<td>4.50</td>
<td>2.20</td>
<td>-2.30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA</td>
<td>2.50</td>
<td>0.80</td>
<td>-1.70</td>
<td>3.00</td>
<td>0.60</td>
<td>-2.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QLD</td>
<td>0.60</td>
<td>-0.60</td>
<td></td>
<td>0.66</td>
<td>-0.60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>USA</td>
<td>0.90</td>
<td>-0.90</td>
<td></td>
<td>0.66</td>
<td>-0.60</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EUROPE</td>
<td>0.20</td>
<td>0.20</td>
<td></td>
<td>0.80</td>
<td>0.80</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIC Totals</td>
<td>18.00</td>
<td>10.80</td>
<td>-7.20</td>
<td>15.90</td>
<td>10.80</td>
<td>-5.10</td>
<td></td>
<td></td>
<td>-12.50</td>
</tr>
<tr>
<td>SOUTH AUSTRALIA trade figures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>2.20</td>
<td>3.20</td>
<td>1.00</td>
<td>2.30</td>
<td>3.70</td>
<td>1.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSW</td>
<td>1.60</td>
<td>1.30</td>
<td>-0.30</td>
<td>1.80</td>
<td>1.60</td>
<td>-0.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>VIC</td>
<td>0.80</td>
<td>2.50</td>
<td>1.70</td>
<td>0.66</td>
<td>3.00</td>
<td>2.40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SA Totals</td>
<td>4.60</td>
<td>7.00</td>
<td>2.40</td>
<td>4.70</td>
<td>8.30</td>
<td>3.60</td>
<td></td>
<td></td>
<td>6.00</td>
</tr>
<tr>
<td>QUEENSLAND trade figures</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>UK</td>
<td>2.80</td>
<td>1.70</td>
<td>-1.10</td>
<td>2.10</td>
<td>3.30</td>
<td>1.20</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>NSW</td>
<td>2.30</td>
<td>3.30</td>
<td>1.00</td>
<td>1.90</td>
<td>4.00</td>
<td>2.70</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>QLD Totals</td>
<td>5.10</td>
<td>5.00</td>
<td>-0.10</td>
<td>4.00</td>
<td>7.90</td>
<td>3.90</td>
<td></td>
<td></td>
<td>3.90</td>
</tr>
<tr>
<td>Gross trading surplus/deficit</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>£-1.20 million</td>
</tr>
</tbody>
</table>
### Appendix 3: Gold Council's data on various countries' gold stocks


#### TABLE 1: CENTRAL BANK / TREASURY STOCKS

<table>
<thead>
<tr>
<th>Country</th>
<th>1845</th>
<th>1850</th>
<th>1855</th>
<th>1860</th>
<th>1865</th>
<th>1870</th>
<th>1875</th>
<th>1880</th>
<th>1885</th>
<th>1890</th>
<th>1895</th>
<th>1899</th>
</tr>
</thead>
<tbody>
<tr>
<td>UK (Bank of England)</td>
<td>64.00</td>
<td>124.72</td>
<td>74.01</td>
<td>97.63</td>
<td>90.20</td>
<td>144.11</td>
<td>102.36</td>
<td>77.20</td>
<td>71.20</td>
<td>105.20</td>
<td>316.67</td>
<td>235.67</td>
</tr>
<tr>
<td>Bank of Italy (Bank of the Republic)</td>
<td>32.58</td>
<td>42.30</td>
<td>42.98</td>
<td>40.88</td>
<td>32.38</td>
<td>32.38</td>
<td>32.38</td>
<td>32.38</td>
<td>32.38</td>
<td>32.38</td>
<td>32.38</td>
<td>32.38</td>
</tr>
<tr>
<td>Austria-Hungary</td>
<td>94.86</td>
<td>46.86</td>
<td>46.86</td>
<td>46.86</td>
<td>46.86</td>
<td>46.86</td>
<td>46.86</td>
<td>46.86</td>
<td>46.86</td>
<td>46.86</td>
<td>46.86</td>
<td>46.86</td>
</tr>
<tr>
<td>Germany (Bank of)</td>
<td>2.00</td>
<td>5.00</td>
<td>10.17</td>
<td>19.47</td>
<td>18.40</td>
<td>20.76</td>
<td>23.77</td>
<td>24.22</td>
<td>28.96</td>
<td>41.66</td>
<td>20.35</td>
<td>20.35</td>
</tr>
<tr>
<td>Italy (Bank of)</td>
<td>NA</td>
<td>NA</td>
<td>12.66</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
<td>15.00</td>
</tr>
<tr>
<td>Switzerland (National Bank)</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
<td>0.41</td>
</tr>
<tr>
<td>United States - Treasury</td>
<td>187.00</td>
<td>160.10</td>
<td>136.95</td>
<td>113.20</td>
<td>100.30</td>
<td>100.30</td>
<td>100.30</td>
<td>100.30</td>
<td>100.30</td>
<td>100.30</td>
<td>100.30</td>
<td>100.30</td>
</tr>
<tr>
<td>Canada (Bank of)</td>
<td>216.74</td>
<td>201.36</td>
<td>171.05</td>
<td>141.48</td>
<td>123.23</td>
<td>123.23</td>
<td>123.23</td>
<td>123.23</td>
<td>123.23</td>
<td>123.23</td>
<td>123.23</td>
<td>123.23</td>
</tr>
<tr>
<td>Japan</td>
<td>7.33</td>
<td>7.33</td>
<td>7.33</td>
<td>7.33</td>
<td>7.33</td>
<td>7.33</td>
<td>7.33</td>
<td>7.33</td>
<td>7.33</td>
<td>7.33</td>
<td>7.33</td>
<td>7.33</td>
</tr>
<tr>
<td>Hungary (Hungarian Bank)</td>
<td>216.74</td>
<td>201.36</td>
<td>171.05</td>
<td>141.48</td>
<td>123.23</td>
<td>123.23</td>
<td>123.23</td>
<td>123.23</td>
<td>123.23</td>
<td>123.23</td>
<td>123.23</td>
<td>123.23</td>
</tr>
</tbody>
</table>

*All figures in million ounces fine gold.*
Woolgar Goldfield

Appendix 3

257


Appendix 4: Queensland Demographics and Rail System
## Appendix 5: Queensland's Principle Gold Mine Production

<table>
<thead>
<tr>
<th>Date</th>
<th>Mine</th>
<th>Troy Ounces</th>
</tr>
</thead>
<tbody>
<tr>
<td>1867</td>
<td>Gympie</td>
<td>3,308,158</td>
</tr>
<tr>
<td>1870</td>
<td>Ravenswood</td>
<td>865,054</td>
</tr>
<tr>
<td>1872</td>
<td>Charter Towers &amp; Cape</td>
<td>6,622,261</td>
</tr>
<tr>
<td>1873</td>
<td>Palmer</td>
<td>1,329,042</td>
</tr>
<tr>
<td>1875</td>
<td>Hodgkinson</td>
<td>229,706</td>
</tr>
<tr>
<td>1886</td>
<td>Croydon</td>
<td>766,996</td>
</tr>
<tr>
<td>1886 *</td>
<td>Various Small Mines</td>
<td>825,182</td>
</tr>
<tr>
<td>1888</td>
<td>Rockhampton &amp; Mt Morgan</td>
<td>4,565,624</td>
</tr>
<tr>
<td>1888</td>
<td>Eidsvold</td>
<td>97,679</td>
</tr>
<tr>
<td>1893</td>
<td>Coen</td>
<td>51,255</td>
</tr>
<tr>
<td>1900</td>
<td>Hamilton</td>
<td>45,547</td>
</tr>
<tr>
<td>1909</td>
<td>Chillago</td>
<td>18,504</td>
</tr>
<tr>
<td>1869/09 ^</td>
<td>Various Small Mines</td>
<td>605,797</td>
</tr>
</tbody>
</table>

* Cloncurry, Calliope, Clermont, Paradise, Normanby & others

* Etheridge, Woolgar & Oaks

**Reference**

Appendix 6: Historical Gold-Silver differentials


<table>
<thead>
<tr>
<th>Countries</th>
<th>Monetary System</th>
<th>Ratio between Gold and Full Legal Tender Silver</th>
<th>Ratio between Gold and Limited Tender Silver</th>
<th>Population  [000's omitted]</th>
<th>Stock of Gold  [000's omitted]</th>
</tr>
</thead>
<tbody>
<tr>
<td>France</td>
<td></td>
<td>1 to 15½</td>
<td>1 to 14½</td>
<td>26,800</td>
<td>160,000</td>
</tr>
<tr>
<td>Germany</td>
<td></td>
<td>1½ to 15½</td>
<td>1½ to 13½</td>
<td>45,400</td>
<td>123,800</td>
</tr>
<tr>
<td>United States</td>
<td></td>
<td>1½ to 15½</td>
<td>1½ to 13½</td>
<td>67,400</td>
<td>132,300</td>
</tr>
<tr>
<td>Austria-Hungary</td>
<td></td>
<td>1½ to 15½</td>
<td>1½ to 13½</td>
<td>41,300</td>
<td>24,800</td>
</tr>
<tr>
<td>Spain</td>
<td></td>
<td>1½ to 15½</td>
<td>1½ to 13½</td>
<td>17,500</td>
<td>5,000</td>
</tr>
<tr>
<td>Italy</td>
<td></td>
<td>1½ to 15½</td>
<td>1½ to 13½</td>
<td>30,400</td>
<td>10,900</td>
</tr>
<tr>
<td>Belgium</td>
<td></td>
<td>1½ to 15½</td>
<td>1½ to 13½</td>
<td>0,100</td>
<td>10,800</td>
</tr>
<tr>
<td>Turkey</td>
<td></td>
<td>1½ to 15½</td>
<td>1½ to 13½</td>
<td>39,200</td>
<td>10,000</td>
</tr>
<tr>
<td>Netherlands</td>
<td></td>
<td>1½ to 15½</td>
<td>1½ to 13½</td>
<td>4,600</td>
<td>8,800</td>
</tr>
<tr>
<td>Switzerland</td>
<td></td>
<td>1½ to 15½</td>
<td>1½ to 13½</td>
<td>2,000</td>
<td>3,000</td>
</tr>
<tr>
<td>Cuba</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>1,800</td>
<td>8,800</td>
</tr>
<tr>
<td>Serbia</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>2,200</td>
<td>600</td>
</tr>
<tr>
<td>Haiti</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>1,000</td>
<td>400</td>
</tr>
<tr>
<td>Greece</td>
<td></td>
<td>1½ to 15½</td>
<td>1½ to 13½</td>
<td>2,200</td>
<td>100</td>
</tr>
<tr>
<td>Roumania</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>5,500</td>
<td>400</td>
</tr>
<tr>
<td>India</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>282,300</td>
<td></td>
</tr>
<tr>
<td>The Straits</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>3,800</td>
<td></td>
</tr>
<tr>
<td>China</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>402,700</td>
<td></td>
</tr>
<tr>
<td>Japan</td>
<td></td>
<td></td>
<td></td>
<td>40,400</td>
<td>16,140</td>
</tr>
<tr>
<td>Russia</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>124,900</td>
<td>86,400</td>
</tr>
<tr>
<td>South American States</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>34,300</td>
<td>9,000</td>
</tr>
<tr>
<td>Morocco</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>11,400</td>
<td>1,000</td>
</tr>
<tr>
<td>Central American States</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>3,000</td>
<td>300</td>
</tr>
<tr>
<td>United Kingdom</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>35,100</td>
<td>108,000</td>
</tr>
<tr>
<td>Egypt</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>2,800</td>
<td>24,800</td>
</tr>
<tr>
<td>Australia</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>4,300</td>
<td>21,000</td>
</tr>
<tr>
<td>Portugal</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>4,700</td>
<td>8,000</td>
</tr>
<tr>
<td>Denmark</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>2,200</td>
<td>2,840</td>
</tr>
<tr>
<td>Canada</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>4,800</td>
<td>2,800</td>
</tr>
<tr>
<td>Sweden</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>4,800</td>
<td>1,700</td>
</tr>
<tr>
<td>Norway</td>
<td></td>
<td>1½ to 15½</td>
<td></td>
<td>2,000</td>
<td>1,440</td>
</tr>
<tr>
<td>Grand Totals</td>
<td></td>
<td>1½ to 15½</td>
<td>1½ to 13½</td>
<td>1,294,400</td>
<td>786,360</td>
</tr>
</tbody>
</table>

* Germany and Austria-Hungary are classified among the gold countries by the Director among the gold and silver countries. I have also changed Japan from the gold and silver Bank of Japan and in the Japanese Treasury, there is no gold in circulation, and no payments Bank and by the Government. In March, 1898, the amount of uncovered paper money was.
Appendix 7: Berdan located at Middle Camp Woolgar goldfield during the 2004 visit  (photo Taylor 2004)
Appendix 8: Provisional school buildings Woolgar (Richmond County Shire Offices)
Appendix 9: Miners Rights and Trade Licences
(Staunton Research n.d. Richmond Shire Archives)
### Woolgar Miners

Miners Rights issued in 1864 at the Warden's Office, Georgetown, Queensland (after Stavins' research files)

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Miners Rights, nos.</th>
<th>Miners Name</th>
<th>Year</th>
<th>Month</th>
<th>Miners Rights No.</th>
<th>Miner's Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>May</td>
<td>82375</td>
<td>Sutli, W</td>
<td>30</td>
<td>May</td>
<td>8295</td>
<td>Miller, R</td>
</tr>
<tr>
<td>2</td>
<td>May</td>
<td>82377</td>
<td>Leont, A</td>
<td>31</td>
<td>May</td>
<td>8296</td>
<td>Murphy, S</td>
</tr>
<tr>
<td>3</td>
<td>May</td>
<td>82380</td>
<td>Conchew, F</td>
<td>32</td>
<td>May</td>
<td>8297</td>
<td>Hall, J</td>
</tr>
<tr>
<td>4</td>
<td>May</td>
<td>82382</td>
<td>Percy, W</td>
<td>33</td>
<td>May</td>
<td>8298</td>
<td>Williams, W</td>
</tr>
<tr>
<td>5</td>
<td>May</td>
<td>82383</td>
<td>Lemmarrone,</td>
<td>34</td>
<td>May</td>
<td>8299</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>May</td>
<td>82384</td>
<td></td>
<td>35</td>
<td>May</td>
<td>8300</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>May</td>
<td>82385</td>
<td></td>
<td>36</td>
<td>May</td>
<td>8301</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>May</td>
<td>82386</td>
<td></td>
<td>37</td>
<td>May</td>
<td>8302</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>May</td>
<td>82387</td>
<td></td>
<td>38</td>
<td>May</td>
<td>8303</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>May</td>
<td>82388</td>
<td></td>
<td>39</td>
<td>May</td>
<td>8304</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>May</td>
<td>82389</td>
<td></td>
<td>40</td>
<td>May</td>
<td>8305</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>May</td>
<td>82390</td>
<td></td>
<td>41</td>
<td>May</td>
<td>8306</td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>May</td>
<td>82391</td>
<td></td>
<td>42</td>
<td>May</td>
<td>8307</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>May</td>
<td>82392</td>
<td></td>
<td>43</td>
<td>May</td>
<td>8308</td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>May</td>
<td>82393</td>
<td></td>
<td>44</td>
<td>May</td>
<td>8309</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>May</td>
<td>82394</td>
<td></td>
<td>45</td>
<td>May</td>
<td>8310</td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>May</td>
<td>82395</td>
<td></td>
<td>46</td>
<td>May</td>
<td>8311</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>May</td>
<td>82396</td>
<td></td>
<td>47</td>
<td>May</td>
<td>8312</td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>May</td>
<td>82397</td>
<td></td>
<td>48</td>
<td>May</td>
<td>8313</td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>May</td>
<td>82398</td>
<td></td>
<td>49</td>
<td>May</td>
<td>8314</td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>May</td>
<td>82399</td>
<td></td>
<td>50</td>
<td>May</td>
<td>8315</td>
<td></td>
</tr>
<tr>
<td>22</td>
<td>May</td>
<td>82400</td>
<td></td>
<td>51</td>
<td>May</td>
<td>8316</td>
<td></td>
</tr>
<tr>
<td>23</td>
<td>May</td>
<td>82401</td>
<td></td>
<td>52</td>
<td>May</td>
<td>8317</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>May</td>
<td>82402</td>
<td></td>
<td>53</td>
<td>May</td>
<td>8318</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>May</td>
<td>82403</td>
<td></td>
<td>54</td>
<td>May</td>
<td>8319</td>
<td></td>
</tr>
<tr>
<td>26</td>
<td>May</td>
<td>82404</td>
<td></td>
<td>55</td>
<td>May</td>
<td>8320</td>
<td></td>
</tr>
</tbody>
</table>

Appendix 9
### Woolgar Miners

Miners' Rights Issued at Warden's Office, Georgetown, Queensland (after Staunton's research files)

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Miner's Rights, No.</th>
<th>Miners Name</th>
<th>Year</th>
<th>Month</th>
<th>Miner's rights No.</th>
<th>Miner's Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1885</td>
<td>E2996</td>
<td>Welsh, D</td>
<td>1885</td>
<td>May</td>
<td>55517</td>
<td>Crowis, A</td>
</tr>
<tr>
<td>2</td>
<td>1885</td>
<td>E2939</td>
<td>Dearlely, J</td>
<td>1885</td>
<td>May</td>
<td>52626</td>
<td>Crowis, J</td>
</tr>
<tr>
<td>3</td>
<td>1885</td>
<td>E2910</td>
<td>Darleley, R</td>
<td>1885</td>
<td>May</td>
<td>52657</td>
<td>O'Brian</td>
</tr>
<tr>
<td>4</td>
<td>1885</td>
<td>E2947</td>
<td>Dernit, T</td>
<td>1885</td>
<td>May</td>
<td>52626</td>
<td>Frost, W</td>
</tr>
<tr>
<td>5</td>
<td>1885</td>
<td>E2992</td>
<td>McPhail, H</td>
<td>1885</td>
<td>May</td>
<td>52690</td>
<td>Breen</td>
</tr>
<tr>
<td>6</td>
<td>1885</td>
<td>E2999</td>
<td>Greening, G</td>
<td>1885</td>
<td>May</td>
<td>52690</td>
<td>Crowder, J</td>
</tr>
<tr>
<td>7</td>
<td>1885</td>
<td>E2994</td>
<td>Lender, W</td>
<td>1885</td>
<td>May</td>
<td>52691</td>
<td>Leahey, P</td>
</tr>
<tr>
<td>8</td>
<td>1885</td>
<td>E2995</td>
<td>Lender, W S</td>
<td>1885</td>
<td>May</td>
<td>52691</td>
<td>Cough, D</td>
</tr>
<tr>
<td>9</td>
<td>1885</td>
<td>E2996</td>
<td>Lender, H S</td>
<td>1885</td>
<td>Jun</td>
<td>52691</td>
<td>Smith, C</td>
</tr>
<tr>
<td>10</td>
<td>1885</td>
<td>E2997</td>
<td>Tricket, C</td>
<td>1885</td>
<td>Jun</td>
<td>52692</td>
<td>Heath, H</td>
</tr>
<tr>
<td>11</td>
<td>1885</td>
<td>E2998</td>
<td>Michael, J</td>
<td>1885</td>
<td>Jun</td>
<td>52691</td>
<td>Scott, A</td>
</tr>
<tr>
<td>12</td>
<td>1885</td>
<td>E2999</td>
<td>Keary, J</td>
<td>1885</td>
<td>Jun</td>
<td>52692</td>
<td>Burridge, H</td>
</tr>
<tr>
<td>13</td>
<td>1885</td>
<td>E3000</td>
<td>Thompson, M</td>
<td>1885</td>
<td>Jul</td>
<td>52621</td>
<td>Fraser, A</td>
</tr>
<tr>
<td>14</td>
<td>1885</td>
<td>E3001</td>
<td>Donaldey, B</td>
<td>1885</td>
<td>Jul</td>
<td>52621</td>
<td>Morrison, B M</td>
</tr>
<tr>
<td>15</td>
<td>1885</td>
<td>E3002</td>
<td>Morrice, S</td>
<td>1885</td>
<td>Jul</td>
<td>52620</td>
<td>Fletche, T</td>
</tr>
<tr>
<td>16</td>
<td>1885</td>
<td>E3003</td>
<td>Moore, J</td>
<td>1885</td>
<td>Jul</td>
<td>52620</td>
<td>McKeen, J</td>
</tr>
<tr>
<td>17</td>
<td>1885</td>
<td>E3004</td>
<td>Davis, J</td>
<td>1885</td>
<td>Jul</td>
<td>52620</td>
<td>Collins, H</td>
</tr>
<tr>
<td>18</td>
<td>1885</td>
<td>E3005</td>
<td>Savage, T</td>
<td>1885</td>
<td>Jul</td>
<td>52620</td>
<td>Reilly, J</td>
</tr>
<tr>
<td>19</td>
<td>1885</td>
<td>E3006</td>
<td>Russet, J</td>
<td>1885</td>
<td>Aug</td>
<td>52620</td>
<td>Whinney, W</td>
</tr>
<tr>
<td>20</td>
<td>1885</td>
<td>E3007</td>
<td>McTavish, W</td>
<td>1885</td>
<td>Aug</td>
<td>52620</td>
<td>Watervale, J</td>
</tr>
<tr>
<td>21</td>
<td>1885</td>
<td>E3008</td>
<td>Ganier, C</td>
<td>1885</td>
<td>Aug</td>
<td>52620</td>
<td>Bonford, J</td>
</tr>
<tr>
<td>22</td>
<td>1885</td>
<td>E3009</td>
<td>Webster, R</td>
<td>1885</td>
<td>Aug</td>
<td>52620</td>
<td>Copley, J</td>
</tr>
<tr>
<td>23</td>
<td>1885</td>
<td>E3010</td>
<td>McNally, S</td>
<td>1885</td>
<td>Aug</td>
<td>52633</td>
<td>Boswell, J</td>
</tr>
<tr>
<td>24</td>
<td>1885</td>
<td>E3011</td>
<td>Wood, J</td>
<td>1885</td>
<td>Aug</td>
<td>52620</td>
<td>Manin, J</td>
</tr>
<tr>
<td>25</td>
<td>1885</td>
<td>E3012</td>
<td>Martin, J</td>
<td>1885</td>
<td>Aug</td>
<td>52620</td>
<td>River, J</td>
</tr>
<tr>
<td>26</td>
<td>1885</td>
<td>E3013</td>
<td>Matthews, H</td>
<td>1885</td>
<td>Sept</td>
<td>52659</td>
<td>Quinn, D</td>
</tr>
<tr>
<td>27</td>
<td>1885</td>
<td>E3014</td>
<td>Panhorst, A</td>
<td>1885</td>
<td>Sept</td>
<td>52657</td>
<td>Mitchell</td>
</tr>
<tr>
<td>28</td>
<td>1885</td>
<td>E3015</td>
<td>Vaughan, O H</td>
<td>1885</td>
<td>Sept</td>
<td>52659</td>
<td>Peary, J</td>
</tr>
<tr>
<td>29</td>
<td>1885</td>
<td>E3016</td>
<td>Moir, L</td>
<td>1885</td>
<td>Sept</td>
<td>52659</td>
<td>Skelton, J</td>
</tr>
<tr>
<td>Year</td>
<td>Month</td>
<td>Minor's Rights No.</td>
<td>Minor's Name</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>-------</td>
<td>---------------------</td>
<td>----------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>Nov</td>
<td>88811</td>
<td>Ellis</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>91</td>
<td>Dec</td>
<td>88812</td>
<td>Ellis, John</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>83</td>
<td>Dec</td>
<td>88813</td>
<td>Ellis, John</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>Dec</td>
<td>88814</td>
<td>Ellis, John</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>Dec</td>
<td>88815</td>
<td>Ellis, John</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>Dec</td>
<td>88816</td>
<td>Ellis, John</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>Dec</td>
<td>88817</td>
<td>Ellis, John</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>Dec</td>
<td>88818</td>
<td>Ellis, John</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Woolgar Miners

Miners' Rights issued at Warden's Office, Georgetown, Queensland (after Staunton's research file)

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Miner's Rights, No.</th>
<th>Miner's Name</th>
<th>Year</th>
<th>Month</th>
<th>Miner's Rights, No.</th>
<th>Miner's Name</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1885</td>
<td>Jan</td>
<td>88351</td>
<td>30</td>
<td>1886</td>
<td>May</td>
<td>88368</td>
</tr>
<tr>
<td>2</td>
<td>1886</td>
<td>Jan</td>
<td>88582</td>
<td>31</td>
<td>1886</td>
<td>Jun</td>
<td>88351</td>
</tr>
<tr>
<td>3</td>
<td>1886</td>
<td>Jan</td>
<td>88583</td>
<td>32</td>
<td>1886</td>
<td>Jun</td>
<td>88382</td>
</tr>
<tr>
<td>4</td>
<td>1886</td>
<td>Jan</td>
<td>88584</td>
<td>33</td>
<td>1886</td>
<td>Jun</td>
<td>88383</td>
</tr>
<tr>
<td>5</td>
<td>1886</td>
<td>Jan</td>
<td>88553</td>
<td>34</td>
<td>1886</td>
<td>Jun</td>
<td>88384</td>
</tr>
<tr>
<td>6</td>
<td>1886</td>
<td>Feb</td>
<td>88518</td>
<td>35</td>
<td>1886</td>
<td>Jun</td>
<td>88385</td>
</tr>
<tr>
<td>7</td>
<td>1886</td>
<td>Feb</td>
<td>88517</td>
<td>36</td>
<td>1886</td>
<td>Jun</td>
<td>88386</td>
</tr>
<tr>
<td>8</td>
<td>1886</td>
<td>Feb</td>
<td>88516</td>
<td>37</td>
<td>1886</td>
<td>Jun</td>
<td>88397</td>
</tr>
<tr>
<td>9</td>
<td>1886</td>
<td>Feb</td>
<td>88510</td>
<td>38</td>
<td>1886</td>
<td>Jun</td>
<td>88399</td>
</tr>
<tr>
<td>10</td>
<td>1886</td>
<td>Feb</td>
<td>88571</td>
<td>39</td>
<td>1886</td>
<td>Jun</td>
<td>88399</td>
</tr>
<tr>
<td>11</td>
<td>1886</td>
<td>Feb</td>
<td>88571</td>
<td>40</td>
<td>1886</td>
<td>Jun</td>
<td>88393</td>
</tr>
<tr>
<td>12</td>
<td>1886</td>
<td>Feb</td>
<td>88571</td>
<td>41</td>
<td>1886</td>
<td>Jun</td>
<td>88394</td>
</tr>
<tr>
<td>13</td>
<td>1886</td>
<td>Feb</td>
<td>88571</td>
<td>42</td>
<td>1886</td>
<td>Jun</td>
<td>88395</td>
</tr>
<tr>
<td>14</td>
<td>1886</td>
<td>Feb</td>
<td>88571</td>
<td>43</td>
<td>1886</td>
<td>Jun</td>
<td>88396</td>
</tr>
<tr>
<td>15</td>
<td>1886</td>
<td>Mar</td>
<td>88571</td>
<td>44</td>
<td>1886</td>
<td>Jul</td>
<td>88397</td>
</tr>
<tr>
<td>16</td>
<td>1886</td>
<td>Mar</td>
<td>88571</td>
<td>45</td>
<td>1886</td>
<td>Jul</td>
<td>88398</td>
</tr>
<tr>
<td>17</td>
<td>1886</td>
<td>Mar</td>
<td>88571</td>
<td>46</td>
<td>1886</td>
<td>Jul</td>
<td>88399</td>
</tr>
<tr>
<td>18</td>
<td>1886</td>
<td>Mar</td>
<td>88571</td>
<td>47</td>
<td>1886</td>
<td>Jul</td>
<td>88390</td>
</tr>
<tr>
<td>19</td>
<td>1886</td>
<td>Mar</td>
<td>88571</td>
<td>48</td>
<td>1886</td>
<td>Jul</td>
<td>88391</td>
</tr>
<tr>
<td>20</td>
<td>1886</td>
<td>Mar</td>
<td>88571</td>
<td>49</td>
<td>1886</td>
<td>Jul</td>
<td>88392</td>
</tr>
<tr>
<td>21</td>
<td>1886</td>
<td>Apr</td>
<td>88571</td>
<td>50</td>
<td>1886</td>
<td>Jul</td>
<td>88393</td>
</tr>
<tr>
<td>22</td>
<td>1886</td>
<td>Apr</td>
<td>88571</td>
<td>51</td>
<td>1886</td>
<td>Jul</td>
<td>88394</td>
</tr>
<tr>
<td>23</td>
<td>1886</td>
<td>Apr</td>
<td>88571</td>
<td>52</td>
<td>1886</td>
<td>Jul</td>
<td>88395</td>
</tr>
<tr>
<td>24</td>
<td>1886</td>
<td>Apr</td>
<td>88571</td>
<td>53</td>
<td>1886</td>
<td>Jul</td>
<td>88396</td>
</tr>
<tr>
<td>25</td>
<td>1886</td>
<td>Apr</td>
<td>88571</td>
<td>54</td>
<td>1886</td>
<td>Jul</td>
<td>88397</td>
</tr>
<tr>
<td>26</td>
<td>1886</td>
<td>Apr</td>
<td>88571</td>
<td>55</td>
<td>1886</td>
<td>Jul</td>
<td>88398</td>
</tr>
<tr>
<td>27</td>
<td>1886</td>
<td>Apr</td>
<td>88571</td>
<td>56</td>
<td>1886</td>
<td>Jul</td>
<td>88399</td>
</tr>
</tbody>
</table>
### Woolger: Various Business Licences

Business Licences issued at Warden's Office, Georgetown, Queensland (after Staunton's research files)

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Licence No.</th>
<th>Proprietor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1885</td>
<td>Sep</td>
<td>6624</td>
<td>Mrs. W.</td>
</tr>
<tr>
<td>1885</td>
<td>Jan</td>
<td>6625</td>
<td>Moo Chin</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6826</td>
<td>Ah Kin, William</td>
</tr>
<tr>
<td>1887</td>
<td>Jun</td>
<td>6627</td>
<td>Ah Kong</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6828</td>
<td>Ah Geor</td>
</tr>
</tbody>
</table>

### Market Garden Licences

<table>
<thead>
<tr>
<th>Year</th>
<th>Month</th>
<th>Licence No.</th>
<th>Proprietor</th>
</tr>
</thead>
<tbody>
<tr>
<td>1885</td>
<td>May</td>
<td>2</td>
<td>Low Gun</td>
</tr>
<tr>
<td>1885</td>
<td>Jul</td>
<td>1</td>
<td>Ah Hon Tommy</td>
</tr>
<tr>
<td>1885</td>
<td>Jul</td>
<td>3</td>
<td>Ah Kong</td>
</tr>
<tr>
<td>1885</td>
<td>Sep</td>
<td>4</td>
<td>Ah Geor</td>
</tr>
<tr>
<td>1885</td>
<td>Jul</td>
<td>5</td>
<td>Ah Hee</td>
</tr>
<tr>
<td>1885</td>
<td>Jul</td>
<td>6</td>
<td>Sing Lee</td>
</tr>
</tbody>
</table>
Appendix 9

Depression era miners (Richmond Shire Archives)

Early Woolgar Miners (Richmond Shire County Archives)
Appendix 10: Haldane Sketch of the Woolgar Goldfield (Haldane [1895] 1932: 389)
Appendix 11: Electoral map of Far North Queensland 1921
Appendix 12: From Strategic Minerals NL Annual report 2012
## Appendix 13: Lost World list of material culture

**List of Material Culture found at Lost World’s Campsite dating 1909-2014**

<table>
<thead>
<tr>
<th>Item No.</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Glass Fragments</td>
</tr>
<tr>
<td>2</td>
<td>Flagstone, influence tent or hut</td>
</tr>
<tr>
<td>3</td>
<td>Half-bottle bottle ‘England London’</td>
</tr>
<tr>
<td>4</td>
<td>Stained shoe, 3 metal frags and potsherd</td>
</tr>
<tr>
<td>5</td>
<td>Metal match box lid</td>
</tr>
<tr>
<td>6</td>
<td>Rectangle of rusty metal</td>
</tr>
<tr>
<td>7</td>
<td>Clear glass frag</td>
</tr>
<tr>
<td>8</td>
<td>Clear glass frag</td>
</tr>
<tr>
<td>9</td>
<td>Clear glass frag, mixed with blue</td>
</tr>
<tr>
<td>10</td>
<td>Bottom of broken clear bottle with frag. Blue</td>
</tr>
<tr>
<td>11</td>
<td>Clear glass frag</td>
</tr>
<tr>
<td>12</td>
<td>Clear glass frag</td>
</tr>
<tr>
<td>13</td>
<td>Small frag, heavy metal</td>
</tr>
<tr>
<td>14</td>
<td>Pedestal piece of tin with small punch holes</td>
</tr>
<tr>
<td>15</td>
<td>Metal handle of shovel</td>
</tr>
<tr>
<td>16</td>
<td>Glass glass frag</td>
</tr>
<tr>
<td>17</td>
<td>Glass glass frag</td>
</tr>
<tr>
<td>18</td>
<td>Two small frags. Of rusty metal</td>
</tr>
<tr>
<td>19</td>
<td>Clear glass frag</td>
</tr>
<tr>
<td>20</td>
<td>Clear glass frag</td>
</tr>
<tr>
<td>21</td>
<td>Silver frag</td>
</tr>
<tr>
<td>22</td>
<td>Frag blue glass</td>
</tr>
<tr>
<td>23</td>
<td>Steel hinge to heel of boot</td>
</tr>
<tr>
<td>24</td>
<td>Frag small rusty metal</td>
</tr>
<tr>
<td>25</td>
<td>Alloy embossed with partial design</td>
</tr>
<tr>
<td>26</td>
<td>Top of bulbous tin can with large hole</td>
</tr>
<tr>
<td>27</td>
<td>Clear glass frag</td>
</tr>
<tr>
<td>28</td>
<td>Rusty metal pieces</td>
</tr>
<tr>
<td>29</td>
<td>Possible stone artifacts</td>
</tr>
</tbody>
</table>
Appendix 14: Examples of sluicing

Powered sluicing at an unknown Queensland location (Nation Library Australia)

Gravity Ground Sluicing at Dolly's Creek, Victoria (Lawrence 2000)