

# Applying Frontier Theory to a Western Australian Site: The Problem of Chronological Control

GAYE NAYTON

*It has been suggested that frontier research could become a major focus for Australian historical archaeologists. Yet lack of substantive research indicates that there is a problem in applying frontier theory to the archaeological record in Australia. This paper highlights the methodological problem caused by rapid change on archaeological sites. Artefact classes are examined for their usefulness as chronological markers and a modified application of South's Mean Ceramic Date formula proposed as a method to solve the dating problem.*

The importance of frontiers in initiating social and technological change has held the attention of scholars in many fields since Turner's work late last century.<sup>1</sup> In 1983 Birmingham and Jeans suggested that frontier research could become a major focus for Australian historical archaeologists.<sup>2</sup> Such a shift in research has not occurred.

Work stimulated by their paper concentrated on testing the model formulated by them, the Swiss Family Robinson model, against the historical record of colonisation in parts of Australia. Attempts to test it against the archaeological record are non-existent. This indicates that there is a problem in applying frontier theory to the archaeological record in Australia.

A survey of Western Australian local histories suggests that this problem may be the rapid pace of change on Australian frontiers.<sup>3</sup> They indicate that in Western Australia the frontier stage at most places passed in less than thirty years. Further, to answer some questions posed by some frontier models archaeological time frames may need to be less than a decade.

For an archaeologist it is often difficult to distinguish such short periods of time within their material. It can be done by comparing securely dated short term sites, but such sites constitute only a tiny fraction of the archaeological record. To confine frontier theory to such sites is to consign it only a minor role in Australian research. For it to play a larger role methods must be found which are capable of dating precise chronological layers within long term sites.

This problem is being addressed through the study of excavation data from a store site situated in the port of Cossack. Cossack and nearby Roebourne spearheaded the colonisation of the northwest (Fig. 1) which began in 1863.

## AREA HISTORY

Settlement of the northwest began shortly after Gregory's exploration of the area in 1861. The first pastoralist landed in Butchers Inlet in 1863, then moved his stock inland to the Harding River pools before finding a permanent run. Later arrivals followed this same pattern and the first northwest towns were established at the pools (Roebourne 1866) and the landing at Butchers Inlet (Cossack 1872).

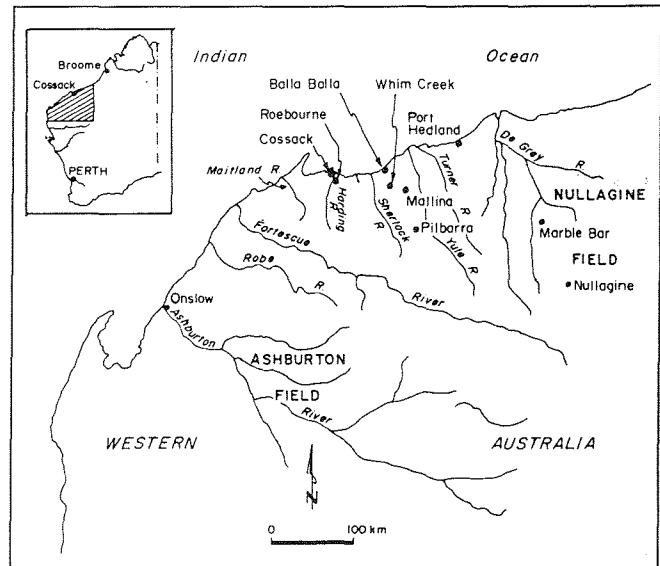


Fig. 1: Map of northwest Western Australia.

Although Butchers Inlet was used as the landing place from the first arrival, permanent occupation did not take place until after a government warehouse was established in the hulk of the *New Perseverance* (January 1867).<sup>4</sup> During the first concerted pearling season (Summer 1868-1869) rough bush huts were built at the landing by pearlers but the first substantial building was a wooden store built by Knight and Shenton early in 1870. A small jetty was constructed during the same season. By 1872 Cossack was gazetted and consisted of two stores, two hotels, a jetty, two better-quality houses and an unknown number of bush huts.<sup>5</sup>

By the 1881 census Cossack had a population of 229 making it double the size of Roebourne. This was largely due to the success of the pearling industry which had turned Cossack from an empty beach into a viable port with facilities good enough to attract London wool ships up the coast to take on cargoes of wool and pearlshell. The arrival of the first wool ship in 1879 set the pastoral industry on a much firmer footing by markedly reducing the cost of getting their goods to market. Pastoral

expansion began soon afterwards and by 1883 Derby in the West Kimberley and Carnarvon in the Gascoyne had been declared. The area around Broome was settled in 1881 but Broome was largely a pearling rather than a pastoral town.

The Kimberley goldfields at Halls Creek were discovered in 1884. Miners came into the goldfields through Derby and Wyndham. The more productive Pilbara field was discovered in 1887 leading to the foundation of Marble Bar, Nullagine and Port Hedland as major servicing centres. With the dividing up of the old north district into smaller and smaller areas, each with their own administration and port facilities, the central importance of the Roebourne district was challenged. Cossack's supremacy as the northwest port was also challenged, primarily by Port Hedland as a rival for the wool and gold trade, and Broome for the pearl trade. These changes resulted in both Roebourne and Cossack losing their municipal status in 1910.

Cossack was also replaced as Roebourne's port by a deep water jetty at Port Samson which was linked to Roebourne by tramway. Cossack enjoyed a brief resurgence in the 1920s after the deep water jetty was damaged but by 1930 only eight households were left. One of the buildings still utilized was Knight and Shenton's old store building which was finally abandoned some time after the Second World War. The building stood until 1979 when it was damaged by a cyclone and subsequently pulled down and burnt.

## EXCAVATION.

For excavation I chose Cossack's first substantial building, with an archaeological sequence spanning 109 years before it was demolished in 1979. The site history can be summarized as follows.

- 1870-1871: Knight and Shenton – General store.
- 1871-1891: F. McRae & Co – General store.
- 1891-1900: W Moore – Store managers house.
- 1900-1907: C Moore – Store managers house.\*
- 1907-early 1920s: Muramats – Japanese Laundry.\*
- Mid 1920s-1939: Muramats – House for Japanese divers.\*
- After 1945– circa 1960s: Occasional informal site use.
- 1979: Destruction and subsequent burning.

The excavation site (hereafter called the Cossack store site) is located on a vegetated back beach dune close to the jetty used for the port landing. The sedimentary matrix was a loose white sand in which very little stratigraphy was visible. Visible stratigraphy resulted from the inclusion of charcoal or gravel as small, spatially discrete layers within the overall formless matrix.

The store building and its back and side yards were excavated as an open area excavation. This method was necessitated by the loose nature of the matrix which caused the side walls of test pits to collapse at a depth of only 150 mm. While providing information on features in the plan view (Fig. 2), it limited the observation of vertical sections to two areas where greater sediment compaction allowed the use of trenches.

\* Oral testimony and primary sources differ over the sequence of use.

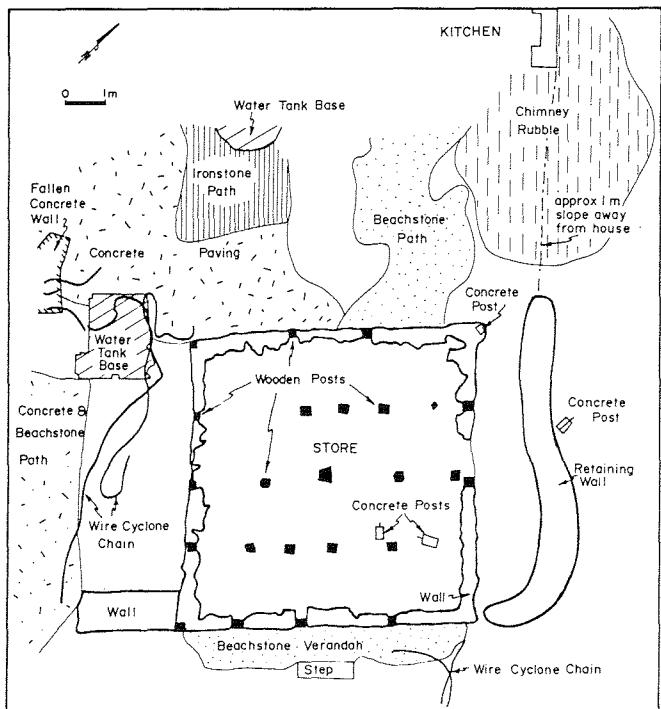


Fig. 2: Knight and Shenton store: surface features.

The site was divided into one metre squares and excavated in spits of 50 mm. When a feature was encountered the spit was terminated at that level and the feature recorded at a scale of 1:10. Each square was excavated to a depth where artefacts and features were no longer encountered. This depth varied from 160 mm to 750 mm.

All artefacts from within a spit were bagged together. Artefacts can thus be located by square and spit but most cannot be separated with any greater definition. Artefacts found associated with a feature were bagged separately and recorded along with information about the feature.

The rate of deposition across the site obviously varied as similar artefact assemblages were recovered at different depths. For example clay tobacco pipes were largely confined to the lower spits but the depth of the spits varied from 120 mm to 700 mm. The geographical information system (GIS) Arc/Info will be used to combine artefact information such as type, date and provenance with relevant information on features to produce chronological plans of the site.

## LABORATORY ANALYSIS

The laboratory methods have two main thrusts, which together should allow the definition of precise chronological layers within the excavated data.

Firstly, the Arc/Info program was used to catalogue all feature and artefact information. This provides the ability to produce maps showing artefact distributions and features together, as well as manipulating raw data. Arc/Info will be used in two ways, firstly to organise features and their associated artefacts into chronological layers and secondly to analyse the resulting assemblages.

Second, a heavy emphasis has been placed on identifying and dating artefacts to provide good chronological markers. It is hoped that this will enable the assignment of tight chronological ranges to archaeological layers identified across the site. This paper will concentrate on presenting the results of my search for chronological markers.

## IDENTIFYING CHRONOLOGICAL MARKERS

Artefacts from the excavation site vary greatly in their potential for precise dating. The most abundant artefact classes found were bottle glass and seals, architectural metals and ceramics. Some other classes such as clay tobacco pipes, buttons and bullets were also relatively common.

### Ceramics

Ceramic sherds from the site were mostly small but were recognisably late nineteenth century to early twentieth-century wares, largely mass produced and unmarked. Ceramics were divided into four wares: stoneware, earthenware, porcelain, and refined whitebodied earthenwares. Whitebodied wares cover a range of vitreous and semivitreous bodies.<sup>6</sup> They made up the largest proportion of the excavated ceramics.

Types were delineated on the basis of ware, body colour and texture, decoration technique, and the colour and pattern of the decoration. While this resulted in a clear-cut division of types within stonewares and earthenwares, whitebodied wares and porcelain were more problematic. Most of the sherds recovered from the site were small averaging only 40-50 mm across. It was rarely possible to match the fragments of patterns shown on them to patterns documented in ceramic reference books.<sup>7</sup> Therefore the possibility exists that some of my 'types' are in fact different parts of the same pattern, but without further evidence I cannot say which ones. On this basis 173 types were delineated.

Only one motif was identified definitely from published ceramic source books. This was type 131 which displayed the Asiatic Pheasant motif, the second most popular motif used during the second half of the nineteenth century between 1850 and 1890.<sup>8</sup> Type 157, a Holloway's black printed ointment jar was dated 1867 to circa 1875 by the address printed on the jar and Perth advertisements. A second Holloway's design (type 158) with a classical motif was identified through advertisements as being from circa 1875-1895. There appears to be a time lapse between Holloway's changing address, which he did in 1884, and the change appearing in his advertisements.

None of the ceramic sherds from the Cossack site carried British Patent Office registration marks. Some carried makers' and dealers' back marks. Of these the A. BROs mark is from G. L. Ashworth and Brothers and is dated to after 1862.<sup>9</sup>

Comparisons with other collections such as Western Australian shipwreck material<sup>10</sup> and New Zealand sites<sup>11</sup> have highlighted the probability that few of the Cossack store site ceramics are curated items from earlier in the century. Even the transfer printed ware should be considered as belonging to the second half of the century, manufactured during the declining years of the industry. Therefore, sherds from the site containing romantic transfer printed scenes are thought more likely to date to the period of decline (1860-1880) than to the height of the romantic period itself (1845-1860).

A general guide to dating can be established through changing technology and style, as has been summarised in Table 1. Periods of manufacture or style popularity are

represented in Table 1 by a dashed line (----), while periods of lesser popularity or availability are represented by spaced dashes (- - -). Table 1 suggests that the bulk of ceramics from the Knight and Shenton site will not be useful for establishing short chronological periods, for although the shortest ranges are 15 years, most ranges are around 50 to 60 years. While the two Holloway designs will be of some use, in particular spits they occur too infrequently to be of general use in establishing site wide layers.

### Bottles

The technology of bottle making changed considerably during the period of site occupation, giving diagnostic sherds such as bottle bases and tops some potential for dating purposes.

Recent research has investigated when bottles created using new technology actually reached Australian sites.<sup>12</sup> Two manufacturing changes are of particular interest when considering precise dating on a late nineteenth century site. These are the development of crown finishes in 1892 and of automatic and semiautomatic bottle making machines in the 1890s.

The development of bottle making machines is archaeologically useful as these machines leave several distinctive mould marks on bottles, one of which extends through the finish. Boow and Byrnes suggest that the first dates from Australian sites for bottles made on these machines vary according to where the bottles were made. Some European bottles made on semi-automatic machines could have been arriving on Australian sites since 1890 while those made on fully automatic machines would be unlikely to date before 1910. American bottles made on semi-automatic machines are more likely to date from 1910, while those from fully automatic machines began arriving earlier, in 1904. Dating also varies depending on whether the bottle was 'black glass', or flint glass which was available from 1900 (Blow & Blow) or 1910 (Suction).

Bottles made with a crown finish are also easy to spot in the archaeological record owing to their distinctive shape. The caps made to fit this finish are also distinctive. Early crown finishes were hand made using a finishing tool, and are distinguishable from those made by semi-automatic or fully-automatic bottle making machines by the absence of mould seams on the finish.

Because of problems with forming a perfect seal, the crown finish was not widely used for hand-produced bottles. The finish was quickly adopted in the United States after the introduction of fully automatic bottle-making machines in 1904. However, as Boow and Byrnes point out, most of the bottles imported into Australia came from Britain, where such machines were not adopted until 1915-1925.

For an Australian site receiving mainly British bottles, sherds exhibiting the distinctive mould marks of machine-made bottles could date from 1890 but are likely to be more numerous after 1910, with crown finishes on this type of bottle occurring after 1915. Hand-made crown finishes, on the other hand, are more likely to date from between 1892 and circa 1915. This gap between the invention of crown finishes and their use with bottle-making machines in Britain has potential for dating purposes.

For precise dating such technological change on its own has some usefulness. A quite sharp distinction can be made between pre-1920 and post-1920 bottles and several useful changes occurred in the 1880s and 1890s. But there are problems archaeologically with using bottle glass. Firstly the dating for Australian sites has been

carried out in the eastern states and may not be so applicable to Western Australia. To further blur the picture, bottles were often reused and the practice is known to have been widespread in Australia.<sup>13</sup>

Another potentially useful method of dating artefacts is tracing the date of registration of trademarks. While paper labels are not durable in the archaeological context, marks on bottles which are embossed or acid-etched last much longer. Embossing was often used on late nineteenth century medicine bottles, but was used less on alcohol bottles. Many bottles remained plain, while even the artefacts which can be dated in this manner may suggest too early a date for a layer because the bottles have been reused.

Table 1 summarises dating information for glass from the Knight and Shenton site. Dating from marks and names gives shorter time ranges but marked glass is relatively less common than that which can be dated by technological features. Glass was found in every spit and diagnostic sherds were relatively common, making glass potentially useful as a chronological marker. However, reuse may affect this usefulness. The degree to which reuse distorts dating through glass artefacts is a question that will be pursued during my research.

#### Bottle Sealing Capsules (refer to Appendix 1)

An ideal chronological marker would be an artefact that was plentiful in the archaeological record, that had several different types, designs or styles which could be dated to a series of short date ranges that together covered a long or crucial period of time, and that was not commonly curated or reused. A class of artefacts which shows these specifications are lead sealing capsules. This method of sealing bottles was used from 1843 until the 1920s when silver foil was substituted for lead.<sup>14</sup> From 1862 many of these capsules were impressed with trademarks.

Seventy six different designs have been recorded from the excavation, with some brewers being represented by more than one design. Forty one of these designs have been dated (Table 2). Unfortunately, most of the records of English trademark designs were destroyed in 1963, so only the Bass designs could be directly dated from the trademark application. Most of the dating was achieved using the London Post Office Directories which dated when the businesses were being operated at specific addresses by specific people, rather than dating the designs themselves. Advertisements in Perth newspapers were also consulted to determine when particular goods were available in Perth. They were particularly useful prior to 1884, the date of the earliest available London Directory. The availability of only London directories also means that the dates for businesses based in other cities may be artificially late.

Even allowing for this bias Table 2 shows that the lead seals are potentially useful for dating purposes. Blood, Wolfe & Co spirits, Hennessy Brandy and probably Colman's Mustard were the only products which could not be dated to a time span of less than 30 years. The long time span for the three Betts & Co designs relates to the fact that Betts made the lead capsules, so were operating throughout the time period. Many of the designs are dated to a 20 year time span with some having a range of under ten.

While not as bounteous as ceramics or glass they are plentiful enough to be useful, particularly when combined with other types of bottle seal, such as the foil capsules, crown seals and marble stoppers. For dating purposes they also have the advantages of being disposed of at the

time of use, not being subject to reuse and being subject to very little curation.

#### Clay Tobacco Pipes

Another potentially useful artefact which shares many of the same characteristics is clay tobacco pipes. They were cheap, expendable, easily broken during use but durable in the archaeological record, and they have manufacturers' marks for dating purposes. Binford has provided a formula for dating pipe stems, but unfortunately it is not reliable for late nineteenth century stems and so is of limited use on this site.<sup>15</sup>

However, a problem arises when trying to use the makers' marks for dating short time periods. The catalogues of the main Scottish pipemakers show that although new pipes entered production in loose chronological order, once in the catalogue they remained available.<sup>16</sup> Thus a pipe available in 1873 could still be purchased in 1900.

The McKinley Tariff Act of 1891 offers a possible way of separating pre- and post-1891 pipes as it required that goods imported into the United States be marked with their country of origin rather than just the town of origin, which had been common practice until then.<sup>17</sup> Although the act was law only in America it is thought likely that pipes destined for other markets would be treated in the same way once the moulds had been altered.<sup>18</sup> All the marked pipe sherds from the excavation cite town of origin rather than country, which suggests they were pre-1891.

Before clay tobacco pipes can realise their potential for dating occupation layers finely enough to be useful for frontier studies more work needs to be done both with the historical data base, cataloguing information on imported goods, and with the archaeological database, using firmly dated short term sites.

#### Nails and Screws

The potential of nails as a dating tool has already been noted by Varman who showed that early wire nails can be quite precisely dated from their forms.<sup>19</sup> However, his research has not been followed up with work on later nail forms. The store site spans the period covered by Varman's research and extends beyond it into the twentieth century. Nails were recovered from most spits. In all 56 different types of wrought and wire nails and screws were recovered. A large number of these types were relatively common and so are attractive as potentially dateable artefacts.

There are three problems with using nails as chronological markers. The first is associated with how they enter the archaeological record. Nails commonly enter the archaeological record both during a building episode and later during the degradation of the structure. As a single nail can fall out of a structure at any time between its building and final destruction, individual nails are suspect as chronological markers, and only clusters of nails can be used for this purpose. Clusters of one or two nail types around a feature are likely to be associated with either the building or the destruction of the feature. If they are associated with building then they can be used to help date when the feature was built and by extension any layers associated with that event. If associated with the destruction they cannot be used as chronological markers.

The second problem is associated with the degradation of the nails themselves. Nails from the Knight and Shenton store site appear to have been preserved extremely well while still part of the structure. The same cannot be said for nails which entered the archaeological

TABLE 1  
Ceramic and Glass

CERAMIC		
T.P. decline		- - - - -
T.P. revival		- - - - -
Band & Line		- - - - -
Lge.Floral Enam.		- - - - -
W. Granite		- - - - -
Gold Banding		- - - - -
Porcel/Bone		- - - - -
Cut Sponge		- - - - -
Multi Colour		- - - - -
Flow Blue		- - - - -
2nd W.I.		- - - - -
3rd W.I.		- - - - -
Decal Porc		- - - - -
Decal White		- - - - -
Asiatic		- - - - -
Holloways 1		- - - - -
Holloways 2		- - - - -
GLASS		
<u>Technology</u>		
Turn Paste I		- - - - -
Turn. Med		- - - - -
2 Piece		- - - - -
2.Flint Emb		- - - - -
2.Flint Bse		- - - - -
3 Piece		- - - - -
3 Dome P.U.		- - - - -
Auto		- - - - -
A.wide mth		- - - - -
Wide Milk		- - - - -
B & B Flint		- - - - -
Suction Fit		- - - - -
Clear Glass		- - - - -
Ricketts		- - - - -
Orig Codd's		- - - - -
Codd Vmts		- - - - -
Crown Seal		- - - - -
Applied C.S		- - - - -
Applied Rim		- - - - -
Down Toolled		- - - - -
Perry Davis		- - - - -
Ext. Screw		- - - - -
Int. Screw		- - - - -
Blob Top		- - - - -
Med Flat		- - - - -
Mason Jar		- - - - -
<u>Names/Marks</u>		
Cossack		- - - - -
Penfolds		- - - - -
W.A.Glass		- - - - -
Aust Glass		- - - - -
Branded 1		- - - - -
Branded 2		- - - - -
Condys		- - - - -
Holbrook		- - - - -
Perth Glass		- - - - -
Rylands Codd		- - - - -
Davis Pain Killer		- - - - -
Warmer 4city		- - - - -
Auto dated		- - - - -

TABLE 2  
Bottle Seals

LEAD CAPSULES	
Tanunda	-----
Rose	-----
Cooper	-----
Foster	-----
Flower	-----
Crawford	-----
Betts 1	-----
Betts 2	-----
Betts 3	-----
Morton	-----
Ashby	-----
Hennessy	-----
Kupper	-----
Porter	-----
Jeffrey	-----
All Saints	-----
Bass 1	-----
Bass 2,3	-----
Byass	-----
Griffin	-----
Hall	-----
Allsopp 1	-----
Allsopp 2	-----
Allsopp 3	-----
Hart	-----
Grimault	-----
Coates	-----
Atken	-----
Robertson	-----
De Jonghs	-----
Smith	-----
Blood	-----
Ind Coope	-----
Maconochie	-----
Dunville	-----
Kangaroo	-----
Emu	-----
Swan	-----
Bovril	-----
Colman	-----
OTHER	
Foil Capsules	-----
Crown Seals	-----
Swan C. S.	-----
Marble Stop.	-----
Lea & Perrins	-----
Eno's Patent	-----
Aluminium	-----
Screw cap	-----

record during the building of the store in 1870. Varman's categories are difficult to use on nails which have been in the ground for any length of time. Often they can only be separated into wrought and wire categories with sometimes the wire category being capable of subdivision into early and late based on the thickness of the shaft. This is bound to limit the usefulness of late nineteenth century nail types but appears to become less of a problem in the twentieth century owing to a shorter period in the ground and better quality steel and chroming.

The last problem is the level of visibility of nails in the historical record. Nail forms are to all intents and

purposes invisible in the historical record. If they are to be of any use to archaeologists they will have to be dated by association, either in sealed short term deposits or by association with dated artefacts or layers in sites like the Knight and Shenton store. All in all, nails are of limited use for distinguishing chronological layers at the store site, but they may be of use at other sites excavated later, after having been dated by association.

## Buttons

Buttons were plentiful at the site; in all there were 105 different designs grouped into nine classes based on material. Cameron has attempted to build a useable chronology using buttons and my Table 3 is based largely on her work.<sup>20</sup> Some buttons such as metal worktrouser buttons and rubber buttons do appear to have potential as chronological markers but most are dated to periods of 50 or 60 years.

## Tin Cans

All the tin cans located at the site could be dated.<sup>21</sup> Whole cans were not numerous and were largely found together in rubbish pits which reduced their use to dating pit features. Identifiable sherds were slightly more abundant but still not numerous.

## Matchboxes

A great deal of research into matchbox chronology has been carried out in New Zealand.<sup>22</sup> The boxes recovered from the store site were badly corroded but all but one fragment could be identified (Table 3). As there were only nine boxes in total they are little use as chronological markers for most of the site.

### Bullets

Bullets were plentiful enough on the site to be useful chronologically if they could be dated. They fell into three classes: small calibre rimfires, larger calibre centrefires and shotgun cartridges.<sup>23</sup>

Rimfires can be given a date range of 1857 to 1940. This covers their period of general commercial availability, although .22 rimfire cartridges are still made today. Centrefire cartridges have been available since 1868. Centrefire cartridges fall into two types, those that used blackpowder (1868 to circa 1910) and those that used smokeless powder (1892 to present), however, some cartridges originally designed for blackpowder were later loaded with smokeless, prolonging their commercial life. Breechloading shotguns have been around since the late 1840s. Originally they were available in a wide variety of gauges but only six are still available.

Identification of a cartridge as a particular type can narrow these more general date ranges. Seven different rimfire cartridge types were located on the site. Of these two could be identified as American cartridges, the .22 Extra Long (rifle) and the .25 Short (handgun) dated to 1880 to 1935 and 1860 to 1920 respectively. Given the origin of much of the other artefact material from the site the unidentified rimfires may be British. The site also contained a small bullet made by the Czechoslovakian firm of Selior Bellett which was similar to a rimfire except the firing pin struck horizontally across the entire head rather than just on the rim. This bullet is similar in size to the BB cap which is used for indoor target practice.

Two different shotgun cartridge types were identified and dated as 12 gauge (1900 to present) and a 450 gauge (1870-1920). Two military cartridges were identified. One was a .303 flame tracer which is dated to 1942 by the head stamp. It was probably a war souvenir as it was sawn

TABLE 3

## Buttons, Tin Cans, Match Boxes and Bullets

through near the base. The other type of military round is a Nato blank dated to the 1980s by the head stamp. Several of these were found clustered on the surface of the site. Of the remaining centrefire cartridge types, one is the 320 British Revolver (1870 to present) and the other is unidentified at present.

As well as whole bullets and cartridge cases, five lead bullet types were also found. Three types could be identified as belonging to Rimfire cartridges and dated to 1860 to 1920 (.30 Short or Long), 1865 to 1940 (.38 Short or Long) and 1865 to 1920 (.44 Short or Long) respectively, but this dating needs to be confirmed by comparison with British rimfires. One was a bullet for the

320 British Revolver (1870-present) but the last type was something of a surprise. It is a .64 calibre bullet. Barnes lists only one cartridge of this size, the 600 Nitro Express (1903 to 1962).<sup>24</sup> This was the largest and most powerful English elephant rifle of its time. Considered by some professional ivory hunters as overpowered, even for elephants, it is difficult to imagine what use it could have been put to in Australia.

The dating of bullets and cartridges appears to echo that for many other classes of artefacts, in that there is a difference between types available before the 1920s and those available after. Although many cartridges can be tightly dated, those from the Knight and Shenton site were available over a span of 50 to 60 years making them less useful as chronological markers.

## USING CHRONOLOGICAL MARKERS

The information on artefact dating has not yet been applied to the whole site. It has been applied to a test square with encouraging results, but on its own this is not evidence enough to determine if a workable method of determining chronological layers has been reached.

Table 4 shows the amount of dateable material found in square 29 South 7 West and how it fits into the date range of the site. The artefact dates suggest that any mixing between layers has been minor or at least mutually compensatory, as there is a discernable shift of the date ranges. Yet there is a great deal of overlapping, particularly over spits 1-3, so that no clear chronology can be decided by eye alone. A method of mathematically summarising the date ranges is needed.

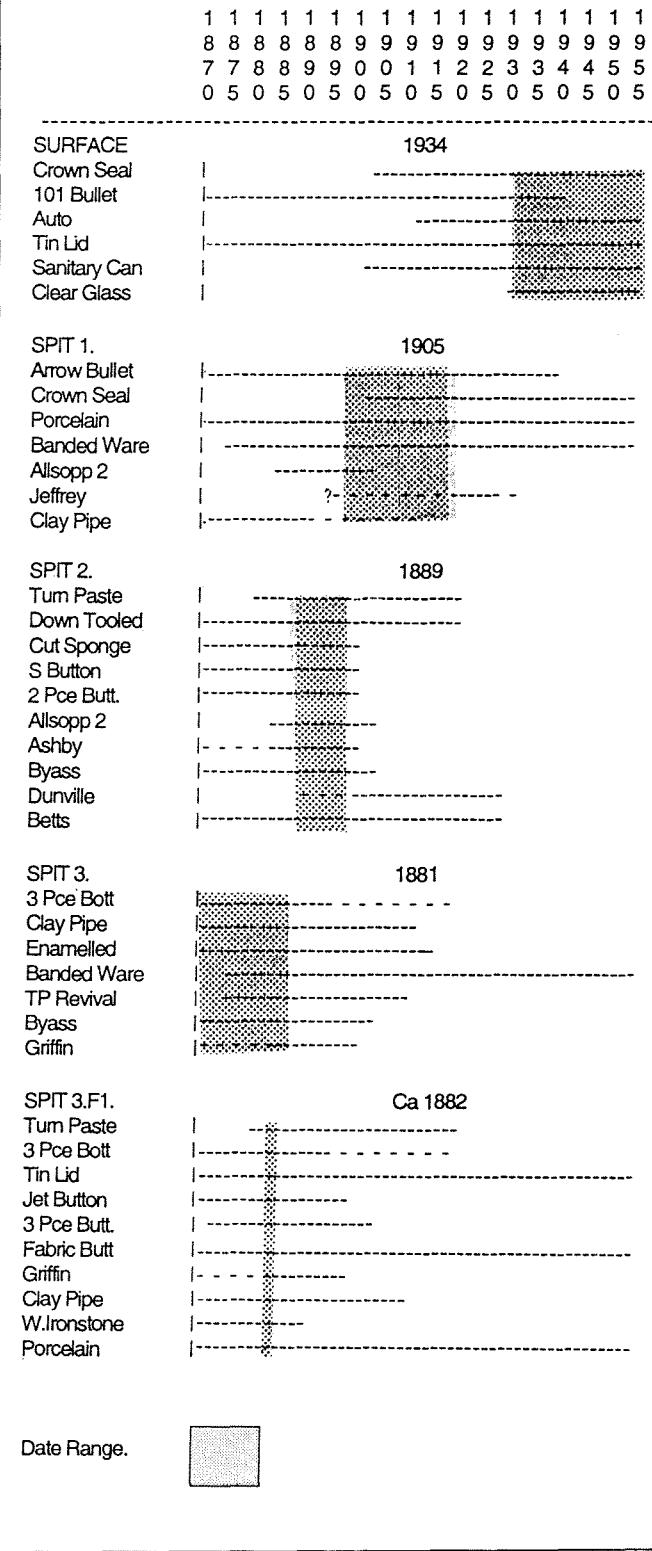
To this end, South's mean ceramic date formula was used. South designed his formula to date sites using ceramic types.<sup>25</sup> Mathematically the formula is quite simple. Each type within the assemblage is multiplied by its frequency of occurrence (how many sherds, weight, or minimum numbers represented). The resulting numbers are then summed and divided by the total frequency of types (total shard count, total weight or total minimum number).

The formula was not originally designed to incorporate a multitude of different classes of artefacts so to use it a suitable measure of frequency had to be determined. Shard counts, even within one class of artefacts such as ceramics, are notoriously unreliable as one object can break into two or a hundred sherds. This problem would be exacerbated in a situation such as this one, where relatively small amounts of material are being used, giving differences in breakage more statistical weight. Extended across a range of artefact classes of different materials with different breakage characteristics, the unreliability of shard counts becomes unacceptable. Weight cannot be used across classes of different materials either, as it would cause a statistical bias in favour of artefacts made from heavier materials. It was felt that minimum numbers was the best measure of frequency for this situation.

Dates were obtained for the test square using total dateable artefacts. These dates are shown in the table below in the column headed 'Total'. Chronologically insensitive artefacts such as porcelain and bone china which have been available for the past 144 years were then removed from the formula. Any artefact type which spanned all or most of the period of site use (1870 to 1979) was considered to be chronologically insensitive. For square 29 South 7 West this meant removing flanged tin lids, Banded Ware, fabric buttons, and porcelain which could not be dated by decoration. These adjusted dates are shown in the column headed 'Chrono-Sensitive'.

	Total	Chrono-sensitive	Date Range
Surface	1932	1934	circa 1930-1979
SPIT 1	1909	1905	1897-circa 1920
SPIT 2	1889	1889	1885-1896
SPIT 3	1885	1881	1870-1884
SPIT 3			
Feature	1890	1882	circa 1882

TABLE 4  
Dateable Artifacts From Square 29S7W.



The surface of the square has a mean date of 1932, with an adjusted date of 1934. Spit 1 is separated from the surface by a layer of friable concrete. It has an adjusted mean date of 1905. The absence of automatic bottle glass suggests an end date no later than circa 1920. Spit 2 has a mean date of 1889. This layer has no chronologically insensitive artefacts (as defined here) and so the chrono-sensitive date does not have to be adjusted. Spit 3 has an adjusted mean date of 1881, with a mean of 1882 for a small rubbish pit dug into it.

These mean dates can be turned into ranges by simply taking the middle date between two means as the end of one range and the start of the next. This quite satisfactorily divides the turn of the century from the late 1880s and 1890s, but the 1870s cannot be divided from the early 1880s. This echoes my preliminary dating of the sideway layers outlined at the 1991 Australian Society for Historical Archaeology conference.<sup>26</sup> The lack of dating control on the early period of lead bottle seals was thought a possible factor deflecting dating of the lower layers towards the 1880s. As this class of artefacts includes the best chronological markers found on the site their role within the formula could be quite crucial. This possibility was tested by substituting 1862 as the beginning date for the Ashby, Betts, Griffin and Byass lead seals. The estimated mean date hardly changed, lending confidence that it may be a reasonably good reflection of reality.

While it would have been ideal to have been able to separate the 1870s from the 1880s, the sort of chronology calculated here is workable at Cossack. In 1883 the provision of a reliable steamer service totally changed the level of integration of the Northwest frontier with both the Perthshire homeland and Britain. Such a transport change, which reduces the effects of distance, has profound ramifications for the availability of goods within the frontier and the cost of getting frontier products to homeland markets. These changes are important in terms of frontier theory and help mark the division of the initial frontier stage from the mature frontier adaptation. Therefore the division between spit 2 and spit 3 will be useful for applying frontier theory to this site if the dating for the rest of the site follows the same divisions.

## CONCLUSION

While application of South's mean ceramic date formula has yet to be carried out across the entire site, initial results indicate that it will be possible to divide the Knight and Shenton assemblage into time frames useable for frontier theory. The possibility that the small numbers involved may be statistically biasing the results will be tested when more of the site data has been grouped into chronological assemblages.

The second probable cause of chronological bias, artefact reuse, will be the subject of ongoing research. The resolution of the question, "how much bias is caused by artefact reuse?" will allow assessment of the degree of confidence which can be placed on the precision of the mean dates.

## NOTES

1. Turner 1893.
2. Birmingham & Jeans 1983.
3. For example De La Rue 1979; Erickson 1978; Fall 1972; Garden 1977, 1979; Sanders 1975; Shann 1926; Staples 1979; Withnell Taylor 1987.

4. CSO 36/603/5 10/1/67: 2 policemen dispatched to Port Walcott. They had the duties of store men rather than policemen.
5. Inquirer 15/5/1872. Governor Resident's report.
6. Semivitreous and vitreous White-Bodied Wares is a term suggested by Majewski & O'Brien 1987:120-124 to cover a range of wares intermediate in hardness between earthenware and porcelain which had been produced by the inclusion of china stone.
7. Godden 1964, 1965, 1966; Coysh 1974; Coýsh & Henrywood 1982.
8. Coysh & Henrywood 1982.
9. Godden 1964.
10. Material held in the West Australian Maritime Museum.
11. Artefact descriptions provided by Ritchie 1986 and Prickett 1981 were used for the comparisons.
12. Boow & Byrnes 1991. This research concentrates on glass found on Australian sites.
13. Iain Stuart. Paper presented at the 1991 ASHA conference.
14. Boow and Brynes 1991.
15. Walker 1967:90-101
16. Contained in Gallagher 1987.
17. Godden 1964:11.
18. Walker 1983:3; also Sudbury 1980:37 shows this change at Old Connellsburg Dump, New Zealand.
19. Varman 1987.
20. Cameron 1985.
21. Using Rock 1984.
22. Anson 1983, Bedford 1985.
23. Identification was carried out using Barnes 1989.
24. Barnes 1989 and Huon 1988.
25. South 1977.
26. Nayton. Paper presented at the 1991 ASHA conference.

## BIBLIOGRAPHY

### Published Sources And Theses

- ANSON, D. 1983. 'Typology and seriation of wax vesta tin matchboxes from Central Otago: a new method of dating historic sites in New Zealand', *New Zealand Journal of Archaeology* 5:115-138.
- BARNES, F.C. 1989. *Cartridges of the World* 6th Edition, Sheldon L. Factor, Northbrook.
- BEDFORD, S. 1985. 'A simplified classification for tin wax vesta matchboxes', *New Zealand Archaeological Association Newsletter* 28 (1):44-64.
- BIRMINGHAM, J. and JEANS, D. 1983. 'The Swiss Family Robinson and the archaeology of colonisations', *The Australian Journal of Historical Archaeology* 1:3-14.

- BOOW, J. 1991. *Early Australian Commercial Glass*, J Byrnes (ed), Department of Planning and the Heritage Council of NSW, New South Wales, Sydney.
- CAMERON, F. 1985. *Analysis of Buttons, Clothing Hardware and Textiles of the Nineteenth Century Chinese Goldminers of Central Otago*, unpublished, B.A. (Hons) University of Otago.
- COYSH, A. W. 1974. *Blue and White Transfer Ware 1780-1840*, David and Charles, Vancouver.
- COYSH, A. and HENRYWOOD R. 1982. *The Dictionary of Blue and White Printed Pottery 1780-1880*, Antique Collectors' Club.
- DE LA RUE, K. 1979. *Pearl Shell and Pastures*, Cossack Project Committee (Inc), Perth.
- ERICKSON, R. 1978. *The Dempsters*, University of Western Australia Press, Nedlands.
- FALL, V. 1972. *The Sea and the Forest*, University of Western Australia Press, Nedlands.
- FINK, N. & DITZLER, M. 1993. *Buttons. The Collector's Guide To Selecting, Restoring and Enjoying New and Vintage Buttons*, New Burlington Books, London.
- GALLAGHER, D. 1987. 'The 1900 price list of the pipe maker's society', pp. 42-163, in P. Davey (ed) *The Archaeology Of The Clay Tobacco Pipe. X. Scotland*; British Archaeological Reports, British Series 178.
- GARDEN, D. 1977. *Albany: A Panorama Of The Sound From 1827*, Nelson (Australia), West Melbourne.
- GARDEN, D. 1979. *Northam, An Avon Valley History*, Oxford University Press, Melbourne.
- GODDEN, G. 1964. *Encyclopaedia Of British Pottery And Porcelain Marks*, Barrie and Jenkins, London.
- GODDEN, G. 1965. *An Illustrated Encyclopedia of British Pottery and Porcelain*, Barrie and Jenkins, London.
- GODDEN, G. 1966. *Illustrated Encyclopedia of British Pottery and Porcelain*, Barrie and Jenkins, London.
- HUON, J. 1988. *Military Rifle and Machine Gun Cartridges*, Dai Nippon, Hong Kong.
- MAJEWSKI, T. & O'BRIEN, M. 1987. 'The use and misuse of nineteenth-century English and American ceramics in archaeological analysis', *Advances in Archaeological Method and Theory* 11:97-209.
- PRICKETT, N. 1981. *The Archaeology Of A Military Frontier: Taranaki, New Zealand, 1860-1881*, unpublished Ph.D Thesis, University of Auckland.
- RITCHIE, N. 1986. *Archaeology and History of the Chinese in Southern New Zealand During the Nineteenth Century: A study of Acculturation, Adaptation and Change*, unpublished Ph.D. Thesis, University of Otago.
- ROCK, J. 1984. 'Cans in the countryside', *Historical Archaeology* 18:97-111.
- SANDERS, T. 1975. *Bunbury: Some Early History*, Roebuck Society, Canberra.
- SHANN, E. 1926. *Cattle Chosen*, University of Western Australia Press, Nedlands.
- SOUTH, S. 1977. *Method and Theory in Historical Archaeology*, Academic Press, New York.
- STAPLES, A.C. 1979. *They Made Their Destiny: History Of Settlement Of The Shire Of Harvey 1829-1929*, Shire of Harvey, Harvey, W.A.
- SUDBURY, B. 1980. 'White clay pipes from Connellsburg Dump, 36 FA 140', *Historic Clay Tobacco Pipe Studies* 1:23-46.
- TURNER, F. J. 1893 'The significance of the frontier in American history', *Annual Report of the American Historical Association for the year 1893*:199-227.
- VARMAN, R. 1987. 'The nail as a criterion for dating of buildings and building sites (late 18th century to 1900)', in J. Birmingham and D. Bairstow, *Papers In Australian Historical Archaeology*, The Australian Society for Historical Archaeology, 104-112.
- WALKER, I. 1983. 'Nineteenth century clay tobacco pipes in Canada', *The Archaeology of the Clay Tobacco Pipe VIII*', America: BAR International Series, 175:1-88.
- WITHNELL TAYLOR, N. 1987. *A Saga of the North-West, Yeera-Muk-A-Doo*, Hesperian Press, Western Australia.
- Unpublished Sources**
- COLONIAL OFFICE RECORDS, Inwards and Outwards correspondence, West Australian Archives.
- NAYTON, G. 1991. Material culture changes on a frontier: Research at Cossack, WA: Paper presented at the Australian Society for Historical Archaeology. Eleventh Annual Conference.
- STUART, I. 1991. Alcohol trade in Victoria: Paper presented at the Australian Society for Historical Archaeology. Eleventh Annual Conference.
- WA Museum Shipwreck Material Collection.
- Newspapers**
- INQUIRER AND COMMERCIAL NEWS, Microfilm, Battye Library, Western Australia.
- APPENDIX**
- IDENTIFICATION AND DATING OF LEAD BOTTLE SEALING CAPSULES FROM COSSACK**
- Introduction**
- Any historical archaeologist working in Western Australia has to deal with the fact that change in this state has been rapid. First settlement on the Swan River was in 1829 and exploration of the north-west of the state did not start until 1863. Within the short span of time since then, the modern industrialized state has evolved. In such a situation great changes can occur in a short period of time, which makes studying such changes through the archaeological record challenging. Isolating short periods of archaeological time is methodologically difficult, yet this is a problem which must be solved if historical archaeology in Western Australia is to reach its full potential.

There is a need for good chronological markers for late nineteenth and early twentieth-century sites. These markers must be capable of establishing relatively fine dating of archaeological layers. This Appendix presents the result of research on a single artefact type which has the potential to be such a marker.

## Background

In 1990, the site of the first store in Cossack, an abandoned town in the northwest, was excavated as part of my postgraduate research. The excavation yielded a large number of lead bottle sealing capsules carrying trademarks. In all, 76 different trademarks were represented. The lead capsules were thought to be potentially useful for dating purposes for the same reasons that clay tobacco pipes make good chronological markers. This is both because they are so abundant and because they had relatively short lives within the cultural system, being thrown away as soon as the bottles were opened.

Initial research centred on the British patent and trademark records in an attempt to discover when each trademark was in use. Funding was obtained through the University of Western Australia and the Incentive Program of the Heritage Council of Western Australia.

The archival search achieved limited success. The records agent found that many of the patent and trademark records had been destroyed in 1963. She made an extensive search of the remaining records but found they were largely incomplete. Of the 76 designs, information was only obtained for the three Bass ale designs (designs 19, 20 and 21) which all bear the Bass signature which was registered on the 24th December 1879.

Following the British archival research, further unfunded research was undertaken in the Western Australian archives. London Post Office Directories were searched for businesses named in the trademarks. This source dated the life span of the business rather than when they were using a particular trademark, therefore it does not date artefacts as precisely as trademark records. The earliest available London directory was for 1884 which meant the period 1862 to 1884 could only be dated through newspapers.

Information contained in the London Post Office Directories included the name and address of businesses and whether they were a brewer or shipping agent. For brewers or distillers the address of the brewery or distillery was included along with the products they produced. Information on shipping agents often included the names of products they were licensed to ship. This allowed a more precise date in some cases.

The West Australian directories were consulted for West Australian businesses, also Wellborn for details of the Swan and Emu breweries.<sup>1</sup> For Victorian and South Australian businesses state directories were consulted.

Advertisements contained in back issues of *The Inquirer and Commercial News* and *The West Australian* were also examined to determine when products like Bass Ale were available in Western Australia. The papers were sampled every ten years between 1870 and 1930. A list of advertisers in eastern Australian newspapers given as an appendix in Boow & Byrnes was also used as an additional dating guide.<sup>2</sup>

Mr Ian Moore of the Western Australian Bottle Collectors Association supplied information on the type of drink associated with the different brewers and distillers mentioned on the capsules. He also gave a general guide as to when he thought they were exporting to Western Australia.

## List of Designs from Lead Sealing Capsules Found at Cossack

Lead capsules secured with wire twists were used for sealing bottles from 1843 to the mid 1920s when they were replaced by other forms of closure including foil capsules. Most of the capsules cannot be divided into types on the basis of material or form although some capsules from the later period are made from a thinner, more friable lead foil. From 1862 many carried trademarks impressed onto the top and sides of the capsules. These trademarks were used to divide the capsules into types which could be used as chronological markers.

Virtually all of the lead capsules found at Cossack were used to seal narrow necked bottles; only a few may have been used on wide mouthed bottles or jars. It is indicated in the text if the capsule was larger or smaller than standard, as the associated drawings are not to scale. It was necessary to draw some trademarks slightly larger than others to record the details clearly.

The designs and trademarks have been drawn from one capsule where possible. However, owing to the fragmentary nature of the material, it was sometimes necessary to piece together the design from two or more capsules showing the same design.

### Type 1. Chateau Tanunda Limited

Contained brandy. Chateau Tanunda Ltd appears only in the 1910 South Australian directory but there were distillers at Tanunda from at least 1906. After 1910 Auld WP & Sons were agents for Chateau Tanunda Brandy. The brand name was in use up to the 1950s (*Ian Moore pers. comm.*) perhaps even into the 1970s (*David Bullbeck pers. comm.*). This name was not found during the search of West Australian newspapers.

circa <1910 possibly to 1930

### Type 2. Rose & Company Leith & London

Contained lime juice. L.Rose & Co advertised in Perth in 1870 but they were in Leith only between circa 1890 and 1912.

circa 1890-1912

### Type 3. The Cooper Company, Southwark St, Borough SE

This company were bottlers of Ale or Stout.  
circa <1884-1893

### Type 4. M.B. Foster Limited London

Contained ale. Foster became a limited company between 1890 and 1894. Ian Moore dated this ale to the 1890s-1920s (*pers. comm.*). Bugle Ale had Foster's name and address on the capsule in 1890.<sup>3</sup> Foster's disappeared from the London directory between 1925 and 1930.

circa 1891-circa 1925

### Type 5. Flower & Sons Pale Ale, Samual Ashton London

Samual Ashton was not identified but Flower and Sons became a limited company between 1890 and 1894.

circa <1884-1893

### Type 6. D. Crawford 81 Queen St, Glasgow

Contained Red Star whiskey. Dated by Ian Moore to circa 1880s-1950s (*pers. comm.*) Crawford's whiskey was not advertised in Perth until 1890. It was still being advertised in 1910 but is not among the whiskeys mentioned later.

circa 1890-1930?

#### Type 7. Betts & Co, London.

Betts manufactured the metallic capsules; their new patent capsules were advertised in 1860<sup>4</sup> but by 1913 they were no longer advertising the patent. Betts became a limited company in 1914 or 1915 and continued to make capsules until after 1930.

circa 1860-1913 PATENT CAPSULES.

circa 1860-1915 BETTS & CO CAPSULES.

circa 1860-1930 BETTS MAKER.

#### Type 8. J.T. Morton. Leadenhall St London

JT Morton was a general provider and his marks appear on a range of store goods contained in various sized bottles and jars. Morton's bottled fruits, pickles, jams, salad oil, sauces and castor oil were advertised in Perth from 1870 to 1920. In 1900 C E Morton took over the business and it became a limited company in 1914 to 1915.

1870-1900

#### Type 9. Ashby & Co Brewery Staines

Brewers of mild and pale ale. The name was changed to Ashby's Staines Brewery Ltd in 1900.

circa <1884-1900

#### Types 10 and 11. JA Hennessy Cognac

Available in Sydney from at least 1840<sup>5</sup> and in Perth during the period of review. Design 11 may be the more recent of the two designs as the capsule was made by Betts without the word patent.

circa 1860-1930.

#### Type 12. Tree on crown trademark with Betts maker London but the brewer's name is not legible

circa 1860-1930?

#### Types 13 and 14. Gustav Kupper Lager Elberfeld

Advertised in the Sydney Morning Herald in 1890 & 1900.<sup>6</sup> The use of the royal Prussian insignia indicates a pre-World War I date (Ian Moore *pers. comm.*)

circa 1890-1914

#### Type 15. Robert Porter, London

A bottler of Ale or Stout. Became a limited company in 1900.

circa <1884-1900

#### Types 16 and 17. John Jeffrey & Co Heriot Brewery

Red Castle trademark. Jeffrey's made a whiskey. The name appears in Kelly's in 1920 but the distillery may have been operating earlier as it is a Scottish rather than a London-based business.

circa 1920?-1930

#### Type 18. All Saints Vineyards. G.S. Smith & Sons

This is a Victorian vineyard which is still producing muscats. The producer has used various forms of address. G.S. Smith was used between 1919 and ca. 1924.

circa 1919-1924

#### Types 19, 20 and 21. Bass Ale

There are three different designs all with the Bass signature and a triangle trademark. The signature was registered on the 24th December 1879. A label with the signature and Bass & Co's on the top right hand side was registered in September 1882. It did not contain a triangle trademark but most of the label was left blank to accommodate an earlier trademark. This may have been

the triangle as Bass today claim it as Britain's first registered trademark.

R B Byass was a beer exporter operating between circa 1884 and 1904. Design 19 does not contain the Byass name. It could have contained the name Cameron & Saunders who shipped Bass & Co's Pale Ale and Burton Ale. C & S labels were registered in November 1878 but these early labels did not contain either the Bass signature or the triangle mark. Triangle Ale was advertised in 1880.<sup>7</sup> Bass Ale was advertised in Perth from 1870 and Burton Ale was mentioned in 1880.

Type 19. <1879

20 & 21. 1879-1904

#### Type 22. Robert B. Byass London

Red Shield trademark. Betts maker London. Byass ale and stout were advertised both in 1840 and 1890.<sup>8</sup> Ian Moore (*pers. comm.*) dates the Red Shield trademark to circa 1880s to 1920s but the Byass name had disappeared from the London directory by 1905.

circa 1860-1904

#### Types 23 & 24. T.P. Griffin & Co. London

Type 24 is the same as Type 23 except it does not have the words "patent trademark" across the top of the design. Griffin porter was advertised in 1886.<sup>9</sup> The brewery operated between at least 1884 and ca 1900 and reopened as a limited company in 1930.

circa <1884-1900, and 1930

#### Type 25. T.B. Hall & Co Export Bottlers Liverpool

Hall exported Boar's Head Ale. Both stout and ale were advertised in 1880 and 1890.<sup>10</sup> Hall had become a limited company by 1905.

circa 1880-1904

#### Type 26. Unidentified geometric motif

#### Types 27, 28 and 29. Allsopp's Light Pale Ale

Samuel Allsopp & Sons, Burton-on-Trent.

Design 27 may be the earliest as it is not Allsopp & Sons. Hogsheads of Allsopp's ale were being shipped to Fremantle as early as 1870<sup>11</sup> but it is not known if the bottled ale was arriving that early. The business was Allsopp & Sons by 1884 and became a limited company by 1890.

Both Byass and Patterson & Hibbert were beer exporters. Byass operated between circa 1884 and 1904 and Patterson & Hibbert had become Hibbert & Co Ltd by 1894.

Type 27. circa 1870s-1884

Type 28. circa <1884-1904

Type 29. circa <1884-1894

#### Type 30. Unidentified Red Corkscrew and Stars motif

#### Type 31. Hart & Co Lantern Brand

On several types of drinks including navy rum (Ian Moore *pers. comm.*). A Hart and Co bottlers appeared briefly, in the 1905 directory. It is not certain whether this is the same business.

circa 1901-1912?

#### Type 32. Grimault & Co Pharmacie Paris

Ian Moore believes this motif is connected to Edu de Cologne (*pers. comm.*). The company is recorded as having advertised Syrup of hypophoshite of lime for chest complaints and Malico from pureua pepper leaves in 1870.<sup>12</sup> In Perth, Syrup of hypophoshite was advertised in 1870 and Malico in 1880.

circa 1870-1880s?

**Type 33. Coates & Co Original Plymouth Gin**

From Black Friar's Distillery. They opened after 1884 and before 1890.

circa 1885-1930

**Type 34. Altken's Yellow A trademark, Falkirk**

Altken's appear in Kelly's only in 1930 but they may have been operating earlier as they are a Scottish business.

circa 1930?

**Type 35. Unidentified motif from wide mouthed bottle****Types 36 & possibly 37. All parts of the same label**

John Robertson & Son Ltd Dundee.

Scotch Whiskey. The company appears in Kelly's after 1894 and disappears between 1915 and 1920. It could have been operating before 1894 as it is not a London based business.

circa <1894-circa1915

**Type 38. Unidentified motif****Type 39. Unidentified motif from London**

From an award winning wine in a large sized bottle?

**Type 40. Unidentified crown motif from a large bottle****Type 41. De Jonghs Cod Liver Oil**

This brand was advertised in Perth in 1870.

circa 1870s?

**Type 42. Smith & Hoey London**

Tudor Rose trademark. Wine and Spirit merchants. They appear after 1894 and became a limited company by 1915.

circa 1895-1914

**Type 43. Unidentified motif****Type 44. Blood, Wolfe & Co Liverpool**

This trademark carrying a Z has not been positively identified. Blood, Wolfe & Co XXX porter and ale were advertised in Perth in 1870. Ian Moore believes that it might relate to Blood Wolfe & Son's schnapps and gins (*pers. comm.*).

circa 1870?-1930

**Type 45. Bertrand & Co Bordeaux. Wine****Type 46. Unidentified side or shoulder seal****Type 47. Unidentified motif from large sized bottle****Type 48. Ind Coope & Co Burton on Trent**

This is a long established firm dating from the early 1800s to the 1950s (Ian Moore *pers. comm.*). It became a limited company after 1884 but before 1890. Its ale was advertised in Perth in 1870 and 1880. The capsule is from a large bottle.

circa 1870-1889

**Type 49. Unidentified motif****Type 50. Unidentified motif probably from a French wine****Type 51 & possibly 52. Maconochie Bros. London and Lowestoft**

MB Trident trademark. Bett & Co on side. Maconochie Brothers were general providers. They had become a limited company by 1900 but they were not at Lowestoft until after 1913. From a large or wide mouthed bottle.

circa 1914-1930

**Type 53. Dunville & Co Ltd Belfast**

VP crown trademark. [Betts] maker along rim. Dunville whiskey was advertised in Perth in 1890. It was a limited company in 1900 when first advertised in Kelly's.

circa 1890-1930

**Type 54. Unidentified motif****Type 55. Stout?****Type 56. Unidentified motif from a wine?****Type 57. Kangaroo Brand**

Byass Kangaroo stout was advertised in 1890.<sup>13</sup>  
circa 1890-1904?

**Type 58. Emu Brewery Ltd. Perth**

The Emu Brewery trademark was used from 1908. It became part of Swan Brewery which had introduced crown seals on its bottles by 1926.

1908-circa 1926

**Type 59. Swan Brewery Coy. Perth**

Welborn states that the Swan name was used from 1887 with the trademark being registered in 1894.<sup>14</sup> However, Swan Brewery was advertising under that name in Perth from 1880 and using a trademark of a swan in a half circle of water. The design on type 59 does not appear to be exactly the same as this early design but does appear on later Swan Pale Ale bottles which suggests that it was the 1894 design for this type of ale. The capsules were made in Germany which suggests a pre-WWI date.

1894-1914.

**Type 60. The side of the capsule**

Probably relates to scotch brewed at Staithfield (Ian Moore *pers. comm.*).

**Type 61. Unidentified motif****Type 62. Unidentified motif****Type 63. Unidentified motif**

"Limited" indicates post 1860  
>1860

**Type 64. Unidentified motif****Type 65. Unidentified motif**

Betts Patent trademark indicates an earlier date.  
circa 1860-1913

**Type 66. Nereins Brauerei**

Handshake trademark. Unidentified but Brauerei appeared in Kelly's in 1894. It is unlikely to be earlier than 1884 as in that year only one importer of lager beer was registered.

circa >1884

**Type 67. Unidentified motif**

Business based in London and Paris, possibly wines.

**Type 68. Unidentified motif**

Trademark indicates after 1862.  
>1862?

**Type 69. Bovril**

Ian Moore (*pers. comm.*) believes that Bovril meat extract sold in a small flat-sided bottle with a long neck was in use from the 1880s (Ian Moore *pers. comm.*). Bovril was the trade name for Johnson's fluid beef which first appeared in 1889. It did not appear in Perth papers until

1900 where it continued to be advertised until the endpoint of my survey in 1930.

1889 possibly circa 1900-1930

Type 70. Unidentified motif from the side of a capsule

Type 71. Lifebelt motif with prize medal on side of capsule

Type 72. Unidentified motif

S.....A.... ...ANG.. SOUTH.

Type 73. Colman's Mustard, London

From a small jar or wide mouthed bottle of 32 cm diameter.

circa <1884-1930

Type 74. Unidentified motif. London and Patent mark

Type 75. Unidentified motif

Type 76. P & H London

Betts Co. Part of the name is unidentifiable.

## CONCLUSIONS

Lead sealing capsules have the tightest dating control of any artefact class found at the Knight and Shenton Store site at Cossack. They are, in many ways, ideal chronological markers. Not only can they be dated relatively tightly, they had a comparatively short life in the cultural context, were thrown away when, and where, used and are reasonable abundant and durable in the archaeological record. They offer a real potential to meet the challenge thrown out to historical archaeologists by the rapid pace of change in Western Australia.

## NOTES

1. Wellborn 1988.
2. Boow & Byrnes 1991.
3. *Ibid.*
4. *Ibid.*
5. *Ibid.*
6. *Ibid.*
7. *Ibid.*
8. *Ibid.*
9. *Ibid.*

10. *Ibid.*

11. Henderson 1977:107.

12. Boow & Byrnes 1991.

13. *Ibid.*

14. Wellborn 1988.

## BIBLIOGRAPHY

### Published Sources And Theses

BOOW, J. 1991. *Early Australian Commercial Glass*. in J. Byrnes (ed.) Department of Planning and the Heritage Council of New South Wales.

HENDERSON, G. 1977. *From Sail To Steam: Shipping in Western Australia, 1870 to 1890*, unpublished Masters dissertation, University of Western Australia.

KELLY'S LONDON POST OFFICE DIRECTORY 1884-1930, West Australian Archives.

SAND'S AND McDougall's SOUTH AUSTRALIAN DIRECTORY 1906-1930, Alexander Library, Perth.

SAND'S AND McDougall's VICTORIAN POST OFFICE DIRECTORY 1886-1930, Alexander Library, Perth.

WELLBORN, S. 1988. *Swan: The History Of A Brewery*, University of Western Australia Press, Nedlands.

WISE'S WEST AUSTRALIAN POST OFFICE DIRECTORY 1870-1930, Microfilm, Battye Library, Perth.

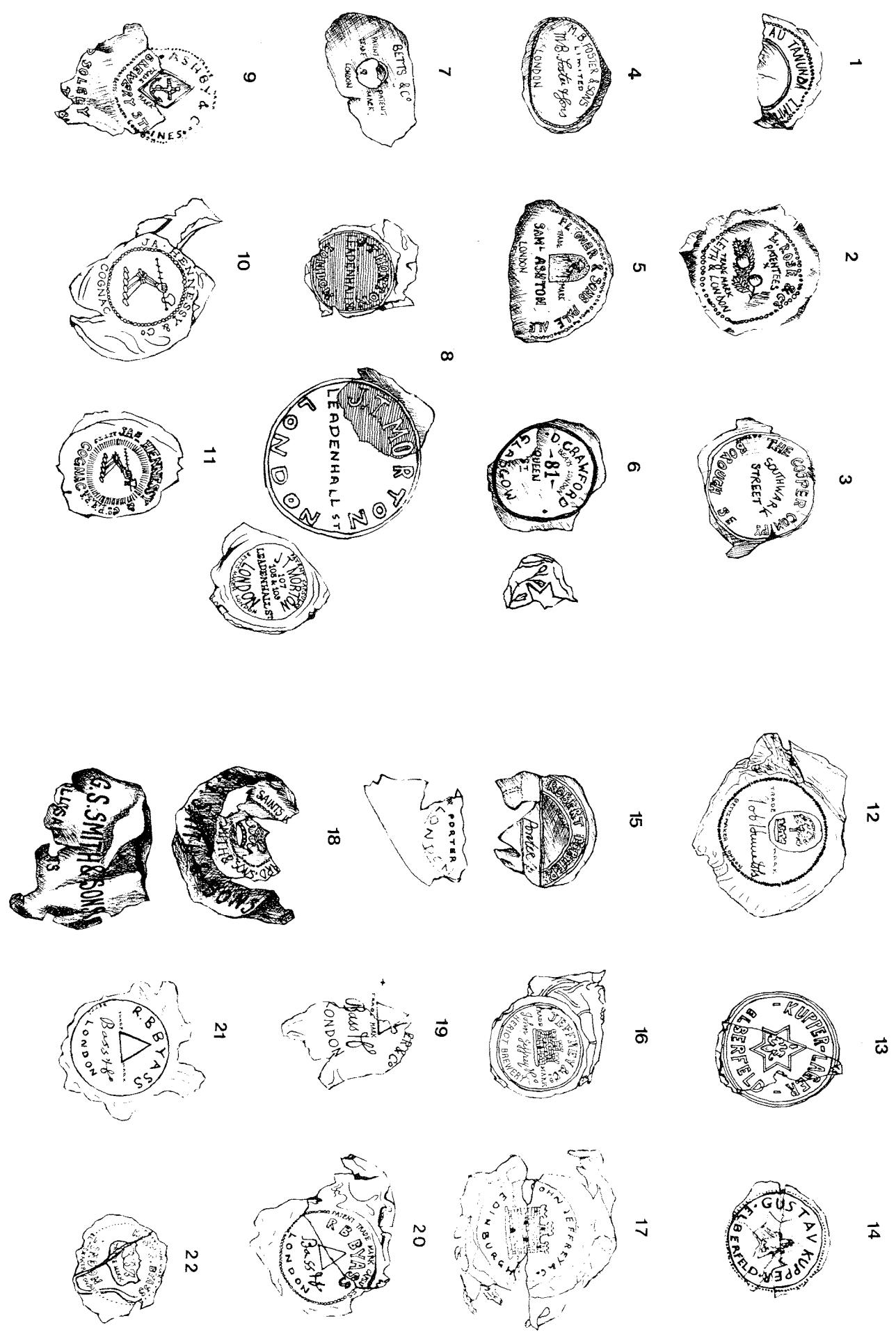
### Newspapers

INQUIRER AND COMMERCIAL NEWS 1870 to 1900, Microfilm, Battye Library, Perth.

THE WEST AUSTRALIAN 1910 to 1930, Microfilm, Battye Library, Perth.

### Illustrations

Illustrations of the sealing capsules listed above are shown on the following four pages.



23



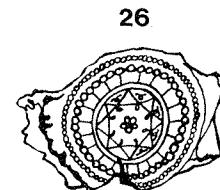
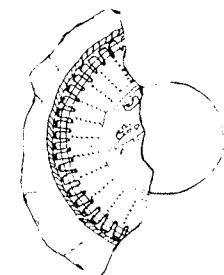
33



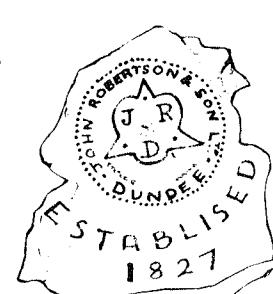
34



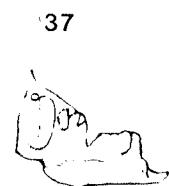
35



26



36



27



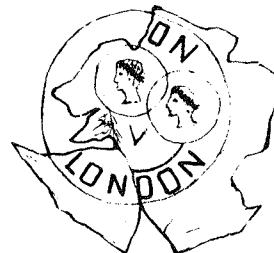
28



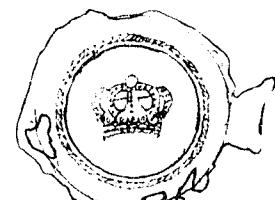
29



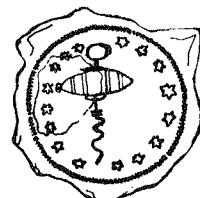
39



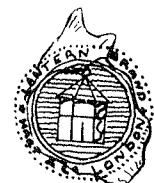
40



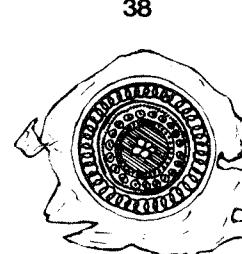
30



31



32



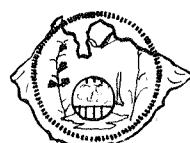
41



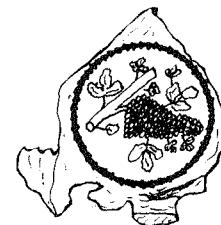
42



43



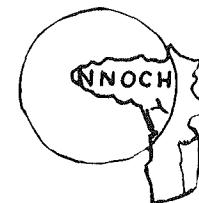
50



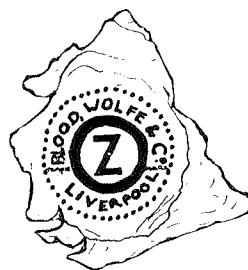
51



52



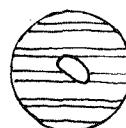
44



45



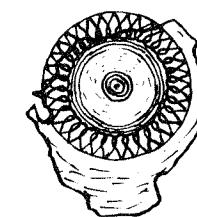
46



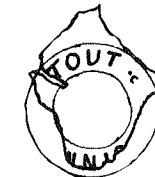
53



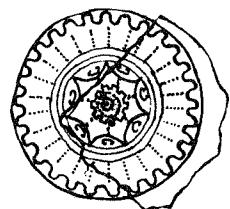
54



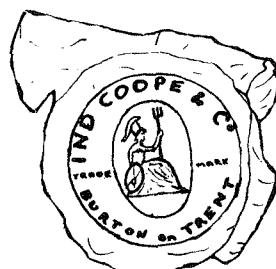
55



47



48



49



56



57



