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ANALYSIS OF THE GLASS BOTTLES AND CONTAINERS FROM
CROMWELL'S CHINATOWN

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The background to Chinese settlement in New Zealand and the Chinatown excavation have been described in an interim report (Ritchie, 1980) and in a more recent update (Ritchie, 1983). The main report is now in preparation.

Over four thousand glass fragments and complete artefacts were uncovered during the excavation. Analysis has revealed that a minimum of 510 glass containers (bottles, jars, vials) are represented. This relatively small total, considering the size and longevity of the settlement, is attributable to the absence of a major midden deposit or at least a failure to locate such a deposit. Possible reasons for the apparent absence of a large midden deposit were outlined by Ritchie (ms:l2-l3).

The glass artefacts described in this paper were found scattered throughout the settlement, within and around hut sites and in small caches in adjacent banks. Consequently, there is a reasonable probability that this sample is representative of the much larger volume of glass-contained products and glass artefacts which must have been used and disposed of during the settlement's existence. Two other factors may also have a bearing on the relative paucity of glass containers in the site. Firstly, many imported Chinese food and alcohol products were packed in ceramic rather than glass containers. Secondly, Cromwell's Chinatown consists of two discrete units - a residential area (which was excavated), overlooked by a business area on the terrace above. During the last twenty years the business area has been extensively excavated by non-archaeologists. It is known that a considerable number of bottles were uncovered but many have been dispersed and were not available for this analysis. However, those which have been observed in private collections are of similar types to those recovered in the residential area.

Objectives of analysis

The glass artefacts were analysed with four primary objectives in mind:

1. to establish the dates of occupation of each structure where possible,
2. to determine differences in hut function or changing uses,

3. to gain insights into socio-economic differentiation within the settlement,
4. to gain insights into subsistence behaviour.

Analytical procedure

The glass from each hut or feature was analysed separately. After cleaning, the glass was identified and placed into categories based on a determination of the original contents of each vessel. Product identifications were facilitated by well established techniques: research into brand names, embossing and labels (where possible), and comparative analysis of bottle morphology, glass characteristics and colour. In addition a 200 unit plus comparative collection was established (largely from bottle collectors duplicates and rejects) for direct comparison of fragments with suspected bottle types. Reference was also made to business directories (eg, Stones), bottle club magazines, issues of the New Zealand Antique Bottle Collector, books on bottle manufacturers marks and bottle collecting (Toulouse, 1971; Fletcher, 1975; Vader and Murray, 1975; Aldridge and Aldridge, 1978; Rusden, 1979; White, 1979) and excavation reports describing bottle remains (Herskovitz, 1978; Armstrong, 1979; Schulz et al, 1980).

Minimum numbers were achieved by counting only positively diagnostic pieces such as necks or bases and taking the greater of the two totals. For common bottles such as green glass ring seal beers, the minimum number determined as above was compared to the number inferred by tallying the total weight of that type of glass divided by the average weight of an intact bottle. This cross-check resulted in a 95% correlation.

Deriving occupation dates from bottles

Dating of bottles was achieved by utilisation of a number of well recognised techniques involving the recognition of known (often patented, hence datable) changes in bottle manufacturing techniques over the past 150 years. These innovations are documented in a number of publications (eg, Fletcher, 1972; Morgan, 1974; Vader and Murray, 1975; White, 1979). They include the recognition of changes in shape, glass colour and purity, mould marks, sealing methods, neck forms, and deciphering makers' marks. Historical records such as histories of bottle manufacturers, business directories and newspaper advertisements are also very useful for dating purposes. Bottles of known short term production or usage are especially useful for accurate and reliable dating of sites.

Bottle categories based on original contents

Glass containers, like many other forms of packaging (such as the shapes of tin cans), exhibit considerable conservatism through time. As a consequence, particular and often well recognised container types have been associated with specific products since their first manufacture. Recognition of these groups is a considerable aid to the identification of a bottle's original contents.

1.0 Alcohol bottles.

1.1 Liquor bottles: these bottles include brandy and whisky bottles and flasks (usually in aqua glass), schnapps, and gin (in distinctive dark green square cross section bottles known as case bottles) and wine bottles (similar in form to modern wine bottles).

1.2 Beers and ales: this large group of bottle remains range from the earliest black glass applied top forms made in three piece moulds to relatively modern embossed crown top beer bottles usually in brown glass. A major sub-group within this category are the heavy green glass ring seal beer bottles (incidentally these bottles were also used for aerated waters). Other early types include blob and collar necks and the rarer skittle form.

2.0. Household bottles: this extensive group is dominated by the bottles which contained various food products such as sauces, pickles, salad oil, vinegar, essences and jams.

2.1. Also included in this category are a group of bottles which contained non-edible or personal products such as perfumes, blacking, leather dressing and inks.

3.0. Pharmaceutical bottles: this category includes prescription and patent medicines, poisons (often in blue glass) and pill and ointment containers.

4.0. Chinese glass: this group consists of various glass containers which were probably made in China and contained China-made products. The main types which are uncovered archaeologically are small straight sided vials (which contained various tinctures including laudanum), tear-drop shaped vials, small round and oval section bottles and vials, tall cylindrical wide mouthed clear glass bottles and small bottles of various shapes often embossed with Chinese characters. All these bottle forms are believed to have contained pharmaceuticals. Generally they are made of clear glass.

4.1. In addition, bottles of European manufacture often bear remnants of Chinese language labels. Presumably these bottles were re-used by the Chinese. As yet no examples have been recovered with labels which are legible enough to translate.

5.0. Aerated waters: this category of bottle includes some distinctive nineteenth century bottle forms including the Hamilton patent (torpedoes), varieties of the Codd patent (marble bottles), and ring seals through to the familiar crown tops.

Undiagnostic fragments: In any archaeological glass assemblage a certain proportion of fragments are not positively ascribable to particular bottles or types. These can be divided into two groups:

- (1) Those which are miscellaneous fragments of identified bottles. These are irrelevant in an analysis and can be put aside.
- (2) Minute fragments which appear to be from additional bottles. Although they add to the overall total, they are too small or undiagnostic to be positively ascribed to a particular bottle type. In this analysis they constituted 9% (46 bottles) of the total.

Discussion and conclusions

In the following discussion the objectives cited earlier are addressed.

Dates of occupation. The occupation dates of the various huts as determined by bottle dating are outlined in Appendix 1. Assuming that rubbish was disposed of regularly during a settlement's existence, it is likely that the majority of uncovered artefacts are temporally biased towards the latter part of the occupation, in fact many are probably the result of individual huts and their contents being finally abandoned when their owners departed. Given this proviso, some spatial-temporal patterns are clearly evident. The earliest huts in the settlement are located at the eastern end (Huts 21, 22, 23, 26), beginning about 1870. The huts (6, 7, 14) at the western end are of later date (post 1900) and some (e.g. Hut 4) appear to have had predominantly European occupation. This is confirmed by historical accounts which indicate that the western end of Chinatown was occupied by destitute Europeans during the 1930s Depression, after it had been abandoned by the Chinese.

Few clear stratigraphic indications of re-use of huts were evident during the excavation. Analysis of the bottle types found within and around each structure indicates that in most instances they form a continuous dating sequence, i.e. there were no or very short breaks in occupation between when a hut was first occupied and when it was abandoned. However, Huts 1, 6, 12 and 18 probably had two periods of occupation based on the bottle dates. These suggest a pre-1900 occupation date evidenced by early forms such as black glass beers, Sykes MacVay

Bottle Type or Product	Quantity	Description or Brand	Probable Date Range
Schnapps	14	Udulpho Wolfe, Schade and Buysings and Gilbeys 'Silver-stream'	1880-1920
Cognac/Brandy	28	Hennessey Brandy, Cognac, ring seal aqua, spun moulded bottle	1880-1920
Gins	55	Plain case gins (53) JDKZ gins (2) (Fig 2)	1880-1920
Spirit Flasks	28	Cognac/Brandy, coffin shaped flasks (10) (Fig 12) Whisky flasks (18)	1890-1920
Whisky	12	aqua applied top, some 3 piece mould (Fig 11)	1880-1920
Miscellaneous Liquors	31	Including Benedictine (with crescent on shoulder), Johnnie Walker whisky (same shape as today, aqua), Penfolds and other ring seal wine bottles and dark brown and green 3 piece mould bottles.	

Bottle Type or Product	Quantity	Description or Brand	Probable Date Range
Black beers	10	3 piece mould, applied top	1870-1880
Ring seal beers	61	dark green 'champagne' type, beer and/or ginger ale and lemonade (Fig 1)	1885-1920
Crown top beers	14	brown glass, various companies	1920-1935
Blob top beers	9	dark green, spun moulded	1910-1920
Skittle beer	1	dark green, collar top	pre 1900
Green applied top beers	8	spun moulded, dark green	1910-1925
TOTAL	103		

TABLE 1. Chinatown bottles: 1. Liquor; 2. Beer and ales.

Bottle Type or Product	Quantity	Description or Brand	Probable Date Range
Leather Dressing	2	square, wide mouthed aqua bottle, embossed 'Hauthaways Peerless Gloss'. Made in USA. (Fig 13)	1900-1915
Salad Oil	2	whirly, aqua bottle, two sizes	
Sauce	5	clear glass, machine made, Lea and Perrins shape.	1920-1930's
Sauce	9	Lea and Perrins Worcester Sauce, aqua, same embossing as above. Also Mellor and Co.	1880-1920
Vinegar	6	Champions vinegar and others.	1880-1920
Pickle Jars	17	Bottles embossed, Haywards Flag Brand Pickles; Stella, Pacific Preserving Works, Dunedin, New Zealand (Fig 3). Military brand; and other unembossed bottles.	
Jams/ Preserving Jars	18	Roll top and screw top jars. Jars embossed St Georges Preserving Works, Dunedin. S Kirkpatrick, Nelson.	1890-1910
Miscellaneous Household	28	Lemos, lemon drink, essence bottles, essence of Rennet and plain unembossed cylindrical wide mouthed bottles.	
Ink	2	Carters ink bottle. (1) N Antoine, Paris No 145 clear glass (1)	
Blacking	3	Nubian Blacking wide mouthed, aqua panelled bottle - label still intact and readable on one bottle.	
TOTAL	92		

TABLE 1. Chinatown bottles: Household and personal bottles.

Bottle Type or Product	Quantity	Description or Brand	Probable Date Range
Medicine	1	Dr Sheldons New Discovery	
Medicine	1	Davis Vegetable Pain Killer - aqua panelled bottle. (Fig 14)	1880-1920
Medicine	1	Chamberlains Pain Balm - embossed, panelled bottle.	circa 1900
Medicine	2	Embossed, Hotop Chemist, Cromwell, aqua. (Fig 4).	1880-1920
Vaseline	2	One is a screw top, clear glass jar, embossed, vaseline. Cheseborough Mfg Co, New York.	1887-1920
Magnesia	4	Dinnefords, Ayers, Kruses	
Perfume	3	Rimmel, embossed Rimmel Perfumer Paris. (Fig 6).	circa 1910
Pills	1	Marshalls Chemical Co, brown glass.	1910-1920
Medicine	1	Clear glass, embossed Marshall Chemical Co, 86 Princes Street, Dunedin.	1910-1920
Cream Pot	2	Milk glass, screw top ointment. pots - one with fluted sides.	
Medicine	1	Baxters Lung Preserver, Christchurch; an aqua panelled bottle.	
Extract	3	Embossed Eucalypti Extract, Saunders and Son; vial type.	
Medicine	1	Fruit salt, Enos. Machine made, clear glass.	1920
Medicine	1	Embossed Johnson & Haslett, Chemist, Dunedin.	
Disinfectant	1	Embossed Jeyes Fluid - brown glass.	
Cosmetic?	1	Bottle embossed 'Tussicura' on two sides.	

TABLE 1. Chinatown bottles: Pharmaceuticals.

Bottle Type or Product	Quantity	Description or Brand	Probable Date Range
Medicine	4	Vial type bottle, two are 3 piece mould. Possible laxative.	circa 1910
Medicine (?)	1	Green medical vial.	
Jar	1	rectangular clear glass, screw top jar - embossed with 'Everetts', contents unknown.	
Poison	2	Octagonal blue poison bottle and rounded triangular type bottle embossed 'Not to be Taken'.	
Jars	2	Small clear glass jars with screw tops, possibly ointment.	
Medicine	7	Plain, unembossed, contents unknown, aqua.	
Medicine	5	Machine made, clear glass, contents unknown.	
TOTAL	48		

Bottle Type or Product	Quantity	Description or Brand	Probable Date Range
Tincture Vials	32	1 tear drop, all others straight sided aqua glass (Fig 10)	
Pharmaceutical	3	Wide mouthed, clear glass, cylindrical bottles. (Fig 7)	
Dark Green beers (?)	3	Applied collar top, spun moulded (intact label with Chinese characters observed on similar bottle in reference collection).	
TOTAL	38		

TABLE 1. Chinatown bottles: Pharmaceuticals (cont.), Chinese bottles.

Bottle Type or Product	Quantity	Description or Brand	Probable Date Range
Hamilton	3	'torpedo' type bottle, one is Theyers and Beck, Alexandra. (Fig 9).	used extensively pre 1900 1888-1893
Codd (marble)	8	J McLoughlin, Cromwell, both Reliance and Dobsons Patent, Lane and Co Dunedin, Thomson and Co (1908 on base), and unembossed Cods. (Fig 8).	1912-1916
Crown Top	4	Lane and Co, Dunedin.	1920-1935
TOTAL	15		

TABLE 1. Chinatown bottles: Aerated waters.

stoppers (1860s-1888), case gin bottles and later occupations evidenced by machine made glass bottles of the 1930s.

Hut functions and social differentiation. The recovered bottle types (and other artefacts) indicate that the majority of the huts were humble living quarters in or around which food and beverages were prepared and consumed. Only one hut (23) appears to have been more specialised and this is reflected in the presence of particular bottle (and other artefact) types. Amongst the artefacts recovered from Hut 23 were 90 bottles (predominantly alcohol), two kerosine lamp glasses, 18 tincture vials (56% of the) and various artefacts associated with opium smoking. Although the hut was basically similar in layout to the other habitation huts, the high incidence of opium smoking equipment suggest its occupants may have allowed its use as a smoking and social venue.

Social differentiation. Comparative analysis of the bottle remains and other artefact types has revealed no pronounced differences which might reliably indicate differences in social status. In fact, the hut assemblages are remarkably egalitarian.





Key Figures 1-15

1. Ring Seal Beer (large size). These bottles were also used for aerated waters (lemonade and ginger ale).
2. Case Gin - Dutch JDKZ brand.
3. Pickle Jar 'Stella Brand, Pacific Preserving Co, Dunedin'.
4. Medicine Bottle. H Hotop. Chemist, Cromwell (1880-1920).
5. Opium lamp glass made from a cut-down brandy bottle.
6. Rimmel (French) perfume bottle, (circa 1910).
7. Chinese pharmaceutical? bottle 11.5 cm tall.
8. J McLoughlin, Cromwell. Codd patent aerated water bottle (1912-1916).
9. Theyers and Beck of Alexandra, Hamilton patent (torpedo) aerated water bottle, 1887-96.
10. Chinese medicinal vials, left to right, oval cross section, straight sided (2 sizes), small medicine bottle, teardrop vial.
11. Aqua, three piece mould applied top, whisky.
12. Coffin shaped flask.
13. Hawthaway's Peerless Gloss (leather dressing).
14. Davis Vegetable Pain Killer.
15. Ring seal brandy bottle 1890-1910.

Socio-economic insights. A final statement on the relative importance of glass bottled products in Chinatown is not possible until other container types (e.g. cans and imported Chinese ceramic food containers) are reported on. At this stage of the analyses of all the packaging remains about 30% appear to be of Chinese origin. However, most of the major imported products e.g. Ng Ka Py (alcohol), rice, soya oil, opium, dried vegetables, sugared ginger and various fish pastes were not packaged in glass. In the absence of a major Chinese glass container manufacturing industry ceramic pots and sacks continued to be the main forms of transporting foodstuffs until about 1910.

The only numerically significant glass-contained product of Chinese origin appear to be pharmaceuticals, although European medications were also used extensively. The presence of some of the Chinese pharmaceuticals is possibly attributable to opium addiction resulting in a demand for products such as tincture of opium (laudanum) especially after its prohibition (1901). The Chinese were also very superstitious and feared European doctors. They generally preferred to use 'tried and true' Chinese medicines and medical procedures such as acupuncture (Butler, 1977:46).

Although the Chinese continued to rely on a wide range of food and alcohol products imported from their homeland, almost from their first settlement in New Zealand, they adopted a number of European foodstuffs, alcoholic beverages and other products, many of which were packaged in glass. Some European bottled products became virtual staples and this is clearly reflected in the remains from Chinatown, other excavated Chinese sites and in the many observations recorded by the Rev. Alexander Don a Presbyterian minister who visited the Chinese settlements regularly for over 20 years.

A minimum number of 510 glass bottles and containers were recovered during the excavation in the residential area of Chinatown. These break down into miscellaneous liquor bottles (mainly spirits) which constitute 33% or 168 units, beers and ales (20%, 103), household bottles (18%, 92), pharmaceuticals (9.5%, 48), products bottled in China (7.5%, 38) and aerated waters (3%, 15). Fragments which were unable to be positively ascribed to individual bottle types or product categories made up the remaining 9%, (46).

In the following discussion the social role of the various bottled products is examined.

The popularity of alcoholic beverages on the goldfields is a well established fact, so the high percentage of alcohol bottles, 53% of the total recovered from Chinatown, perhaps creates little surprise. However, in addition to the obvious consumption of European alcohol, the evidence of consumption of imported Chinese alcohol in ceramic bottles (especially Ng Ka Py, 32 bottles from residential Chinatown, and 65 more in private collections from Upper Chinatown) and the widespread use of opium must be taken into account. The relative significance of these three 'mind altering' agents is difficult to quantify but it is clear that they played a major role in Chinese recreation and social occasions. Later they appear to have increasingly served as a solace to combat loneliness, poverty and despair.

The most common bottles of any sort in Chinatown were large unembossed green glass ring sealed beer bottles. At first it appeared a simple case of preference for brewed products, but later it was found (from intact paper labels) that the same type of bottle was used by both Cromwell (Cromwell Brewery) and Alexandra (Theyers and Becks "Champion" trade mark) aerated water manufacturers for ginger ale and lemonade. Thus it is not possible to comment categorically on the relative consumption patterns concerning the products bottled in these containers. Incidentally no bottles of the Buckham's (Queenstown) brewery and cordial factory were uncovered during the excavation.

The beer bottles uncovered during the excavation attest to the longevity of the Chinese settlement. They range from the early black glass three piece mould applied top forms (1860s-1880s) through skittle forms in dark green glass (pre-1890?), green glass ring seals (1885-1920), blob top spun mould forms (1910-1920) to pictorially embossed brown glass Crown tops (post-1915-1930s). (Some of the latter bottles would be derived from the 1930s occupation of the western part of the abandoned Chinese settlement by destitute Europeans. Others are probably discarded bottles which have rolled or been thrown down the bank).

Another of the more common bottle types found in Chinatown and other Chinese sites are aqua brandy bottles (Fig. 15). Although the popularity of brandy is well attested from archaeological remains, Don's numerous comments about brandy clearly show that it became a very important and integral part of the southern New Zealand Chinese social life, and particularly so during festive and mourning occasions. Some examples: when Don

(1882:43) visited the Round Hill goldfield he observed a list prepared by a storekeeper of the articles consumed at a feast the previous night. "The total cost was about 50 pounds, the most prominent article on the list being brandy, which seems to play the part here that samshoo (Ng Ka Py?) does at home." (Incidentally, the feast cost ten shillings per head). During another visit to the Round Hill field he visited the hut of three men who shared the same dwelling. He noted (1883:47) "I counted 26 empty brandy, whisky and samshoo bottles lying outside - the accumulation of only a few months!" On another visit he entered a Chinese gambling house and noted (1882:105) "six men were seated at a table literally covered with eatables, and besides a brandy bottle and small Chinese wine cups..... In the next shop were about a score of men feasting and the brandy bottles and wine cups were prominent." On a later visit Don (1887:204) encountered another festive occasion. He observed "the festive components were two fowls, six pounds of pork bones with rice and brandy unstinted". Don's recorded observations abound with numerous other comments about the prolific consumption of brandy (e.g. 1883:185, 1885:27, 204, 1886:202, 1889:204). However, in addition to its use as a social lubricant, brandy was also used as a funerary offering. Don observed one occasion when the body of a Chinese miner, who died the previous day on the Round Hill field, was being carried down to Riverton. His bearers "...rested awhile on the way. When the body was lifted several candles were lit and a bottle of brandy spilt to appease the wrath of the deceased's spirit at the removal of the body".

The archaeological remains from Chinatown suggest that gin was even more popular than brandy (although brandy is dominant in other sites in the Cromwell area). There is also a puzzling absence of any observations about the consumption or social role of gin in the Don records. An elderly European informant stated that the Chinese used gin in their cooking (McElligott, pers. comm.), but we have not been able to substantiate this claim. Possible support for its use in cooking comes from the fact that case gin bottles were found in all but three of the huts in Chinatown.

Other European alcoholic beverages which were popular with the Chinese were whisky, schnapps and cognac. Wine was represented by the remains of six bottles in the assemblage.

The most notable area of re-use of glass containers involved the modification of aqua European brandy bottles to make opium heating, and reading lamps. These were formed by cutting off the top quarter and the basal third of a brandy bottle (see Fig. 5) to produce an artefact similar in appearance to a small lantern

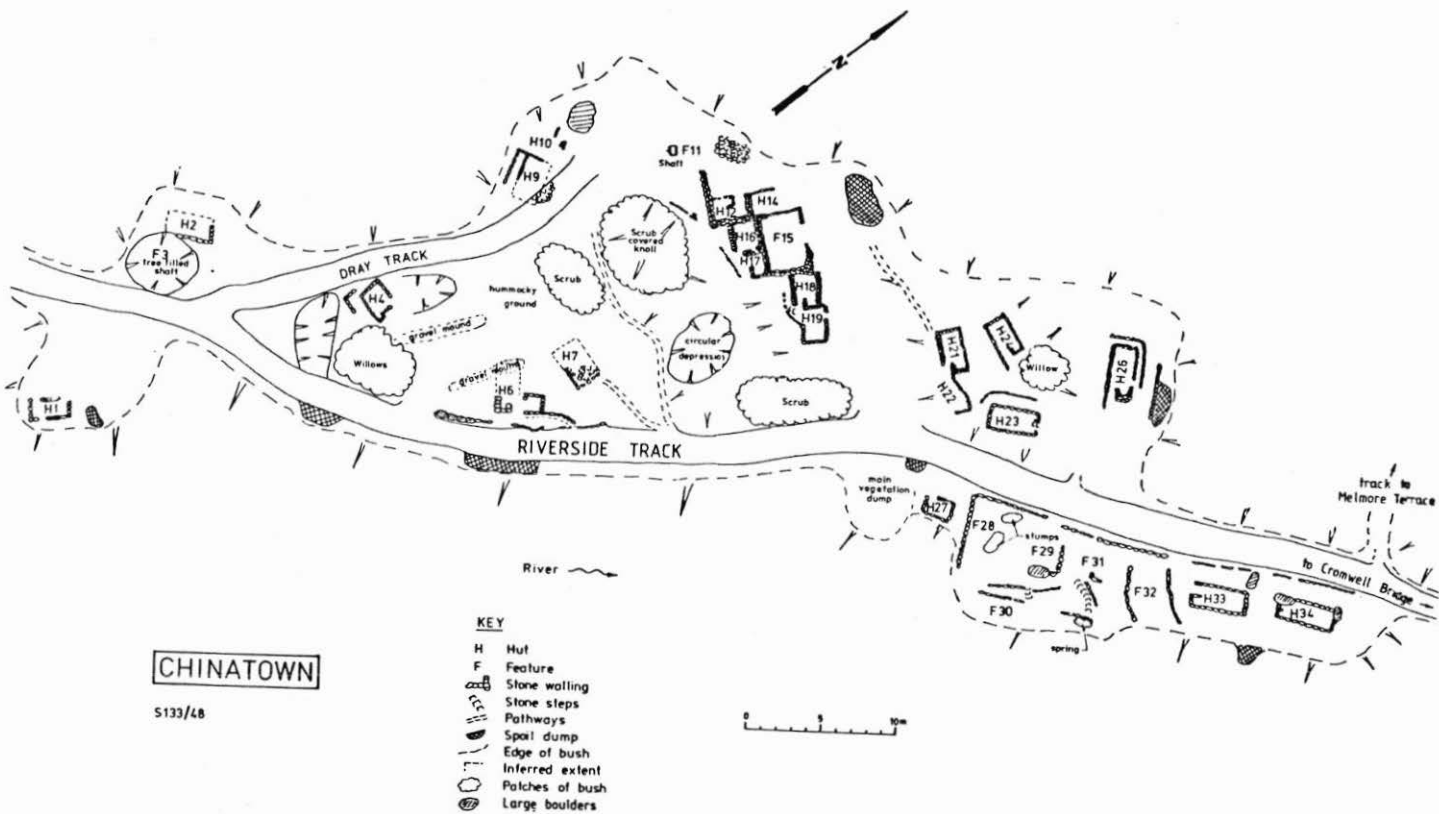


FIGURE 16. Cromwell's Chinatown.

glass. Six of these were found in Chinatown. They are frequently found in Chinese sites associated with opium smoking equipment (Ritchie and Harrison, 1981). Their use for this purpose was amply documented by Don. He recorded (1887:163) when he preached a sermon in a gambling and opium shop in the Nevis Valley "Picture us if you can! The preacher with an empty kerosine tin laid flat on a table for a desk: ditto standing on end for his seat, the congregation seated and reclining on short stools and opium benches; the sacred page lighted by an opium lamp (a jam tin filled with tallow, a cotton wick and the upper part of a brandy bottle for a shade)".

The other major area of re-use of bottles involved cutting off the top third of bottles to make jars. This practice was quite common in the nineteenth century and undertaken by both Europeans and Chinese. However, at Chinatown only one bottle (dark green glass) was uncovered which had been modified in this fashion.

Ninety-two bottles (18% of the total) were categorised as 'household bottles'. The usage of basic European cooking and food products and those of similar appearance or composition to traditional Chinese products is readily understandable, e.g. vinegar and pickles (chow chow). The acceptance of European products also seems to have been promoted by some of the Chinese storekeepers who prided themselves on having European products available as well as Chinese provisions (refer Ritchie, 1980:81).

The Cromwell Chinese adopted several European products which were widely used on the goldfields, e.g. worcester sauce (particularly the Lea and Perrins brand), salad oil, Champion's and other vinegars, pickles (particularly Haywards 'Flag Brand', 'Stella' (Pacific Preserving Works, Dunedin) and the 'Military' brand), and jams (St George Preserving Works and S. Kirkpatrick of Nelson). Less numerous products include Nubian blacking, essence of rennet, Carters and Antoine Inks, Hauthaway's Peerless Gloss (a leather dressing) and Lemos (a lemon drink). The last product was distributed in a very heavily embossed bottle. At least 20% of the glass bottles and jars grouped in the 'household category' were unembossed. However, they can be reliably identified because their shapes are similar to embossed versions of the same bottle form.

The 48 pharmaceutical and cosmetic bottles uncovered in Chinatown provide interesting insights into notions of sickness in the nineteenth century and the health concerns, real and imagined, of the occupants of the settlement. The assemblage is dominated by patent and proprietary medicines such as Dr Sheldon's 'New Discovery', Davis Vegetable Painkiller (c.f. Hayward)

and Diamond, 1982:177), Chamberlain's Pain Balm, Baxters Lung Preserver (Christchurch) and Saunders and Sons Eucalypti Extract. These preparations frequently contained extracts, gums and tinctures derived from plants with narcotic properties. The alcoholic and narcotic contents of these preparations was often incredibly high by today's standards (Herskovitz, 1978:12). While some of the products may have been recommended by doctors, they were generally bought after self diagnosis, influenced by extravagant claims (unfettered by government regulations) that the products would cure almost any sort of ailment.

As an example, the formula of one of the more universal remedies, Davis Vegetable Painkiller, is given by Holbrook (1959:153) as follows: gum myrrh 2 1/4 lbs, capsium 10 oz, gum opium 8 oz, gum benzoine 6 oz, gum fuaiaic 3 oz and 5 gallons of alcohol.

The rest of the assemblage is made up of embossed chemists medicine bottles such as those of H. Hotop, Cromwell, the Marshall Chemical Co, Princes St, Dunedin and Johnson and Haslett, Dunedin, screw top vaseline jars (Chesebrough Manufacturing Co, New York), unembossed ointment and pill jars, Enos fruit salts (machine made), Tussicura, laxative bottles, Jeyes Fluid (embossed), Magnesia (Dinnefords, Ayers and Kruses) and several unembossed vials and small bottles believed to be medicine containers. Only two blue glass poison bottles were found. Two unembossed milk glass (hand or face) cream pots were uncovered; one is a distinctive specimen with curving fluted sides.

In addition to the medicines three French perfume bottles were uncovered (Rimmel and embossed Rimmel Perfumer Paris). Interestingly, French perfume bottles, particularly of the Rimmel brand have also been found in several Chinese occupied rock-shelters in the upper Clutha area. Presumably, in the absence of women, these products were used for male cosmetic purposes.

A total of 38 glass bottles and vials believed to have contained contents bottled in China were uncovered in Chinatown. The largest category (32 specimens) consists of small straight sided vials (Fig. 10). These are known to have contained various medicinal products including tincture of opium. The latter is known to have served as an emergency source of opium after opium sales to Chinese were prohibited in 1901. The opium was extracted from the tincture by boiling off the alcohol.

Most of the vials uncovered in Chinatown were empty but four contained distinctively different contents which have not been analysed yet. These are a clear liquid (resembling water), a

dark brown liquid, a red powder (like cayenne pepper) and small grey balls (like birdshot pellets).

At least five other small medicinal vial forms are known from Chinese sites, viz., parallel and fluted sided vials in two sizes, parallel sided vials with oval cross sections and tear drop shaped vials in two sizes. In Chinatown only one of these additional types was represented - a single specimen of the small size tear drop vial with three Chinese characters written on the front in gilt paint. This label was translated by Dr F. Lam. Although he found the Chinese characters difficult to anglicise (refer App 2) they stated a man's name (presumably the supplier) and indicated the product was some form of universal remedy. An oval cross-section vial recovered from a Chinese site (S115/54) in the Upper Clutha Valley bears the name of the same supplier. In addition a range of small clear glass bottles of various shapes with embossed Chinese characters are also known. These are also believed to be medicine bottles (Fig. 10).

Three wide mouthed, thin walled clear glass cylindrical bottles (11.5 cm tall) were recovered. The bottles have a fine roll-lip and bear the remains of largely illegible Chinese labels. They are believed to have contained a pharmaceutical product (Fig. 7). The labels bear the name and place of the manufacturer, but they were too incomplete to decipher accurately (refer App.2).

Three applied collar-top spun moulded bottles (10 oz size) were recovered. These are similar in form to comparable size beer bottles. The bottles from Chinatown are unembossed and have no labels. However, an identical specimen with an intact label bearing Chinese characters was donated for our reference collection. The label on this bottle was largely illegible. However, Dr Lam was able to determine that the bottle originally contained a wine based medicine described as a 'general remedy'. Although the lower part of the label was very worn it appears to cite a list of the ingredients.

Another widely recognised Chinese bottle type commonly found in post-1910 sites are green glass crown tops similar in form to the modern clear glass 10 oz soft drink bottle. The Chinese ones differ, however, in that they have a distinctive raised band around the neck and frequently Chinese characters on the base or sides. Two of the more common ones are unembossed green glass bottles with Chinese characters on the base and brown glass embossed 'Wing Lee Wai' brand bottles (successors to earlier ceramic bottles of the same brand). However, these post-1900 alcohol

bottles have not been found to date in any of the excavated Chinese sites in the Cromwell area.

Only 15 aerated water bottles were uncovered in Chinatown but as mentioned earlier some of the green glass ring seal beer bottles may have contained aerated water originally. Although aerated water bottles form a relatively insignificant portion of the total assemblage and consumption patterns, they are some of the most useful for dating purposes because of regular and datable changes in the bottle forms (e.g. Hamilton torpedoes through Maugham's patent (bomb bottles) to patented modifications of the Codd marble bottle). Dating is also facilitated if a company only operated for a short period. This is certainly the case with the only embossed Cromwell aerated water bottles found to date. John McLoughlin was initially involved in brewing in Cromwell. He only ventured into aerated water production in 1912 and continued until 1916 (Stone's Directory), thus providing a concise date range. During this brief span McLoughlin used two different versions of the Codd bottle (the Dobson, patented 1885 and the Reliance, patented 1886). Two different size ranges with three different embossings are known from excavated specimens and others observed in private collections. Codd bottles also bear the embossed names of different British bottle manufacturers. Research into the history of the manufacturers can also help with dating, e.g. some specimens are embossed Cannington and Shaw, St Helens, England. This firm was in business from 1875-1913 (Toulouse, 1971:147).

Theyers and Beck of Alexandra were another local aerated water manufacturer. Canute Peterson Beck and Theyers are cited in Stone's directories from 1888 until 1893 as brewers and maltsters, with Beck continuing on his own after that date. During the period of the brewing partnership they were also producing aerated waters. Thus the Hamilton patent embossed Theyers and Beck (torpedo) bottle excavated at Chinatown can be ascribed a similar date range (i.e. 1888-93).

To conclude, the volume of data which can be generated from the analysis of glass containers and associated research is considerable because many vessels have a traceable history. When these individual histories are combined in a research - analysis such as that performed on the Chinatown glass it can provide substantial and new information on the types of research queries addressed in this paper.

Postscript

This paper is one of several which will be published in various outlets on different aspects of the Chinatown assemblages. Forthcoming papers include analyses of the Chinese ceramics, European ceramics, cans and metal artefacts, match-boxes (Anson in press), clay pipes (Foster in press) and opium associated artefacts (Ritchie and Harrison 1981; presently being revised). To assist with these analyses reference collections of bottles, Chinese ceramics, European ceramics (limited), wax vesta boxes, opium associated artefacts, tin cans, nails and buttons have been compiled. These collections are available for consultation.

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APPENDIX 1

OCCUPATION DATES OF INDIVIDUAL HUTS DETERMINED BY BOTTLE DATING

Hut No.	Selected Key Datable Bottles	Probable Date Range
1	Tussicura - 1915-1920. Brandy Flask - 1890-1910. Chemist, machine made, clear glass - 1930's.	1895-1930's
4	Lanes Ltd - softdrink, crown top - 1930's. Ring seal beer, 1905. mid-date. Clear glass, machine made bottles.	1910-1930's
6	Brandy flask - 1890-1910. Ring seal beer - 1905 mid-date. Irvine Stevenson jam jar St Georges, Dunedin 1890-1920. Clear glass, machine made bottles 1930's.	1900-1930's
7	Crown top beer 1920's. Chemist bottles 1910-20. Ring seal beer 1905 mid-date.	1900-1920's
Feature 8	Blue poison, circa 1900. Salad oil - 1900-1915. Stella, Dunedin pickles 1920'-30's. Household essence bottle 1930's.	1900-1930's
12	Lanes Ltd softdrink 1935. Cognac-Brandy ring seals 1890-1910. black bottle 1880's	1880-1930's or perhaps two periods of occupation.
14	H Hotop, Cromwell 1880-1915. Coffin shaped flask. 1890-1910. Ring seal beers mid-date 1905. Ring seal brandy 1880-1910. Pickle jar 1915.	1880's-1915
15	Ring seal beer. Mid-date 1905. Case gin 1900 Johnnie Walker Whisky	1900
16	Base of black bottle embossed N & Co 1872- 1913 Dark green whisky flask 1915. Nubian Blacking 1900-1915.	1885-1915
17	Brandy ring seal 1890-1915. Whisky, dark green, machine made 1920.	circa 1910
18	Sykes and MacVay stopper - 1885 Crown top beer - Apex 1920's Clear glass, machine made bottle 1930's	1885-1930's or possibly two periods of occu- pation

Hut No.	Selected Key Datable Bottles	Probable Date Range
19	Crown top beer, R Powley and Co 1925. Machine made, fruit salt 1930's. Machine made, green crown tops 1925. Hayward Flag Brand pickles - 1900-1915. Case gins, circa 1900.	1900-1930's
21	Pickle jar, embossed with Crown - 1885. Pickle jar, made by Davey and Moore 1910. Crown Brewery Ltd, Christchurch 1920. Ring seal Brandy 1890-1910.	1885-1920
22	Thomson Ltd. Codd 1908 on base. Theyers and Beck, Alexandra torpedo 1888-1893	1880-1910
23	McLoughlin Codd 1912-1916 Shear top square ink 1900 Gilbeys Silverstream Schnapps and Schade and Buysings 1880's-1900 Ring seal Brandy - 1890-1910 Dark green crown top - 1920	1880-1920
24	Military brand pickle, post 1918 Case gin, circa 1900 Coffin shaped flask 1890-1910	1900-1920
Feature 25	Black 3 piece mould beer - 1880 Blob top beer, spun moulded 1910-20 Vinegar bottle 1900 Pickle bottle 1915 Crown top clear glass soft drink - Lanes Ltd 1940	1880-1915 -1940
26	J McLoughlin Codd Cromwell. 1912-16 Rimmel Perfume 1900-15 Ring seal brandy 1890-1910 Torpedo 1885 Black 3 piece mould beers - 1880's Machine made dark green bottle (cut off to make a jar) 1920. Much of the glass in this hut had melted in a fire.	1880-1920
27	Marshall's Chemical Co Ltd 1910-20 Ring seal brandy 1890-1910 aqua, machine made flask 1920	1890-1920
33	Codd, Dobsons patent post 1890 Codd, Lanes Ltd Dunedin 1910 Spirit flasks 1890-1910 Machine made, aqua spirit bottle 1920's	1890-1920's
34	Small blue poison circa 1900 Ring seal brandy 1890 Clear glass flask circa 1915	1890-1915
Feature 36	Square brown machine made jar - 1930 Case gin - circa 1900	1900-1930