

DS/9/3

VERSION 1

Fig 1

SUMMER 1986.

Solomon. Early Levels. Amphora Types Fabric Groupings.

 $5 < .1 < 5 < .2 < 5 < .5 < 5 < 1 < 5$ 

15 26

2 9 13 19

1 4 6 8

3 5 7 11

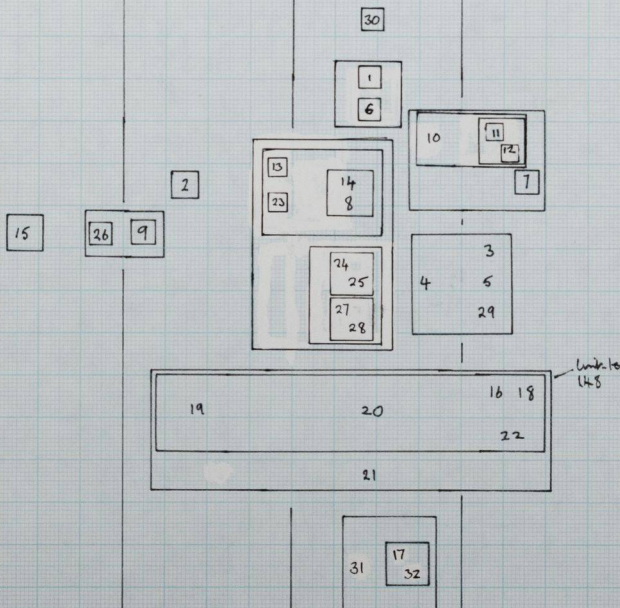
23

10 14 17 20

12 16 18 22

21 24 25 27 29

28 30 31 32



Sabrotha - Amphora type vessels - nos 1-32 Groupings by form and fabric.

Fig 2

FABRIC.

FORM

Vases →

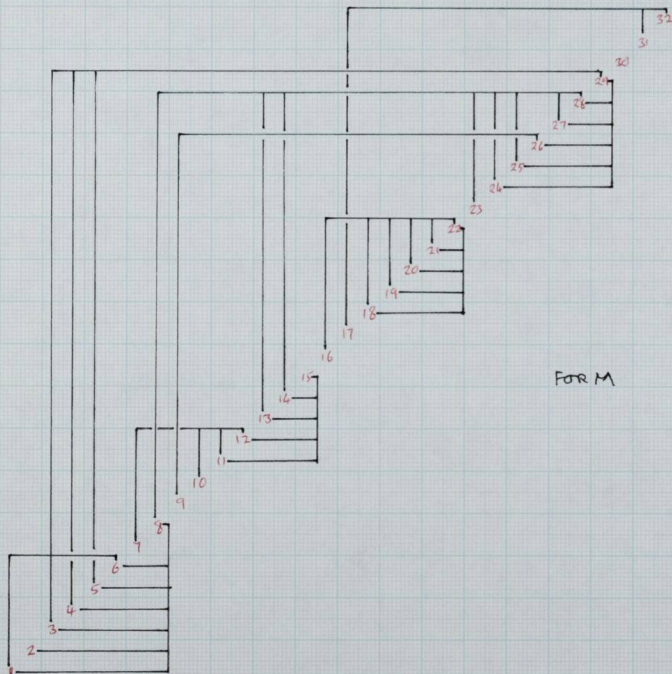




Fig 3

FABRIC

Outermost groupings.

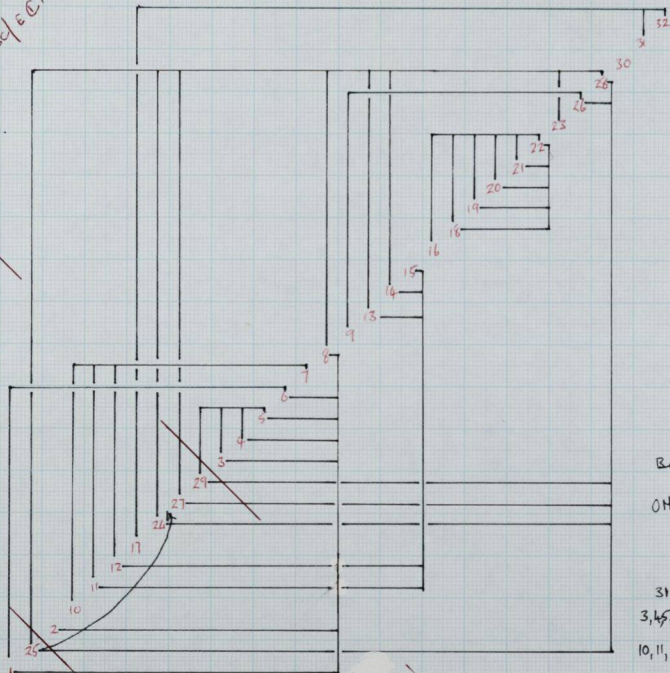
CONTEXT

2nd  $\frac{1}{2}$  ④ BC.

2nd  $\frac{1}{2}$  ⑤ BC

Vessels →

CONTEXT



FORM

Groupings:

Best: 16, 18-22

Others: Context info. tends to confirm split between 25 ; 24, 27 ;  
8, 13, 14, 23, 28 groups

31, 32 group well but context into splits 17 off.  
3, 4, 5 group well, 29 splits off.

10, 11, 12 group well, 7 splits off.

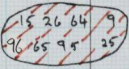
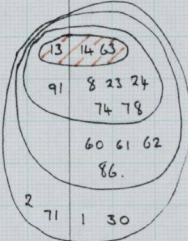
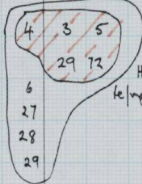
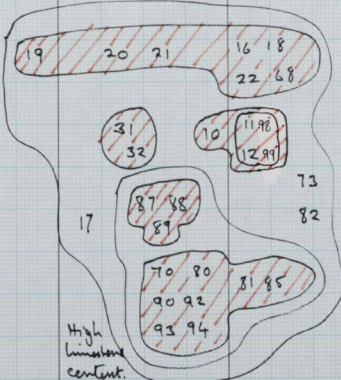
| 2nd $\frac{1}{2}$ ⑤ BC | 2nd $\frac{1}{2}$ ④ BC       | ④ BC - ④ C Ad                                                                                  | ② Ad                                                     | ② Ad           | ④ Ad +         |
|------------------------|------------------------------|------------------------------------------------------------------------------------------------|----------------------------------------------------------|----------------|----------------|
| 1                      | 2 10 11 12 17 24 25 27<br>29 | 3 4 5 6 7 8 9 13 61<br>95 14 15 16 18 19 20 21 22 87<br>23 26 28 30 31 32 63 66 89<br>74 92 93 | 65 69 72 76 77 79 80 81 82 78<br>83 86 85 88 88 91<br>90 | 64 68 70 73 94 | 60 62 67 71 75 |

# SADRATH Amphora and large storage vessels - groupings.

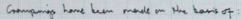
Fig 5

2nd Version  
Sept. 1976.

S = significant fraction of visible inclusions.

| Fabric description | $S < .1$ mm                                                                       | $S < .2$ mm                                                                       | $S < .5$ mm                                                                                                                   | $S < 1$ mm                                      | $\geq S$ |
|--------------------|-----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|----------|
| Vessel numbers.    | 15 26 64 65 95                                                                    | 2 9 13 19 25 69 71 75<br>77 83 86 91                                              | 1 4 6 8 10 14 17 20<br>21 23 24 27 28 30 31 32<br>60 61 62 63 70 74 78 79 85<br>80 86 87 88 89 90 92 93<br>94                 | 3 5 7 11 12 16 18 22<br>29 66 68 72 73 76 81 82 | 67       |
|                    |  |  |  <p>High<br/>leaky, mineral<br/>content.</p> |                                                 |          |
|                    | 69<br>75 77<br>83 84.                                                             |                                                                                   |  <p>High<br/>limestone<br/>content.</p>      | 67.                                             |          |
|                    |                                                                                   |                                                                                   | 7 66<br>76.                                                                                                                   |                                                 |          |





1. Faboulous texture.
2. Induration type:
  - a) Mixed
  - b) Predominance of red/black bc/mg. mineral grains.
  - c) Predominance of limestone.
3. Any striking visual features
4. Fern correspondence.

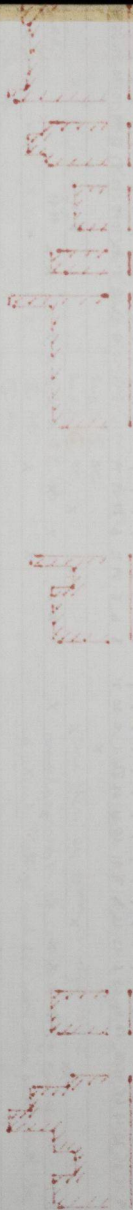
Procedure used was <sup>initially</sup> ~~was~~ taking each of above categories in order, i.e. - initial grouping into 5 feature groups.

subdivision of texture groups by inclusion type.

subdivision of information types by signal feature  
and then by form correspondence.

an assignment of corresponding groups in adjacent texture subdivisions was permitted to allow for possible error in assignment to texture groups.

Camps continued in and represent ~~the~~ groups which are most likely to represent "women" in vessels and groups of vessels which have a well defined cultural identity rather than just a geological one.



| 5<.1           | <5<.2                                                                                                                                     | <5<.5                                                                                                                                                                                                                                                    | <5<1                        | <5. |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|-----|
| 38 39 54 58 59 | 33 40 46 52 58 104<br>105 106 108 109 110 111<br>116 117 118 122 124 126<br>127 128 133 135 139 143<br>144 145 147 149 155 163<br>164 175 | 34 35 36 37 41 43<br>44 45 47 48 49 51<br>53 55 101 102 103 107<br>112 113 114 115 119 120<br>121 122 126 129 130 131<br>132 134 136 137 138 140<br>141 146 148 149 151 152<br>153 156 157 158 159 160<br>161 162 165 166 167 169<br>170 172 173 174 176 | 42 50 57 100 154 171<br>177 |     |

Jugs with seating for lids.

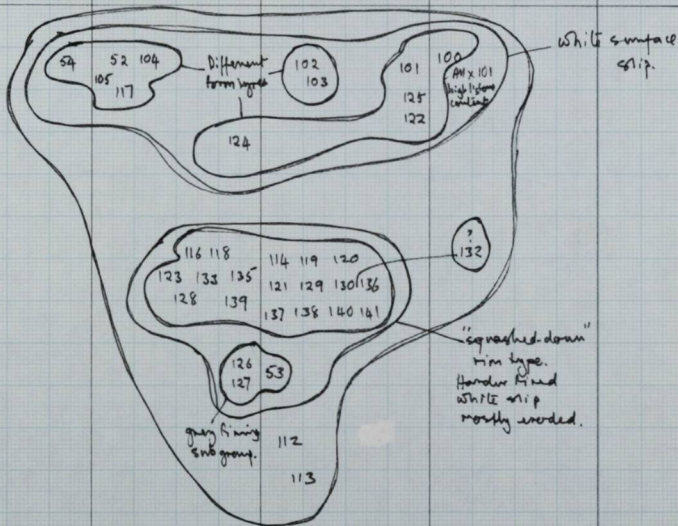
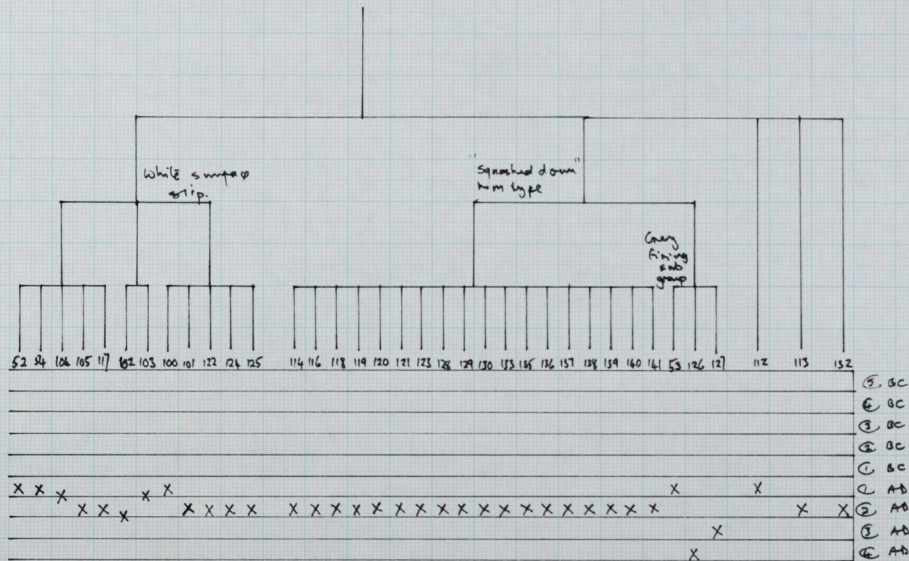




Fig 8

SABRATHA

JUOS WITH LID SEATING - Groupings.





## Jugs with Seating for lids.

Drawn eggs show main form types.

Basic form has funnel shaped neck not well differentiated from body and everted or projecting rim grooved or rebated on its inner side to receive a lid.

Handle is attached directly to rim and is a simple rod which is luted to body at lower end. Only one rim shows complete circumference thus demonstrating for that example definite single handle only. I think I know of eggs with double handles.

### Form variations:

Illustration 104, rim flanged and quite sharply defined.

Also 52 - Dia 13.

54 - " 10.

105 - " 12.

117 - " 7.

Illustration 102/103 Rim altogether thicker and more rounded. Rim is simply everted without overhanging body.

Illustration 100, As 104, but rim has become more of a bulbous projection no moulding.

Also 101 - Dia 10.

122 - Dia 9.

124 - Dia 8.

125 - Dia 9.

104, 102, 100 groups are marked by well fabric similarities ~~between~~ ~~or perhaps from with cream~~ particularly the use of a cream-white slip.

Illustration 119, "Squashed down" rim type. Undermost projection of 104 and 100 types has been squashed down on to neck (this is actually visible in some cases in section) and rim now forms a much smaller projection lid seating becomes a groove on the top of the rim. This type "ought" to be a typologically later development of 104, 100 types.



Jugs with lid-seating cont.

Fig. type cont.

|                      |                      |       |                      |
|----------------------|----------------------|-------|----------------------|
| Also 114 :           | Dia 7.               | 130 : |                      |
| 116 :                | Dia 6.               | 133 : | Dia $5\frac{1}{2}$ . |
| 118 :                | Dia $5\frac{1}{2}$ . | 135 : | Dia $6\frac{1}{2}$ . |
| 120 :                | Dia $5\frac{1}{2}$ . | 137 : | Dia $6\frac{1}{2}$ . |
| 121 <del>124</del> : |                      | 138 : | $5\frac{1}{2}$ .     |
| 123 :                | Dia 6.               | 139 : | $6\frac{1}{2}$ .     |
| 126 :                | Dia 5.               | 140 : | $5\frac{1}{2}$ .     |
| 127 :                | Dia 6.               | 141 : | $5\frac{1}{2}$ .     |
| 128 :                | Dia $5\frac{1}{2}$ . |       |                      |
| 129 :                | Dia 6.               | 136 : |                      |

53, 126, 127 could represent a grey-firing sub type.

53 represents single occurrence of type where lid seating is formed by whole upper rim undulating outwards with no great thickening of rim.

By and large 119, 132, 53 groups are harder (? better fired, higher fired) than 104, 102, 100 groups and do not show the cream white slip so obviously. Many, if not all, of them have or had a slip but on most of them it is now for the most part eroded, whereas it has survived much better on the 104, 102, 100 group.

Differences between groups do represent "real" differences but all are essentially same form. 102/103 group has the most difference in terms of form.

It is noteworthy that above groupings also represent groupings according to mouth diameter.

104 group  
100 group  
119 group

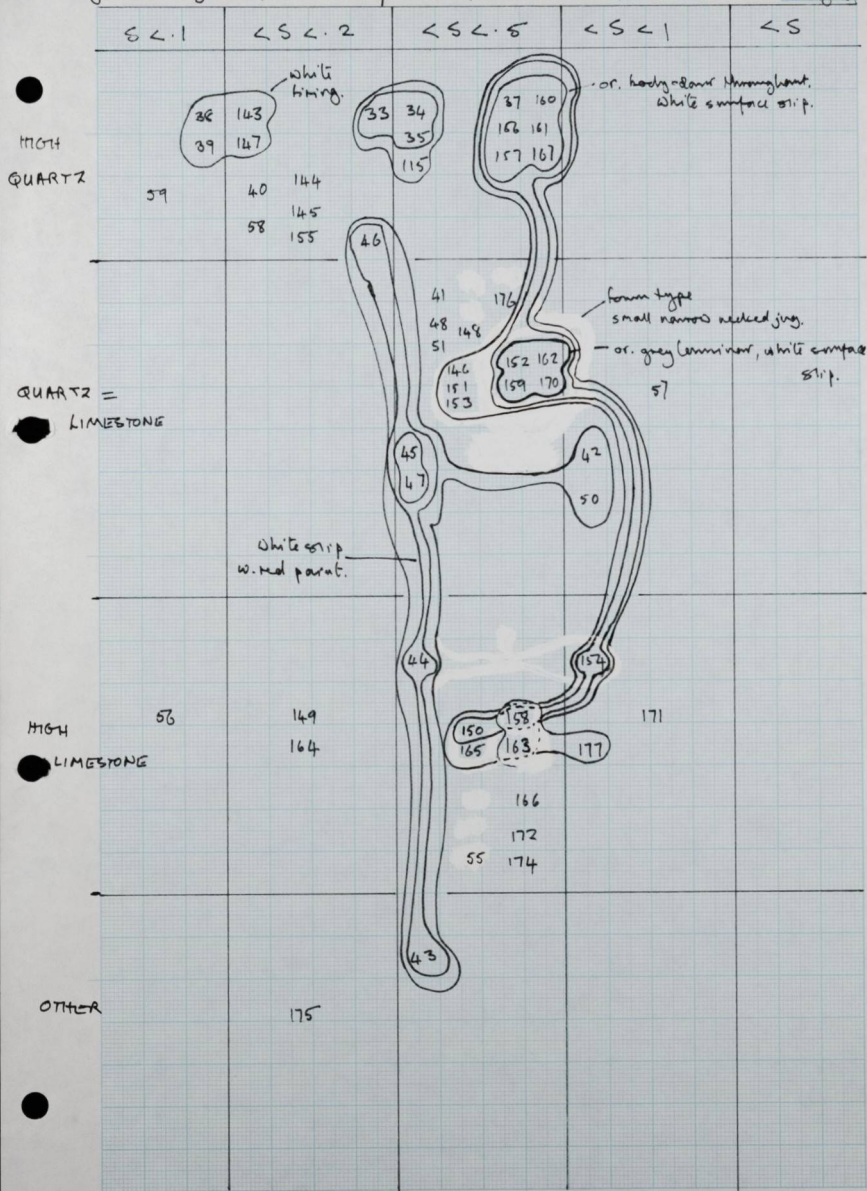
↓ smaller.

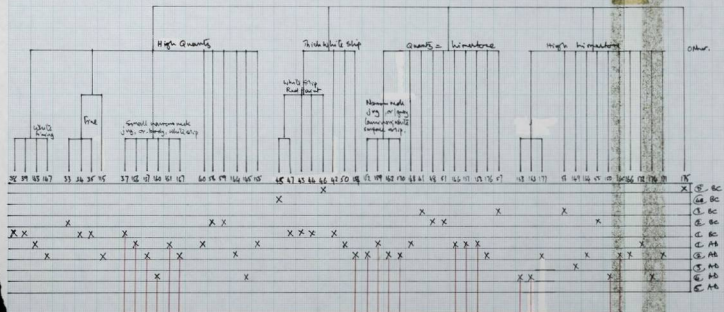
Contextual evidence :- ① AD - ④ AD ; modal values in ② AD bracket.



Jags and Playons other than separate ind. seated series.

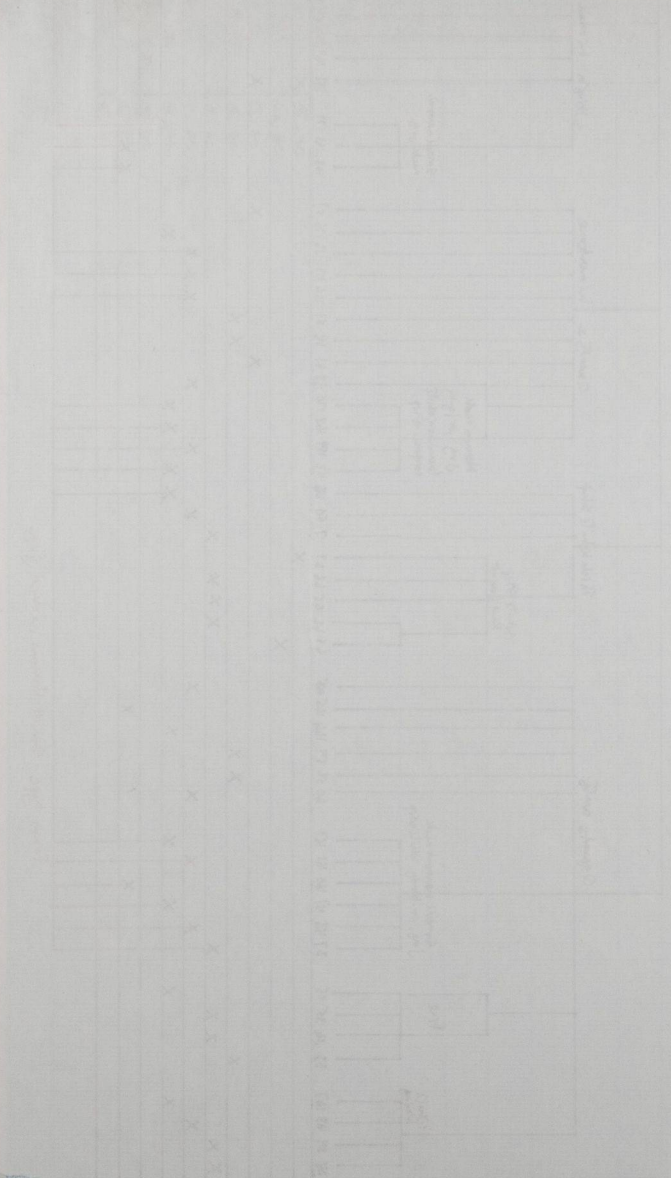
Fig 9.





Form type - small Nomadic jug.

- ① BC
- ② BC
- ③ BC
- ④ BC
- ⑤ BC
- ⑥ AB
- ⑦ AB
- ⑧ AB
- ⑨ AB
- ⑩ AB





## Small Tugs and Flayers.

| (5) 400 | (4) 300 | (3) 200 | (2) 100 | (1) 100 | (1) 100 | (2) 200 | (3) 300 | (4) 400 | (5) |
|---------|---------|---------|---------|---------|---------|---------|---------|---------|-----|
| 175     | 45      | 41      | 33      | 35      | 34      | 108     | 105     | 126     |     |
| 46      |         | 49      | 36      | 37      | 108     | 104     | 106     | 145     |     |
|         |         | 56      |         | 38      | 107     | 113     | 127     | 150     |     |
|         |         | 57      |         | 39      | 109     | 114     | 149     | 158     |     |
|         |         |         |         | 42      | 110     | 115     |         | 160     |     |
|         |         |         |         | 43      | 111     | 116     |         | 163     |     |
|         |         |         |         | 44      | 112     | 117     |         | 174     |     |
|         |         |         | 48      | 47      | 113     | 118     |         |         |     |
|         |         |         | 51      | 53      | 148     | 147     |         |         |     |
|         |         |         | 56      |         | 151     | 119     |         |         |     |
|         |         |         |         |         | 153     | 120     |         |         |     |
|         |         | 58      |         |         | 155     | 121     |         |         |     |
|         |         |         | 59      |         | 158     | 122     |         |         |     |
|         |         |         |         |         | 159     | 123     |         |         |     |
|         |         |         |         |         | 161     | 124     |         |         |     |
|         |         |         |         |         |         | 125     |         |         |     |
|         |         |         |         |         | 172     | 128     |         |         |     |
|         |         |         |         |         | 39      | 129     |         |         |     |
|         |         |         |         |         | 50      | 130     |         |         |     |
|         |         |         |         |         | 52      | 131     |         |         |     |
|         |         |         |         |         | 54      | 132     |         |         |     |
|         |         |         |         |         |         | 133     |         |         |     |
|         |         |         |         |         |         | 134     |         |         |     |
|         |         |         |         |         |         | 135     |         |         |     |
|         |         |         |         |         |         | 136     |         |         |     |
|         |         |         |         |         |         | 137     |         |         |     |
|         |         |         |         |         |         | 138     |         |         |     |
|         |         |         |         |         |         | 139     |         |         |     |
|         |         |         |         |         |         | 140     |         |         |     |
|         |         |         |         |         |         | 141     |         |         |     |
|         |         |         |         |         |         | 144     |         |         |     |
|         |         |         |         |         |         | 152     |         |         |     |
|         |         |         |         |         |         | 154     |         |         |     |
|         |         |         |         |         |         | 157     |         |         |     |
|         |         |         |         |         |         | 166     |         |         |     |
|         |         |         |         |         |         | 170     |         |         |     |
|         |         |         |         |         |         | 171     |         |         |     |
|         |         |         |         |         |         | 173     |         |         |     |
|         |         |         |         |         |         | 176     |         |         |     |
|         |         |         |         |         |         | 177     |         |         |     |



## Jugs + Flagon - other than lid seated variety covered separately

Vessels classified by fabric texture and inclusion type to give following categories:

|                      | $S < .1$ | $S < .2$ | $S < .5$ | $S < 1$ | $S$ |
|----------------------|----------|----------|----------|---------|-----|
| High Quantity        |          |          |          |         |     |
| Quantity = limestone |          |          |          |         |     |
| High limestone       |          |          |          |         |     |
| Other.               |          |          |          |         |     |

$S$  = significant portion  
 $<$  = less than  
 measurements in mm.

Fig. shows distribution of vessels in this classification

Out of this classification following groups emerge:

38, 39, 143, 147 (High Quantity) Vessels with pale coloured body colour throughout - i.e. probably an iron free clay. This grouping may or may not be otherwise significant.

33, 34, 35, 115 - Vessels with fine, smooth fabric, finely made. Forms are quite similar so may be a significant grouping.

Small narrow necked jug or Flagon group. - this is a large general grouping which may have significance. Within it are various coherent sub-groupings:

37, 152, 157, 160, 161, 167 - group characteristics: high quantity,  $.2 < S < .5$ , orange body colour across whole break, cream white slip on outside, form homogeneity (simple vented rim, roll rim, or triangular sectioned). This would seem to be a significant grouping. Date range from context I BC - Q AD with modal values in I AD - Q AD bracket.

152, 159, 162, 170 - group characteristics: quantity = limestone,  $.2 < S < .5$ , or, light banded colour in break, cream white slip on outside, form homogeneity (forms as 37, 156 group) No 162 interesting - here the vessel mouth has developed a slight lip on upper edge and slight concavity inside, which gives the whole rim an undulating appearance in section. Both features may have been designed to aid pouring and the lip could have provided the seating for a lid. Is it functional or ~~etc~~



do these features represent the early development of (4), and later jugs of the  type. Contextual evidence - C AD - E AD with modal value in C AD bracket.

158, 163, 177 - Cramp characteristics - high limestone,  $2 < S < 1$ , orange brown colour across the break, dark warm brown to black slip surface. The quality of the slip on 177 suggests that it may not group with the others. 163, 158 would seem to be a significant grouping. Contextual evidence C AD - G AD. Both 163 and 158 fall in the G AD bracket. The dark surface coating may be a late characteristic (ie C - G AD) in which case contextual evidence is OK but both vessels came from the VATS in the Casp Broyan which prob. contained a lot of residual material.

The above three groups have been subsumed in the more general grouping of small narrow necked jugs which would seem to be of C AD - G AD date. The Prob. the most significant grouping is the amalgamation of the 37-167 and 152-170 groupings with the addition of 150, 154 (and ? 158).

Characteristics of this supergroup:  $2 < S < 1$  (actually all except 154 are in the  $2 < S < .5$  texture group), white exterior coating (slip), form homogeneity (150 and 154 have a "triangular" rim section which is fitting for similar reasons to 162 - ie the development of a lip on the top surface and and ~~and~~ a concavity just inside the lip).

Other vessels can be added to this grouping mainly on the grounds that they are small and narrow mouthed but the complete grouping shown on fig. is less convincing as a significant entity than the above grouping.





## White-stipped Pinnic Groupings

43, 44, 45, 46, 47 — This is the most significant sub grouping within the above overall group.

Group characteristics:  $-1 < S < .5$ , thick cream/white surface coating, red paint applied in horizontal stripes, form homogeneity — all are 11m sherds from necked jars; necks are inverted funnel shaped; none of two types: ① splashed and lightly mottled ② projecting and indolent. The subgroup can be further subdivided on the basis of inclusion type: —

45, 46, 47 — quartz limestone

44 — high limestone but also significant proportion of red (iron) grains.

43 — high proportion of black, be/ty silicate grains.

The general quality of pottery is much the same for 43, 45, 46, 47 but 44 is distinctly finer both in body clay and slip.

No 58 may belong to this group also — its possible that it is a kumt example.

The overall grouping includes 42, 50, ~~51, 52~~ <sup>core</sup> 43, 44, 45, 46, 47. 42 in particular is quite similar to the above <sup>core</sup> sub group for texture, inclusion type and the thick cream/white slip but there is no evidence of ~~red~~ red paint.

42 is similar to the 10, 11, 13, 98, 99 group in amphora and larger storage vessels and could well provide the link between the two groups.

50 is less convincing as a member of the overall group.

57 has only been included in the overall group because it has certain characteristics in common — mainly the

Central evidence  $\textcircled{E}BC - \textcircled{C}AB$ . no. 50 is the only one in the  $\textcircled{C}AB$  bracket — this could tend to ~~strengthen~~ strengthen its non-membership of the group. Without 50 range is  $\textcircled{E}BC - \textcircled{C}BC$  with modal values in  $\textcircled{C}BC$  bracket (? these residual).

Prelim. classificationOpen vs closed forms.

Closed

Open

Upper wall makes  
low angle from verticalUpper wall makes  
high angle from vertical  
("very closed" forms)lid locator smoothly  
curved with rounded  
l.p. (d)lid locator  
more square cut  
(e)"Upright collar"  
type of lid  
locator (a)hooded or reent  
lid locator +  
strap handle (b)

Others (c)

lid locator hooded/reent  
to give small proj. flange on  
outside and lip on insideconvex upper  
wall  
(essentially shallow  
vessel) (f)straight upper  
wall  
(taller vessel)  
(g)

Nos

300-303 a

304 b

305, 306 c

307-326 d

327-350 e

351-357 f

358-388 g

SITE :-

DATE :-

FOR :-

COMMENCED :-

SHERD NO.

MARKING

FORM

FAB.

GLOSS :-

FABRIC :-

CONDITION :-

DECORATION :-

ATtribution :-

DATE :-

ILLUSTRATE? :-

PAGE :-

COMPLETED :-



| Inclusion Type | Fabric Texture | Form →                              |           |           |           |           |           |           |    |       |    |  |  |  |  |  |  |  |  |  |  | $\sum_{i=1}^r \sum_{j=1}^c \sum_{k=1}^L n_{ijk}$ |  |  |  |
|----------------|----------------|-------------------------------------|-----------|-----------|-----------|-----------|-----------|-----------|----|-------|----|--|--|--|--|--|--|--|--|--|--|--------------------------------------------------|--|--|--|
|                |                | Inclusion Type →                    |           |           |           |           |           |           |    |       |    |  |  |  |  |  |  |  |  |  |  |                                                  |  |  |  |
|                |                | a                                   | b         | c         | d         | e         | f         | g         |    |       |    |  |  |  |  |  |  |  |  |  |  |                                                  |  |  |  |
|                |                | 1 2 3 4 5                           | 1 2 3 4 5 | 1 2 3 4 5 | 1 2 3 4 5 | 1 2 3 4 5 | 1 2 3 4 5 | 1 2 3 4 5 |    |       |    |  |  |  |  |  |  |  |  |  |  |                                                  |  |  |  |
|                | 5              |                                     |           |           |           |           |           | 2         |    |       |    |  |  |  |  |  |  |  |  |  |  |                                                  |  |  |  |
|                | 2S             |                                     |           |           |           |           | 6         | 12 3 1    | 2  | 2 4 2 | 31 |  |  |  |  |  |  |  |  |  |  |                                                  |  |  |  |
|                | 3S             | 4 1                                 |           | 2 1 3     | 1 10 3    | 3 3 2     | 2 2 1     | 3 13 5    | 59 |       |    |  |  |  |  |  |  |  |  |  |  |                                                  |  |  |  |
|                | 4S             |                                     |           |           |           | 1         |           |           | 1  |       |    |  |  |  |  |  |  |  |  |  |  |                                                  |  |  |  |
|                |                | 4 1                                 | 2 1 3     | 1 10 3    | 14 6 3 1  | 2 4 1     | 7 17 5 2  | 93        |    |       |    |  |  |  |  |  |  |  |  |  |  |                                                  |  |  |  |
|                |                | $\sum_{i=1}^r \sum_{j=1}^c n_{ijk}$ | 5         | 2         | 4         | 20        | 24        | 7         | 31 |       |    |  |  |  |  |  |  |  |  |  |  |                                                  |  |  |  |
|                |                | $\sum_{i=1}^r \sum_{k=1}^L n_{ijk}$ | ①         | ②         | ③         | ④         | ⑤         |           |    |       |    |  |  |  |  |  |  |  |  |  |  |                                                  |  |  |  |
|                |                | 5                                   | 40        | 34        | 9         | 5         |           |           |    |       |    |  |  |  |  |  |  |  |  |  |  |                                                  |  |  |  |

|    | d     |        | e     |        | f     |        | g     |        |    |
|----|-------|--------|-------|--------|-------|--------|-------|--------|----|
|    | low L | high L | low L | high L | low L | high L | low L | high L |    |
| 2s | 6     |        | 15    | 1      | 2     |        | 6     | 2      | 31 |
| 3s | 13    |        | 6     | 2      | 4     | 1      | 16    | 5      | 47 |
|    | 19    |        | 20    | 3      | 6     | 1      | 22    | 7      | 78 |
|    | 19    |        | 23    |        | 7     |        | 29    |        |    |

low L high  
67 11

Fig 11b.

Contingency and Abridged table

3 dimensions: r = fabric texture - restricted to 2S and 3S

c = inclusion type - conflated to low limestone and high limestone low = &lt; quantity limestone (2-5)

L = form type - restricted to forms d-g.

high = &gt; quantity limestone (4-5)

$$\chi^2 = 16.6 \quad DF = 10$$

H<sub>0</sub> accepted at 5% significance.

Fig 11a.

Contingency Table for early cassidules nos 300-388

3 Dimensions

r = fabric texture

c = inclusion type

L = form type.

|        | $D_1$ | $D_2$ | $D_3$ | $D_4$ | Dimension |
|--------|-------|-------|-------|-------|-----------|
| Form a | 2     | 2     | 1     |       |           |
| b      | 1     | 1     | 1     |       |           |
| c      | 1     | 1     | 1     |       |           |
| d      | 7     | 10    | 2     |       | 19        |
| e      | 2     | 19    | 2     |       | 23        |
| f      | 1     | 3     | 3     |       | 7         |
| g      | 8     | 16    | 5     | 2     | 29        |
|        | 18    | 48    | 12    |       | 78        |

Contingency table for early Cassenelles  
vers 300-388

Dimensions: Kessel diameter, internal  
moneth.

$$D_1: 10 < D \leq 16$$

$$D_2: 16 < D \leq 21 \quad \text{Units are mm.}$$

$$D_3: 21 < D \leq 26$$

$$D_4: 26 < D$$

for heavily outlined areas:

$$\chi^2 = 10.84 \quad \text{DF} = 6.$$

$H_0$  accepted.

Diameter - cms.

Early conseroles

types a-g. - relationship of diameter to wall angle.

10

15

20

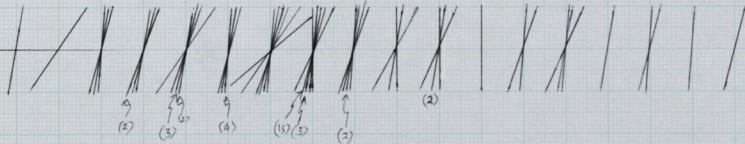
25

30

1  
2  
3  
4  
5  
6  
7  
8

1  
2  
3  
4  
5  
6  
7  
8

no of vessels  
↓



Angle of upper wall.



| Column | Row | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 | 35 | 36 | 37 | 38 | 39 | 40 | 41 | 42 | 43 | 44 | 45 | 46 | 47 | 48 | 49 | 50 | 51 | 52 | 53 | 54 | 55 | 56 | 57 | 58 | 59 | 60 | 61 | 62 | 63 | 64 | 65 | 66 | 67 | 68 | 69 | 70 | 71 | 72 | 73 | 74 | 75 | 76 | 77 | 78 | 79 | 80 | 81 | 82 | 83 | 84 | 85 | 86 | 87 | 88 | 89 | 90 | 91 | 92 | 93 | 94 | 95 | 96 | 97 | 98 | 99 | 100 | 101 | 102 | 103 | 104 | 105 | 106 | 107 | 108 | 109 | 110 | 111 | 112 | 113 | 114 | 115 | 116 | 117 | 118 | 119 | 120 | 121 | 122 | 123 | 124 | 125 | 126 | 127 | 128 | 129 | 130 | 131 | 132 | 133 | 134 | 135 | 136 | 137 | 138 | 139 | 140 | 141 | 142 | 143 | 144 | 145 | 146 | 147 | 148 | 149 | 150 | 151 | 152 | 153 | 154 | 155 | 156 | 157 | 158 | 159 | 160 | 161 | 162 | 163 | 164 | 165 | 166 | 167 | 168 | 169 | 170 | 171 | 172 | 173 | 174 | 175 | 176 | 177 | 178 | 179 | 180 | 181 | 182 | 183 | 184 | 185 | 186 | 187 | 188 | 189 | 190 | 191 | 192 | 193 | 194 | 195 | 196 | 197 | 198 | 199 | 200 | 201 | 202 | 203 | 204 | 205 | 206 | 207 | 208 | 209 | 210 | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 | 227 | 228 | 229 | 230 | 231 | 232 | 233 | 234 | 235 | 236 | 237 | 238 | 239 | 240 | 241 | 242 | 243 | 244 | 245 | 246 | 247 | 248 | 249 | 250 | 251 | 252 | 253 | 254 | 255 | 256 | 257 | 258 | 259 | 260 | 261 | 262 | 263 | 264 | 265 | 266 | 267 | 268 | 269 | 270 | 271 | 272 | 273 | 274 | 275 | 276 | 277 | 278 | 279 | 280 | 281 | 282 | 283 | 284 | 285 | 286 | 287 | 288 | 289 | 290 | 291 | 292 | 293 | 294 | 295 | 296 | 297 | 298 | 299 | 300 | 301 | 302 | 303 | 304 | 305 | 306 | 307 | 308 | 309 | 310 | 311 | 312 | 313 | 314 | 315 | 316 | 317 | 318 | 319 | 320 | 321 | 322 | 323 | 324 | 325 | 326 | 327 | 328 | 329 | 330 | 331 | 332 | 333 | 334 | 335 | 336 | 337 | 338 | 339 | 340 | 341 | 342 | 343 | 344 | 345 | 346 | 347 | 348 | 349 | 350 | 351 | 352 | 353 | 354 | 355 | 356 | 357 | 358 | 359 | 360 | 361 | 362 | 363 | 364 | 365 | 366 | 367 | 368 | 369 | 370 | 371 | 372 | 373 | 374 | 375 | 376 | 377 | 378 | 379 | 380 | 381 | 382 | 383 | 384 | 385 | 386 | 387 | 388 | 389 | 390 | 391 | 392 | 393 | 394 | 395 | 396 | 397 | 398 | 399 | 400 | 401 | 402 | 403 | 404 | 405 | 406 | 407 | 408 | 409 | 410 | 411 | 412 | 413 | 414 | 415 | 416 | 417 | 418 | 419 | 420 | 421 | 422 | 423 | 424 | 425 | 426 | 427 | 428 | 429 | 430 | 431 | 432 | 433 | 434 | 435 | 436 | 437 | 438 | 439 | 440 | 441 | 442 | 443 | 444 | 445 | 446 | 447 | 448 | 449 | 450 | 451 | 452 | 453 | 454 | 455 | 456 | 457 | 458 | 459 | 460 | 461 | 462 | 463 | 464 | 465 | 466 | 467 | 468 | 469 | 470 | 471 | 472 | 473 | 474 | 475 | 476 | 477 | 478 | 479 | 480 | 481 | 482 | 483 | 484 | 485 | 486 | 487 | 488 | 489 | 490 | 491 | 492 | 493 | 494 | 495 | 496 | 497 | 498 | 499 | 500 | 501 | 502 | 503 | 504 | 505 | 506 | 507 | 508 | 509 | 510 | 511 | 512 | 513 | 514 | 515 | 516 | 517 | 518 | 519 | 520 | 521 | 522 | 523 | 524 | 525 | 526 | 527 | 528 | 529 | 530 | 531 | 532 | 533 | 534 | 535 | 536 | 537 | 538 | 539 | 540 | 541 | 542 | 543 | 544 | 545 | 546 | 547 | 548 | 549 | 550 | 551 | 552 | 553 | 554 | 555 | 556 | 557 | 558 | 559 | 560 | 561 | 562 | 563 | 564 | 565 | 566 | 567 | 568 | 569 | 570 | 571 | 572 | 573 | 574 | 575 | 576 | 577 | 578 | 579 | 580 | 581 | 582 | 583 | 584 | 585 | 586 | 587 | 588 | 589 | 590 | 591 | 592 | 593 | 594 | 595 | 596 | 597 | 598 | 599 | 600 | 601 | 602 | 603 | 604 | 605 | 606 | 607 | 608 | 609 | 610 | 611 | 612 | 613 | 614 | 615 | 616 | 617 | 618 | 619 | 620 | 621 | 622 | 623 | 624 | 625 | 626 | 627 | 628 | 629 | 630 | 631 | 632 | 633 | 634 | 635 | 636 | 637 | 638 | 639 | 640 | 641 | 642 | 643 | 644 | 645 | 646 | 647 | 648 | 649 | 650 | 651 | 652 | 653 | 654 | 655 | 656 | 657 | 658 | 659 | 660 | 661 | 662 | 663 | 664 | 665 | 666 | 667 | 668 | 669 | 670 | 671 | 672 | 673 | 674 | 675 | 676 | 677 | 678 | 679 | 680 | 681 | 682 | 683 | 684 | 685 | 686 | 687 | 688 | 689 | 690 | 691 | 692 | 693 | 694 | 695 | 696 | 697 | 698 | 699 | 700 | 701 | 702 | 703 | 704 | 705 | 706 | 707 | 708 | 709 | 710 | 711 | 712 | 713 | 714 | 715 | 716 | 717 | 718 | 719 | 720 | 721 | 722 | 723 | 724 | 725 | 726 | 727 | 728 | 729 | 730 | 731 | 732 | 733 | 734 | 735 | 736 | 737 | 738 | 739 | 740 | 741 | 742 | 743 | 744 | 745 | 746 | 747 | 748 | 749 | 750 | 751 | 752 | 753 | 754 | 755 | 756 | 757 | 758 | 759 | 760 | 761 | 762 | 763 | 764 | 765 | 766 | 767 | 768 | 769 | 770 | 771 | 772 | 773 | 774 | 775 | 776 | 777 | 778 | 779 | 780 | 781 | 782 | 783 | 784 | 785 | 786 | 787 | 788 | 789 | 790 | 791 | 792 | 793 | 794 | 795 | 796 | 797 | 798 | 799 | 800 | 801 | 802 | 803 | 804 | 805 | 806 | 807 | 808 | 809 | 810 | 811 | 812 | 813 | 814 | 815 | 816 | 817 | 818 | 819 | 820 | 821 | 822 | 823 | 824 | 825 | 826 | 827 | 828 | 829 | 830 | 831 | 832 | 833 | 834 | 835 | 836 | 837 | 838 | 839 | 840 | 841 | 842 | 843 | 844 | 845 | 846 | 847 | 848 | 849 | 850 | 851 | 852 | 853 | 854 | 855 | 856 | 857 | 858 | 859 | 860 | 861 | 862 | 863 | 864 | 865 | 866 | 867 | 868 | 869 | 870 | 871 | 872 | 873 | 874 | 875 | 876 | 877 | 878 | 879 | 880 | 881 | 882 | 883 | 884 | 885 | 886 | 887 | 888 | 889 | 890 | 891 | 892 | 893 | 894 | 895 | 896 | 897 | 898 | 899 | 900 | 901 | 902 | 903 | 904 | 905 | 906 | 907 | 908 | 909 | 910 | 911 | 912 | 913 | 914 | 915 | 916 | 917 | 918 | 919 | 920 | 921 | 922 | 923 | 924 | 925 | 926 | 927 | 928 | 929 | 930 | 931 | 932 | 933 | 934 | 935 | 936 | 937 | 938 | 939 | 940 | 941 | 942 | 943 | 944 | 945 | 946 | 947 | 948 | 949 | 950 | 951 | 952 | 953 | 954 | 955 | 956 | 957 | 958 | 959 | 960 | 961 | 962 | 963 | 964 | 965 | 966 | 967 | 968 | 969 | 970 | 971 | 972 | 973 | 974 | 975 | 976 | 977 | 978 | 979 | 980 | 981 | 982 | 983 | 984 | 985 | 986 | 987 | 988 | 989 | 990 | 991 | 992 | 993 | 994 | 995 | 996 | 997 | 998 | 999 | 1000 | 1001 | 1002 | 1003 | 1004 | 1005 | 1006 | 1007 | 1008 | 1009 | 1010 | 1011 | 1012 | 1013 | 1014 | 1015 | 1016 | 1017 | 1018 | 1019 | 1020 | 1021 | 1022 | 1023 | 1024 | 1025 | 1026 | 1027 | 1028 | 1029 | 1030 | 1031 | 1032 | 1033 | 1034 | 1035 | 1036 | 1037 | 1038 | 1039 | 1040 | 1041 | 1042 | 1043 | 1044 | 1045 | 1046 | 1047 | 1048 | 1049 | 1050 | 1051 | 1052 | 1053 | 1054 | 1055 | 1056 | 1057 | 1058 | 1059 | 1060 | 1061 | 1062 | 1063 | 1064 | 1065 | 1066 | 1067 | 1068 | 1069 | 1070 | 1071 | 1072 | 1073 | 1074 | 1075 | 1076 | 1077 | 1078 | 1079 | 1080 | 1081 | 1082 | 1083 | 1084 | 1085 | 1086 | 1087 | 1088 | 1089 | 1090 | 1091 | 1092 | 1093 | 1094 | 1095 | 1096 | 1097 | 1098 | 1099 | 1100 | 1101 | 1102 | 1103 | 1104 | 1105 | 1106 | 1107 | 1108 | 1109 | 1110 | 1111 | 1112 | 1113 | 1114 | 1115 | 1116 | 1117 | 1118 | 1119 | 1120 | 1121 | 1122 | 1123 | 1124 | 1125 | 1126 | 1127 | 1128 | 1129 | 1130 | 1131 | 1132 | 1133 | 1134 | 1135 | 1136 | 1137 | 1138 | 1139 | 1140 | 1141 | 1142 | 1143 | 1144 | 1145 | 1146 | 1147 | 1148 | 1149 | 1150 | 1151 | 1152 | 1153 | 1154 | 1155 | 1156 | 1157 | 1158 | 1159 | 1160 | 1161 | 1162 | 1163 | 1164 | 1165 | 1166 | 1167 | 1168 | 1169 | 1170 | 1171 | 1172 | 1173 | 1174 | 1175 | 1176 | 1177 | 1178 | 1179 | 1180 | 1181 | 1182 | 1183 | 1184 | 1185 | 1186 | 1187 | 1188 | 1189 | 1190 | 1191 | 1192 | 1193 | 1194 | 1195 | 1196 | 1197 | 1198 | 1199 | 1200 | 1201 | 1202 | 1203 | 1204 | 1205 | 1206 | 1207 | 1208 | 1209 | 1210 | 1211 | 1212 | 1213 | 1214 | 1215 | 1216 | 1217 | 1218 | 1219 | 1220 | 1221 | 1222 | 1223 | 1224 | 1225 | 1226 | 1227 | 1228 | 1229 | 1230 | 1231 | 1232 | 1233 | 1234 | 1235 | 1236 | 1237 | 1238 | 1239 | 1240 | 1241 | 1242 | 1243 | 1244 | 1245 | 1246 | 1247 | 1248 | 1249 | 1250 | 1251 | 1252 | 1253 | 1254 | 1255 | 1256 | 1257 | 1258 | 1259 | 1260 | 1261 | 1262 | 1263 | 1264 | 1265 | 1266 | 1267 | 1268 | 1269 | 1270 | 1271 | 1272 | 1273 | 1274 | 1275 | 1276 | 1277 | 1278 | 1279 | 1280 | 1281 | 1282 | 1283 | 1284 | 1285 | 1286 | 1287 | 1288 | 1289 | 1290 | 1291 | 1292 | 1293 | 1294 | 1295 | 1296 | 1297 | 1298 | 1299 | 1300 | 1301 | 1302 | 1303 | 1304 | 1305 | 1306 | 1307 | 1308 | 1309 | 1310 | 1311 | 1312 | 1313 | 1314 | 1315 | 1316 | 1317 | 1318 | 1319 | 1320 | 1321 | 1322 | 1323 | 1324 | 1325 | 1326 | 1327 | 1328 | 1329 | 1330 | 1331 | 1332 | 1333 | 1334 | 1335 | 1336 | 1337 | 1338 | 1339 | 1340 | 1341 | 1342 | 1343 | 1344 | 1345 | 1346 | 1347 | 1348 | 1349 | 1350 | 1351 | 1352 | 1353 | 1354 | 1355 | 1356 | 1357 | 1358 | 1359 | 1360 | 1361 | 1362 | 1363 | 1364 | 1365 | 1366 | 1367 | 1368 | 1369 | 1370 | 1371 | 1372 | 1373 | 1374 | 1375 | 1376 | 1377 | 1378 | 1379 | 1380 | 1381 | 1382 | 1383 | 1384 | 1385 | 1386 | 1387 | 1388 | 1389 | 1390 | 1391 | 1392 | 1393 | 1394 | 1395 | 1396 | 1397 | 1398 | 1399 | 1400 | 1401 | 1402 | 1403 | 1404 | 1405 | 1406 | 1407 | 1408 | 1409 | 1410 | 1411 | 1412 | 1413 | 1414 | 1415 | 1416 | 1417 | 1418 | 1419 | 1420 | 1421 | 1422 | 1423 | 1424 | 1425 | 1426 | 1427 | 1428 | 1429 | 1430 | 1431 | 1432 | 1433 | 1434 | 1435 | 1436 | 1437 | 1438 | 1439 | 1440 | 1441 | 1442 | 1443 | 1444 | 1445 | 1446 | 1447 | 1448 | 1449 | 1450 | 1451 | 1452 | 1453 | 1454 | 1455 | 1456 | 1457 | 1458 | 1459 | 1460 | 1461 | 1462 | 1463 | 1464 | 1465 | 1466 | 1467 | 1468 | 1469 | 1470 | 1471 | 1472 | 1473 | 1474 | 1475 | 1476 | 1477 | 1478 | 1479 | 1480 | 1481 | 1482 | 1483 | 1484 | 1485 |
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## The Wheel Made Cooking Ware.

### Casseroles

Initial division is into Early (ie generally Hellenistic) and Late (ie generally Roman) vessels.

### Early Casseroles.

Fig 9 shows a classification tree for early casseroles, and concentrates on the closed forms. The definition of closed is here taken to be that the maximum diameter of the vessel must occur at some point below the mouth  $\frac{1}{2}$  - that is the mouth must be "retracted" in relation to the internal volume of the vessel. (a-o)

The closed vessels are subdivided into 7 classes on the basis of form.

Fig 10 shows the distribution of early closed casseroles through the Reg. II Ins. 6+7, Casa Brogan contexts. The different forms are identified by coloured symbols. Fig 10 would seem to give a general indication of the chronology of the different types. The major identifiable groupings would seem to be:

Early → Late  
Forms a d e, f, g.

Form b is a single example only.

Form c is not really a form at all but rather a "sack" category containing two vessels which cannot readily be fitted into other categories.

Fig 10 would seem to confirm certain major feature groupings in the forms. ~~see note over.~~

a. - very distinctive. The lid locator forms what could be termed an "upright collar" on top of a plain rim casserole or large jar.  
d-g. The lid locator now projects at an angle from the vessel forming a cupped flange for the lid to sit in/on. The lid stop at the mouth of the vessel is much reduced in size.

Within this grouping a distinction can be made between d. and e-g.

d. - the lid locator is gently curved with a rounded tip.

e-g. - the lid locator is hooked and bent with a ~~shoulder~~ and lips.

e. - the lid locator is still quite curved in profile.

f-g. the lid locator is more projecting and less curved.

The distinction between e and f, g does not seem to be clear cut, - there is possibly a progression from one to another though whether this is chronologically related is not known.

The form of the lid locator of e-g seems to have been designed

\* note - form a, no. 303 is probably v. shallow carinate.

eg.



should be subdivided.  
= a 2.





to provide a relatively wide resting surface for the lid edges. The ~~top~~ lid locator is inclined at about  $45^\circ$ , the resting surface is slightly convex and the movement of the lid is restricted by steps at the top and bottom. On the outside of the lid locator is a slight lip.

The essential difference between form a. and forms d-g is that in a. the lid locator does just that, - it locates the lid on top of the vessel but the resting surface is provided by the actual mouth of the vessel. In forms d-g the lid locator is no longer upright but angled to the body of the vessel and now provides the resting surface for the lid with the beveled lips and steps actually locating the lid on the resting surface.

Forms f. and g. are distinguished as follows:

Form f. seems to have been shallower than form g. The upper wall of all the examples of form f. is much more curved than form g. and in one example a carination is present. Two examples of form f. have horizontal rod handles.

As well as form the following attributes have been recorded:

Fabric texture: S, 2S, 3S, 4S, 5S =  $5 < 1 < 5 < 2 < 5 < 5 < 1 < 5$

S = Significant proportion of total inclusions  
measurement of diameter in mm.

Colour

Vessel diameter

Inclusion type.

Colour seems to be fairly constant and not to associate with any of the other attributes.

Fig 12 shows a contingency table for vessel diameter and vessel type.

Area in heavy black was tested and did not yield significant results. As one would expect size does not associate with a particular form type - within each form type a variety of sizes are being made.

Under the inclusion-type attribute a distinction can be made between three out of the four <sup>all</sup> examples of form (a) and all except one of the examples of the other forms. The three examples of (a) all contain a substantial proportion of vitreous black being animals.



Categories of inclusion type are as follows:

1. Vitreous black grains (in significant proportions)
2. Major fraction = quartz.
3. Quartz > limestone
4. Quartz = limestone
5. Limestone > Quartz.

Fig 11a is a three dimensional contingency table where

$r$  (rows) = fabric texture.

$c$  (columns) = inclusion type.

$l$  (layer or strata) = form type.

Fig 11b. is a conflated and abridged version of 11a, for:

$r = 26, 35$

$c =$  low limestone content, high limestone content.

$l =$  form types d-g.

These totals yielded no significant results, which would seem to indicate that there was no association between the three variables and thus that within the parameters established by the various categories of the various variables that there were no meaningful groupings within or between the form categories already established.

Early Casseroles - Adjustments to 1st Generation

4-10-87.

Shallow dish-like casseroles. <sup>Cups - some</sup> Variety of handles.

a1 Possibly.

a2a Certainly - some of these seem very small - ? cups.

a2b "

a2c "

a3a "

a3b "

c1

d2 shallow dishlike version of d1

f

Deeper bowl-like casseroles Occasional handles surviving.

a4a

a4b

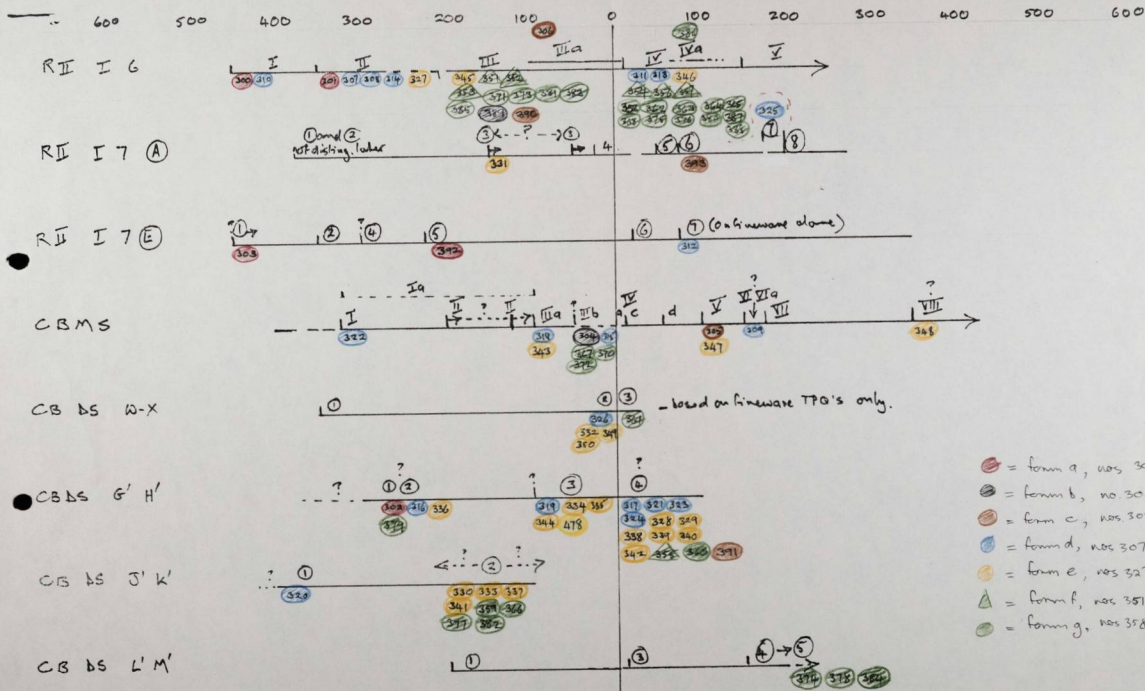
b

d1

e

g

REGIO II INSULAE 6 + 7  
CASA BROADMAN  
DATING.



- = form a, nos 300-305
- = form b, no. 304
- = form c, nos 305, 306
- = form d, nos 307-326
- = form e, nos 327-350
- = form f, nos 351-357
- = form g, nos 358-368.

Conclusions on basis of visual examination of chart:

early → late  
form a, known, forms e, f, g  
no discrimination possible between forms b, c, d, f, g.



Fig 10.

DATE NG.

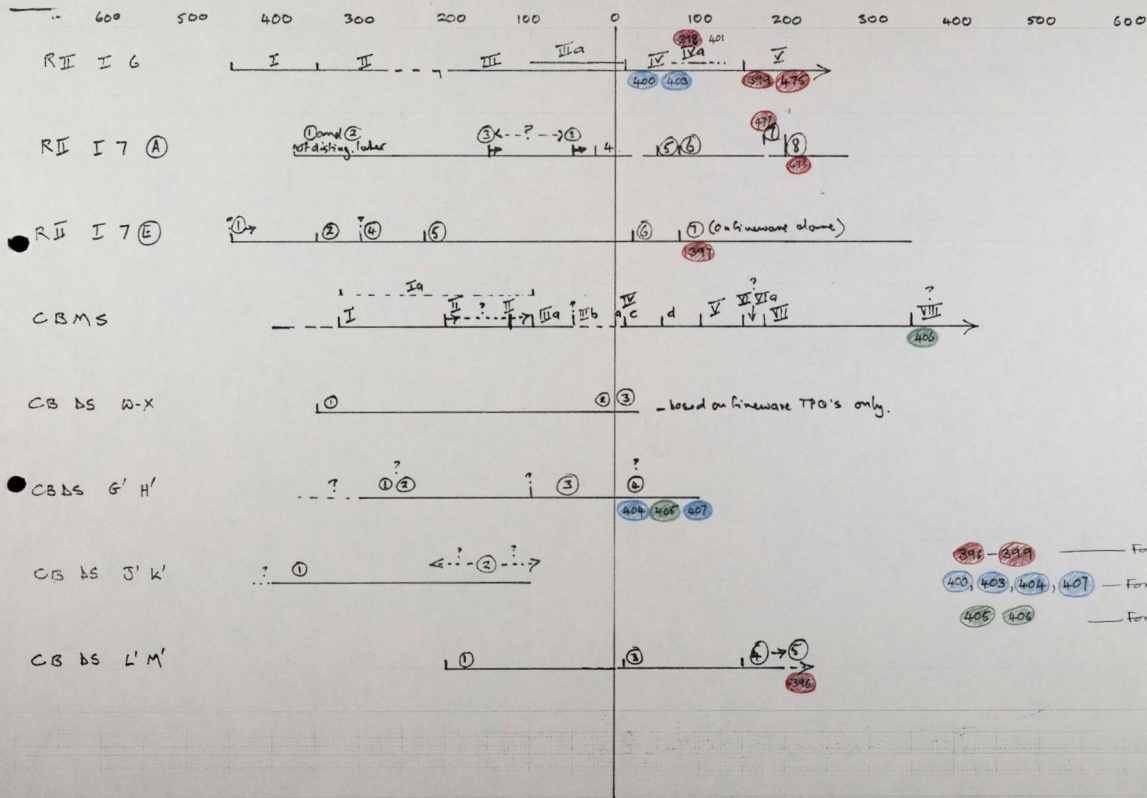


FIG 15

Forms h  
j

| Inclusion type | Form. |   |
|----------------|-------|---|
|                | h     | j |
| 1              | 5     | 0 |
| 2-5            | 2     | 6 |

12

Completed table

$r$  = inclusion type - i.e. presence or absence of red or black granules.  
 $c$  = forms h or j

$$\chi^2 \text{ with Yates continuity correction} = N(1ad - bc)^2 / (0.5N)^2$$

for table as:

|   |   |
|---|---|
| a | b |
| c | d |

$$= 2.74 \quad df = 1$$

 $H_0$  accepted.

|    | 1 | 2 | 3 | 4 | 5 |
|----|---|---|---|---|---|
| h. | 1 | 1 |   |   |   |
| j. | 1 |   | 1 |   |   |
| j. |   | 2 |   | 1 |   |
|    |   |   |   | 2 |   |

Cassanegas 396-420, 403-407

 $r$  = fabric texture $c$  = inclusion type $l$  = form type.

from HST (ie red, black etc.).





## Wheel-Made Casseroles.

Transitional Open  $\rightarrow$  Closed forms (ie wall about vertical.)

Nos. 396-400, 403-407.

2 forms distinguishable

h (nos 396-399) — <sup>plain</sup> lid locator gently curved with rounded tip.  
+475, 477

j (nos 400, 403-407) — lid locator bevelled or bent to form steps for lid at top and/or bottom of sitting surface.

Fig 15 shows distribution of these types in Reg. II Lvs 6+7, Casa Brogan contexts. All are AD. The sample is basically too small to allow any finer distinctions in date to be made between the types.

All examples of form h. have the same orange yellow colour and black outer surface.

Fig 16 shows contingency tables for

- r = fabric texture
- c = inclusion type
- l = form.

form j has been subdivided into  $j_1$  and  $j_2$  on the basis of inclusion type and colour.  $j_1$  tends towards a greater proportion of limestone to quartz than  $j_2$  and the examples of  $j_2$  have an orange colour throughout the break whereas those of  $j_1$  tend to be a darker brownish orange with a grey core or laminations.

form h seems to be associated with a fabric containing red and black groins apart from the usual quartz and limestone although a  $\chi^2$  test (see fig 16) yielded inconclusive results.

7-10-87.

hater Casseroles.

Adjustments to 1st Sensation.

Forms.

h

j 1

j 2

Addition of

j 3

j 4

j 5

j 1-4 may actually all be slightly different manifestations of the same basic form.

Fig 18

FORM K

Diameter mm.

FORM L

10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31

Diameter from here

Width.

Diameter. Min = 17

Max = 27

Mean = 22.24

Std. Dev. = 2.962



Correlation

 $r = .5979.$  $R @ .05 = .3961$  $.01 = .5052.$ 

Width.

Min = 3.1

Max = 7

Mean = 5.18

Std. Dev. = 1.1898

Width.

mm.

0

1

2

3

4

5

6

7

8

Width.

Dia

less nos 466, 470

Diameter Min = 11

11

Max = 31

20

Mean = 18.118

16.267

Std. Dev. = 5.1585

3.0582

Correlation

 $r = .7030$  $@ .05 = .4821$  $.01 = .6055$ 

less nos 466, 470

.6224

.5140

.6411

Width

Min = 2.4

2.4

Max = 6.2

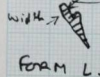
5.6

Mean = 4.1529

3.9267

Std. Dev. = 1.0477

.87788

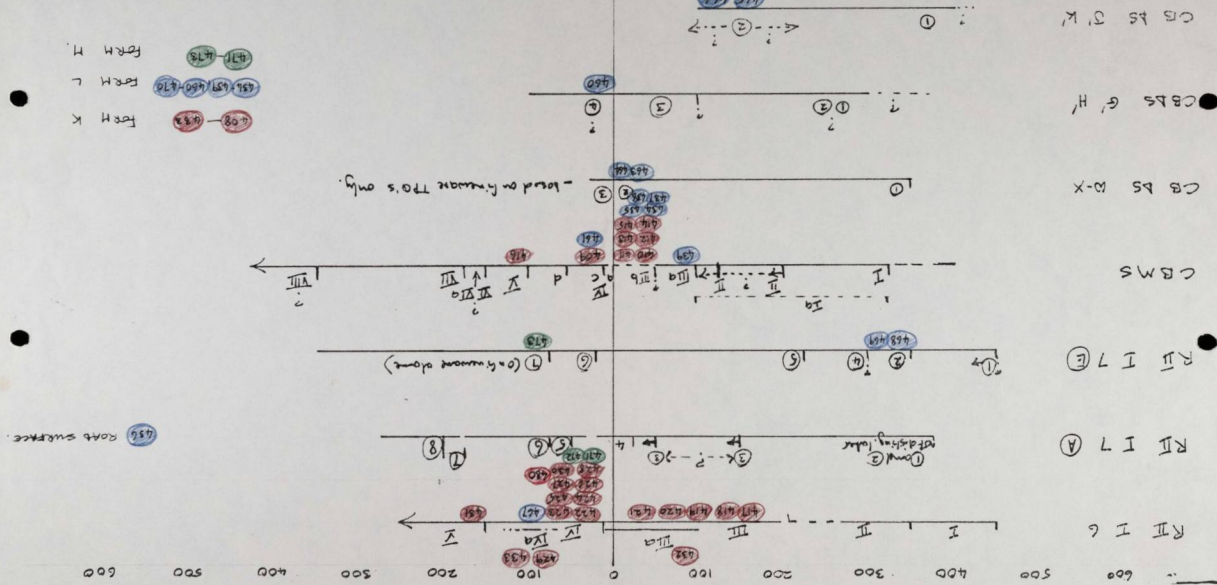


FORM L.

# REGIO II INSULIN 6 + 7

CNSA BROOKMAN

BATHING.



RII I 6

RII I 7 (A)

RII I 7 (E)

CBMS

CBBS W-X

CBBS G' H'

CBBS J' K'

CBBS L' M'



Fig 17

Form k

L

m

Fig 19.

|    | K <sub>1</sub> |   |   |   |   | K <sub>2</sub> |   |   |   |   | L <sub>1</sub> |   |   |   |   | L <sub>2</sub> |   |   |   |   | L <sub>3</sub> |   |   |   |   | L <sub>4</sub> |   |   |   |   | M |  |  |  |  |
|----|----------------|---|---|---|---|----------------|---|---|---|---|----------------|---|---|---|---|----------------|---|---|---|---|----------------|---|---|---|---|----------------|---|---|---|---|---|--|--|--|--|
|    | 1              | 2 | 3 | 4 | 5 | 1              | 2 | 3 | 4 | 5 | 1              | 2 | 3 | 4 | 5 | 1              | 2 | 3 | 4 | 5 | 1              | 2 | 3 | 4 | 5 | 1              | 2 | 3 | 4 | 5 |   |  |  |  |  |
| 5  |                |   |   |   |   |                |   |   |   |   |                |   |   |   |   |                |   |   |   |   |                |   |   |   |   |                |   |   |   |   |   |  |  |  |  |
| 25 |                |   | 1 | 1 |   |                |   |   |   |   | 1              | 1 | 1 |   |   |                |   |   |   |   |                |   |   |   |   |                |   |   |   |   | 1 |  |  |  |  |
| 35 | 1              | 1 | 1 | 5 | 3 | 1              |   |   |   |   | 3              | 4 | 2 |   |   |                |   |   |   |   | 1              |   |   |   |   |                |   |   | 1 | 1 |   |  |  |  |  |
| 45 |                |   | 3 |   |   |                |   |   |   |   | 1              |   |   | 1 |   |                |   |   |   |   |                |   |   |   |   |                | 1 | 1 |   |   |   |  |  |  |  |

Contingency table for forms K, L and M.

r = fabric texture  
c = inclusion type  
l = forms.



|    | 2 | 3  | 4 |     |
|----|---|----|---|-----|
| 25 | 1 | 2  | 2 | 5   |
| 35 | 4 | 19 | 5 | 28  |
| 45 | 0 | 4  | 0 | 4   |
|    | 5 | 24 | 7 | (3) |

Table for forms K<sub>1</sub>, L<sub>1</sub> from above, collapsed over forms.

r = inclusion texture  
c = inclusion type

$$\chi^2 = 3.92 \text{ DF} = 4$$

H<sub>0</sub> accepted.

|        | Phases   |          |     |      |        |     |        |       |        |     |
|--------|----------|----------|-----|------|--------|-----|--------|-------|--------|-----|
|        | I        |          | II  |      | III    |     | IV     |       | V      |     |
| Forms. | -0.6     | -1.2     |     |      | .26    |     | .17    |       | 1.07   |     |
|        | 0-.76    | 0-1.52   |     |      | 6-.39  |     | 11-.33 |       | 1-1.35 |     |
| k+l    | .63      | .36      | .59 | 1.44 | .45    | .54 | .27    | 10.44 | .63    | .36 |
|        | 2-.57    | 3-.64    |     |      | -1.34  |     | -.79   |       | -.35   |     |
| d      | * 1-2.74 | * 3-6.04 |     |      | 0-1.72 |     | 2-1.3  |       | 0-1.38 |     |
|        | .86      | .12      | .81 | .48  | .61    | 1.8 | .37    | 3.48  | .86    | .12 |
|        | -.72     | -.75     |     |      | .43    |     | .24    |       | -.72   |     |
| e-g.   | 0-1.05   | 1-1.13   |     |      | 9-.74  |     | 16-.54 |       | 0-1.05 |     |
|        | .47      | .52      | .44 | 2.08 | .34    | 7.8 | .20    | 15.08 | .47    | .52 |
|        | 1        | 4        | 15  | 29   | 1      |     |        |       |        |     |

Contingency table for R II 16 and forms k+l, d, e-g.

r = forms.

c = phases (early  $\rightarrow$  late).

18

6

26

$$\chi^2 = 27.11$$

$$DF = 8$$

$H_0$  rejected. Value of adjusted residuals give indication of which cells are contributing most to value of  $\chi^2$ . Those marked with \* need attention both achieve significance at

0.01 level (2.28).

KEY.

|                                             |
|---------------------------------------------|
| Standardised residual                       |
| Observed Adjusted residual                  |
| Variance of Standardised Expected residuals |

Standardised residual  $e_{ij} = (n_{ij} - E_{ij}) / \sqrt{E_{ij}}$

Variance of  $e_{ij} = v_{ij} = (1 - n_{i.}/N)(1 - n_{.j}/N)$

Adjusted residual =  $d_{ij} = e_{ij} / \sqrt{v_{ij}}$

Adjusted residuals  $\sim$  normally distrib. with mean 0 and stdev. 1.

(50)



## Early Casseroles - "Open" variety

Forms  $k_1, L, m$ .

### Form $k_1$

Shallow casserole. Wall is outflanged but essentially straight. Base is sagging. Lid locator is extended by a horizontal flange, presumably for lifting.

Two sub-forms:

$k_1$  - as above. - nos 408-20, 422-435

$k_2$  - as above but wall is rounded rather than straight, giving the vessel a "killed" appearance. - No 421, - also associates with inclusion type. Wall also generally more upright than  $k_1$ .

Fig 19 shows contingency table for  $r =$  inclusion texture

$c =$  inclusion type.

$L =$  forms.

Form and inclusion type provide the group discriminants:

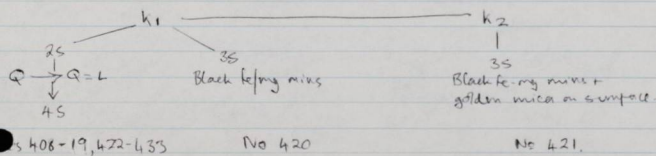
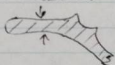


Fig 18 shows diameters and wall thicknesses. It was difficult to get any kind of general indicator of wall thickness from a single standard measurement and averaging many would have been rather time consuming. The single measurement chosen was flange width. Min width of flange =



Average width of flange =



Correlation between diameter and flange width is not particularly good - only  $\pm 0.5$ .

Diameter was measured at the innermost lid stop, rather than at the outer edge of the flange. This seemed advisable as the internal diameter would seem infinitely to have had more significance to the maker and user of the vessel reflecting as it does the usable internal volume of





the vessel.

Diameter — Min: 17 Max: 27  
 Median: 22 Mode: 20.  
 Mean: 22.24 Std. dev.: 2.762.

### Form L.

Shallow casserole. Wall outflanged, but essentially straight. Plain lid (breaker which usually continues line of wall but is sometimes outflanged (curved, mostly only to a small degree. lid slop formed by a small internal flange below the rim.

Form types:  $L_1$  — as above  
 $L_2$  — as above but thicker walled and larger diameter than  $L_1$   
 $L_3$  — as  $L_1$  but thicker walled and larger diameter, also lid breaker more rounded.  
 $L_4$  — as  $L_1$  but thicker walled.

Groups discernable within form L.

| $L_1$                 | $L_2$                         | $L_3$   | $L_4$                 |
|-----------------------|-------------------------------|---------|-----------------------|
| 25                    |                               |         | ? Early               |
| $Q \rightarrow Q > L$ | Black clay rim + golden mica. | 35      | $Q \rightarrow Q > L$ |
| 45                    | 45                            | $L > Q$ | 45                    |

See fig 19 for form-fabric contingency table.

See fig 18 for diameter table — no 470<sup>(L)</sup> immediately distinguished by largest diameter.

see fig 17 for distribution of forms in contexts of RII I 6+7, Casa Bragan. Nos 468 + 469<sup>(L)</sup> immediately distinguished by presence in phase II of RII I 7(E).

### Form M.

Only 3 examples of this form so no other subscript distinctions made.

Basic form — shallow dish, upper wall outflanged and anticurved, lid breaker has now become almost horizontal flange — i.e. it doubles as a lid breaker and lifting flange — just below plain rim, carination in wall, sagging base, ? no footring.

nos 471 and 472 very similar.

no 473 is thicker-walled.



Groups discontinue within m.

Black leg + golden mica

35

472

Q

35

471

L > Q.

25

473

Fig 19 shows form fabric contingencies.

Probable groupings for forms k, l, m.

| k <sub>1</sub> l <sub>1</sub> ?<br>≡ m(472) |            | k <sub>2</sub> , l <sub>2</sub> m(471) |             | l <sub>3</sub> ?<br>≡ m |            |
|---------------------------------------------|------------|----------------------------------------|-------------|-------------------------|------------|
| 25                                          |            | Black rhyolite minerals                |             | L > Q                   | L > S      |
| Q → Q = L                                   |            | 35                                     |             | 35                      | 25         |
| 45                                          |            | ↓                                      |             | 45                      |            |
| (36 vessels)                                | (1 vessel) | (1 vessel)                             | (3 vessels) | (1 vessel)              | (1 vessel) |
| L <sub>4</sub>                              |            |                                        |             |                         |            |
| Q → Q > L                                   |            |                                        |             |                         |            |
| 45                                          |            |                                        |             |                         |            |
| (2 vessels).                                |            |                                        |             |                         |            |

k<sub>1</sub> l<sub>1</sub> m(472) group is the largest. Dispersion of the group is Q → Q = L and 25-45. Fig 19 shows results of  $\chi^2$  test for this group which yielded a non significant result. This suggests no particular association between fabric texture and inclusion type and that the dispersion is what would be naturally expected.

Fig 17 shows distribution of forms k, l, m through contacts of R II J 617 and Casa Program. All could be contained in the Augustan period or later except for nos 468 + 469 (L<sub>4</sub> group) which appear to be substantially earlier.

Discontinuing the L<sub>4</sub> group the question arises of whether there is



any significant difference in the distribution of forms d-g and k, l, m through the contexts which might suggest a difference in date.

(fig 20).

Significance testing of RII 16h (the only sequence with sufficient nos. of all types) showed a significant result for d compared to (k+l, e-g) but no significant difference between k+l and e-g. Carthage report regards form k as generally later than forms e-g.

Early Remon cassioles - addenda to 1st series

7-10-87.

No new forms but confirmation of types  $k_1$   $k_2$   $n_1$

Fundamental difference between  $k_1$  and  $n_1$

$k_1$ : lid locator is essentially slightly outplayed continuation of upper wall with gripping flange attached. ~~lower~~ ~~lid edge~~ Whole lid locator is essentially a ~~lid~~ ledge <sup>inner</sup> rebated in the face of the upper wall.

$n_1$ : upper wall is finished in and lid locator is a ~~separately~~ separate, distinctly articulated feature - outplayed from the upper wall. Gripping flange is generally downturned.

Is it possible that  $n_1$  is a morphological development of  $k_1$ ?

Morphological differences reflect fabric differences.  
Most of  $n_1$  are in the "golden mica" fabric.

Possible that  $k_2 = n_1$



Form 6.

L1 remains same.

L2 remains same - volcanic inclusions - ? Companion.

L4 - here basic distinction between L1 and L4/L5

L1 wall is essentially straight.

L4/5 upper wall outplayed to varying degree.

L4 subdivided mainly because of contextual evidence.

L4a - 2 egs present in early contexts

L4b - rest.

Though there is essentially ~~a~~ little perceptible difference in form. Fabrics are various.

L5 Upper wall outplayed and rim edge tooled into flat surface.

L3 subdivided mainly on fabric grounds.

L3b - 2 egs are very sim. - possible that L3b is early development of <sup>form</sup> L5 (?). Fabric quite similar.

L6 Sack category to take leftovers.

DATING.

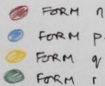


Fig 21

From n  
f  
y  
r



No 481 - 546. Casserelles.

Closed vs open vessel.

lid locator + flange vs lid locator = flange.

Tapered flange vs flange with enlarged (gripping) rim.

Outplayed lid locator vs vertical lid locator.

(tumbled)  
Constructed upper wall vs vertical upper wall.

For lid locator = flange

All eggs have flange with concave upper surface for lid location.

"Simple" flange vs "Complex" flange (ie flange is given thickened / undercut rim for gripping)

↑ i.e. Complex flange may also provide additional seating for lid on top of flange

### Form a

Casserole, upper wall approx. vertical or tumbled home, lid locator + attached flange.

1. Tumbled upper wall, outplayed lid locator, tapered flange.
2. Upright upper wall, upright lid locator, tapered flange.
3. Outplayed upper wall, outplayed lid locator, tapered flange.
4. Tumbled upper wall, outplayed lid locator, flange with thickened gripping rim.
5. Vertical upper wall, outplayed lid locator, flange with "gripping" rim.
6. Vertical upper wall, vertical lid locator, flange with gripping rim.



Form n Additions to 1st sensation

8-10-87.

Discriminating features

Additions in red.

Flange shape

Orientation of lid locator

Orientation of upper wall.

Tapered Flange:

|     |   |                         |                              |
|-----|---|-------------------------|------------------------------|
| n1a | " | + tumbled upper wall    | + antipleged lid locator     |
| n1b | " | "                       | + <u>upright</u> lid locator |
| n2  | " | + upright upper wall    | "                            |
| n3  | " | + antipleged upper wall | + antipleged lid locator     |

Flange with "gripping" rim.

|     |   |                      |                              |
|-----|---|----------------------|------------------------------|
| n4a | " | + tumbled upper wall | + antipleged lid locator     |
| n4b | " | "                    | + <u>upright</u> lid locator |
| n5  | " | vertical upper wall  | antipleged lid locator       |
| n6  | " | "                    | vertical lid locator.        |

no 2709 (n1a) fulfills the classificatory criteria laid down for this form but is in a different fabric.



Form F

Cassiope, upper wall humped, lid locator = flange.

- f1. unduloid or irregularly humped flange.  
 f2. the flange divided at end and undercut (given gripping flange)  
 f3. lid stop on upper surface of flange, no "gripping" flange  
 f4. lid stop, gripping flange.

f1 481 482, 484, 486  
 483 487

f2 485  
 f3 489, 490, 493, 496, 497  
 f4 494

f1 498 - 515  
 f2 516 - 531  
 f3 495, 502, 508 - 537, 539 - 543  
 f4 538, 546 - 546

Form g. Cassiope, upper wall slightly humped, ventral lid locator,

attached flange with Mykand m giving "stop" and gripping  
 m. From 5m to 96 but flange is much shorter, more compressed  
 on to lid locator. Is this a transitional form from 11(a) to

Form f. Cassiope, upper wall slightly humped. Convex moulding on outside  
 of upper wall with small lid locator rebated at top inside of this.  
 One could regard this moulding (which) as the ventral  
 compression of the ~~convex~~ flange with "gripping" mms at corners  
 n and p to the point where all that is essentially left is the  
 convex outer face of the gripping m. The lid locator is  
 unduloid being only a rebated groove on the upper edge of the  
 m. One wonders whether a lid would have been particularly  
 secure on this form - certainly it would have been much more

Additions to 1st variation

9-10-87.

Forms q, r

Additions in red.

q becomes q1

q2a - Simple form with insloping led locator on inner face of M.M. Slightly moulded outer face of rim for gripping flange.

q2b - Similar.

r becomes r1

r2 - smaller, ~~deeper~~ shallower dish version of r1

~~r3~~

DATE NG.

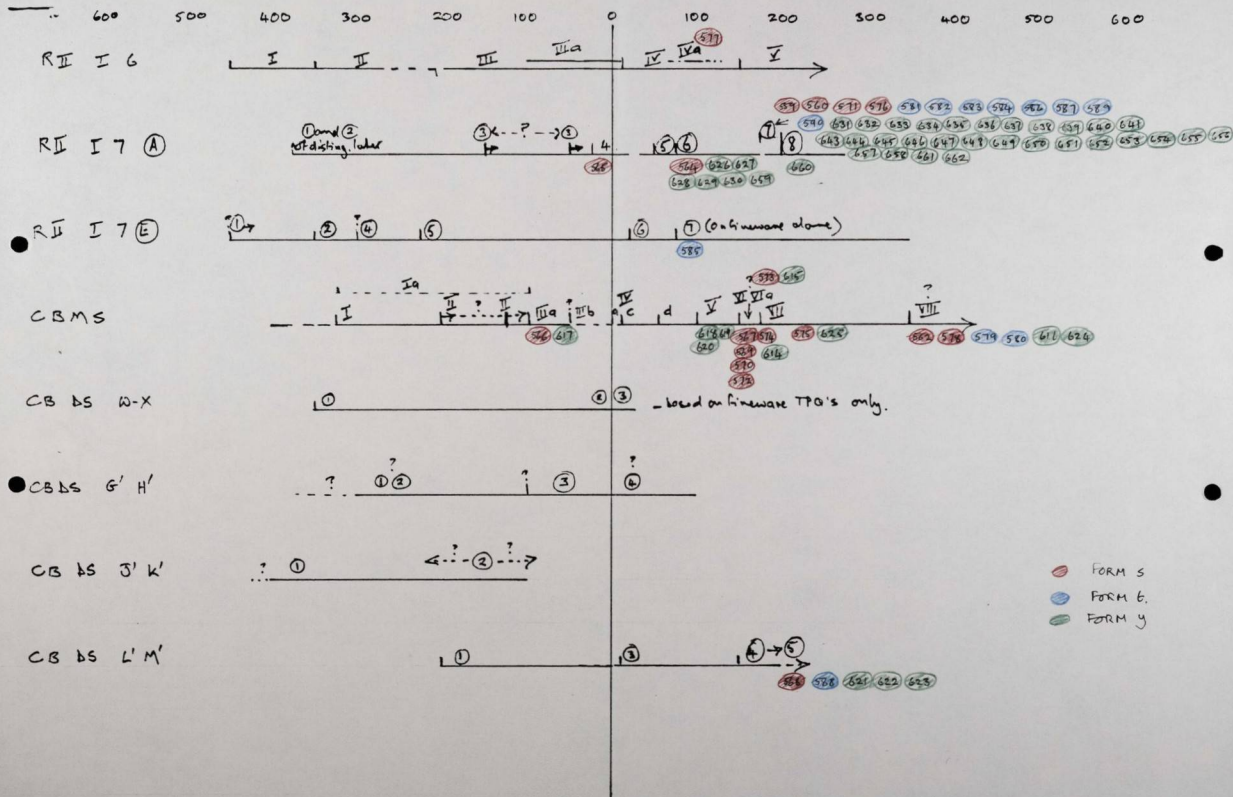






Fig 2B

| Form a |   |    |     |     |     | Form b. |   |   |     |     |     |
|--------|---|----|-----|-----|-----|---------|---|---|-----|-----|-----|
|        | B | Q  | Q>L | Q:L | L>Q |         | B | Q | Q>L | Q:L | L>Q |
| S      |   |    | 1   |     | 1   |         |   |   |     | 1   | 1   |
| 2S     |   |    | 2   |     | 1   | 3       |   |   | 1   |     | 1   |
| 3S     |   | 1  | 8   | 1   | 10  |         |   | 1 | 5   |     | 7   |
| 4S     |   | 1  | 2   |     | 1   | 4       |   | 1 | 2   |     | 3   |
| 5S     |   |    |     |     |     |         |   |   |     |     |     |
|        | 2 | 13 | 1   | 2   | 18  |         | 2 | 8 | 2   | 12  |     |

|      |   |    |
|------|---|----|
| 1    | 1 | 2  |
| 3    | 1 | 4  |
| 2 13 | 1 | 17 |
| 2 4  | 1 | 7  |
| 4 21 | 1 | 4  |
|      |   | 30 |

|       |     |      |       |   |     |    |      |       |
|-------|-----|------|-------|---|-----|----|------|-------|
| START | JOB | 1731 | 11:16 | 2 | OCT | 87 | ARA2 | ***** |
| START | JOB | 1731 | 11:16 | 2 | OCT | 87 | ARA2 | ***** |
| START | JOB | 1731 | 11:16 | 2 | OCT | 87 | ARA2 | ***** |
| START | JOB | 1731 | 11:16 | 2 | OCT | 87 | ARA2 | ***** |
| START | JOB | 1731 | 11:16 | 2 | OCT | 87 | ARA2 | ***** |

```

57914 26 3 or/br,pa br osf 29 t 1 q
58014 26 3 or/br,pa ye/br osf 34 t 1 q>1
58123 21 3 or/br-gr,gn/cr osf 34 t 1 q>1
58223 25 4 or/br,gr/br sf d13 t 1 q>1
58323 21 4 or/br,sm sf 20 t 1 q>1
58423 23 4 or/br,di pa br sf 24 t 1 q
58523 40 3 adk br-gr,pc pa br sf 16 t 1 q>1
58623 25 1 or/br,sm gr/br sf 21 t 1 l>q
58723 20 3 or/br-gr,dk gr sf 22 t 1 q>1
58814 128 3 di or/br-gr,pc gr/br sf 21 t 1 l>q
58923 21 3 or/br,pa cr/br osf 22 t 1 q>1
59023 25 3 or/br,pa br sf 23 t 1 q>1
67723 25 3 or/br,sm sf d17 t 1 q
25092 11 3 or/br,dk gr sf d19 t 1 q>1
2514 2 2 or/ye,gr osf,ye/cr osf 18 t 1 q>1
67414 84 2 or/br,gr co,dk gr osf d19 t 2 q>1
250417 10 3 gr/br,bl osf d24 t 2 q
Job number JARA2 NUMAC Computing Service at Newcastle - Michigan Terminal Sys

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Obtained at 11:16:34 Fri Oct 02/87  
Released at 11:16:34 Fri Oct 02/87

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*****
..END JOB 1731 11:16 2 OCT 87 ARA2 *****
..END JOB 1731 11:16 2 OCT 87 ARA2 *****
..END JOB 1731 11:16 2 OCT 87 ARA2 *****
..END JOB 1731 11:16 2 OCT 87 ARA2 *****
..END JOB 1731 11:16 2 OCT 87 ARA2 *****
*****

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QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2

[illegible]

JOB STATISTICS : 0 CARDS, 3 PAGES

```

Form(s) s Texture=2 Type against Color
q
or/br,pa br sf -5 14 1b : 1,
re/br,or/br sf : 1,
q>1
or/br-gr,ye/cr,osf : 1,
or/br,cr sl osf,na ba bn osf : 1,
or/br,gr osf : 1,
or/br,ye/cr sl osf : 1,
q=1

```





Form 5.

|    | $a$ | $q > l$ | $q = l$ | $l > q$ |    |
|----|-----|---------|---------|---------|----|
| 5  |     | 1       |         |         | 1  |
| 25 | 4   | 8       | 3       |         | 15 |
| 35 | 8   | 20      | 4       | 4       | 36 |
| 45 | 1   | 3       |         | 1       | 5  |
| 55 |     |         |         |         |    |
|    | 13  | 32      | 7       | 5       | 57 |

Form 6.

|    | $a$ | $q > l$ | $q = l$ |  |
|----|-----|---------|---------|--|
| 5  |     |         |         |  |
| 25 |     | 3       |         |  |
| 35 | 2   | 5       |         |  |
| 45 | 1   | 2       |         |  |
| 55 |     |         |         |  |
|    | 3   | 10      |         |  |

Test of Form 5 against Form 6

| $L_{Tq}$ |    | FORM $y_1$ |         |         |         |    |
|----------|----|------------|---------|---------|---------|----|
|          |    | $y$        | $q > L$ | $q = L$ | $L > q$ |    |
| 1        | 1  | 5          |         |         |         |    |
|          | 3  | 25         | 4       |         | 1       | 5  |
| 1        | 8  | 35         | 4       | 25      | 7       | 44 |
|          | 3  | 45         | 1       | 1       | 1       | 4  |
|          |    | 55         |         |         |         |    |
| 2        | 15 |            | 5       | 30      | 8       | 53 |

$H_0$  accepted.

Oct. 6 1987.

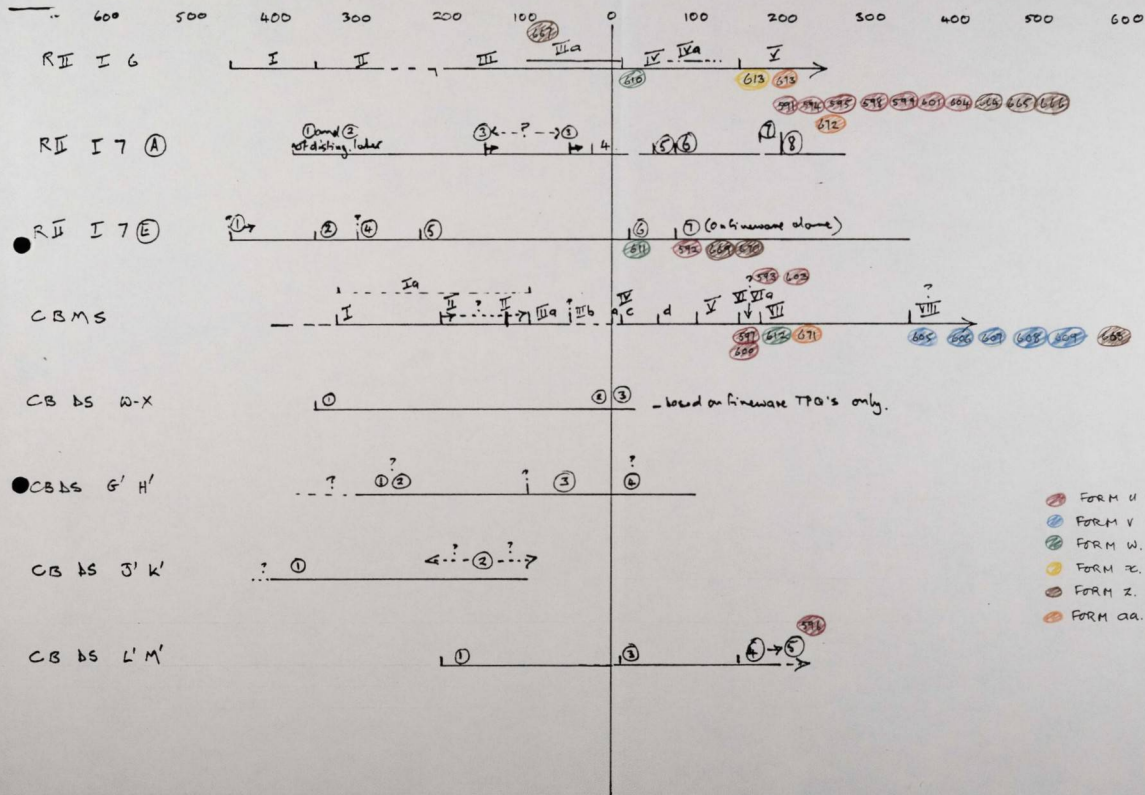




Fig 24



easily dislodged than those which seated on the broad, concave "stepped" locations of the Hellenistic cassettes.

q: <sup>539</sup>~~538~~ - 550

r: 552 - 558.

Form s - casket: contained smoothly curved wall. Flange = lid locator. inner, lid locating face of rim is almost vertical with ridge forming lid-step at bottom; top of rim smoothly curved; from midway down outside of rim the rim has been chamfered inwards, the tool cutting a slight ~~grooved~~ ledge at the top of the wall. Surface has been finished horizontally, moving upwards, as a slight ridge of clay has been drawn up at the edge of the ledge.

Form t. - as form s but the rim shape is more pronounced; the outer chamfer is mainly cut from below the mid point of the rim; the inner, lid locating, face of the rim is no longer vertical but forms a wide channel, wider at the bottom. It must have been an awkward manoeuvre to get a lid into the groove but once in it would have been less easily dislodged.

s: 559 - 578

t: 579 - 590.

## FORM 4

Small jars with everted rim. Almost certainly smaller versions of forms already covered (form p)

- u<sub>1</sub> Simple everted rim, neither particularly thickened nor indented.  
= 591 - 596
- u<sub>2</sub> Everted rim thickened to give "lid stop" rim on upper surface.  
= 597 - 599.
- u<sub>3</sub> Everted rim thickened to give indented edge. Outer face of rim almost vertical and sharply defined. Rim tending to be "squashed down" on to the upper body.  
= 600, 601, 603, 604
- u<sub>4</sub> As u<sub>3</sub> but this is basically a larger vessel. Upper wall is less curved than u<sub>1</sub> - u<sub>3</sub>, rim is thicker and proportionally shorter and more squashed down on to the upper wall.  
u<sub>4</sub> = 602 smaller version of p2.

u<sub>1</sub> = 591 - 596u<sub>3</sub> = 600, 601, 603, 604u<sub>2</sub> = 597 - 599u<sub>4</sub> = 602.

## FORM V. Casserole. Development of v. straight neck with projecting

- v<sub>1</sub> Flange rim. Flange has rounded edge and is often slightly upwards inclined. On outer face of rim tooled groove between rim and upper wall. On inner face of rim there are various bevelled surfaces for a lid to rest on but no actual grooves, rebates or convexities for a lid to seat properly in. The outer face of the upper wall ~~has~~ is decorated in horizontal bands. 607 has narrow, parallel, horizontal "strips" of burnishing spaced c. 10 - 15 mm apart. 605 has wide, parallel horizontal grooves or "furrows" c. <sup>10</sup>/<sub>16</sub> mm wide which could

Additions to 1st Semination

9-10-87

Additions in red.

Form p and u.

Form p.

p1 no change

p2 subdivided — p2a — flange thickened and undercut.  
p2b — as p2a but flange does not project as much as in p2a, in fact in some cases it barely projects beyond the upper wall.

p2a tends to have an internal moulding below the lid locator but this tends to be missing in p2b.

p3 no change

p4 no change

Form u.

u1 no change

u2 no change

u3 subdivided := u3a rim thickened and undercut, outer face of rim almost vertical and sharply defined. rim tending to be "squashed down" on to upper body.  
u3b — as u3a but rim is "squashed down".

u4 no change.

u5 equivalent of p2a in smaller size. u3 and u5 are actually quite similar except in u3 rim projects much less.

u6 — miscellaneous small jars. 4077, 4126

u7 — miscellaneous jars 4147, 4148



have been footed but look rather to have been made ~~and~~ with wet fingers. There is a single & narrow stripe of hummocking towards the top of the wall.

V1 = 605 - 607

V2 as V1 but altogether a thicker, bigger rim with the slight development of a "hd step" on the inside face of the rim.

V2 = 608, 609.

● certain eggs of form V (606 + 609) have a distinctive dark gray to black external surface, which ends in a well sharply defined line just inside the outer edge of the rim. The surface is thin (i.e. not actually visible in section) but pronounced.

Questions — is it simply produced by a sudden and pronounced change in the kiln atmosphere or is a slip involved somewhere?

Is this African Black Top ware.

● The "furrowed" appearance of the outer surface is definitely a distinctive feature.

V1 = 605 - 607

V2 = 608, 609.

FORM W. Jar. More or less developed neck. Quite thin wall.

W1 less developed neck, curved rim of straight profile and plain edge. Tag has handle attached under rim to neck.

W1 = 610, 611

W2 more developed neck, rim = projecting horizontal flange with plain edge.

W2 = 612.

Fabric of form W is distinctive, containing black volcanic grains.

Fig 25

|    | u             | v             | w             | x             |
|----|---------------|---------------|---------------|---------------|
|    | 0 0 0 1 1 1 0 | 0 0 0 1 1 1 0 | 0 0 0 1 1 1 0 | 0 0 0 1 1 1 0 |
| s  |               |               |               |               |
| 2s | 1 1 1         | 2             |               | 1             |
| 3s | 2 3 4 2       | 1             | 2             |               |
| 4s |               | 2             | 1             |               |
| 5s |               |               |               |               |

...

...

...

For

For

For

Form x neck of smoothly curved concave profile. Rim = projecting downturned flange. Slight ledge between neck and upper wall.

Fabric is distinctive - high lime content. Only 1 eg so must wait for larger sample.

x = 613.

Fundamentally different from form W.

Form y Probably associated with forms s and t.

y1 - concave, upper wall smoothly curved concave profile  
rim form is similar to s but less well defined. <sup>rim is somewhat annular</sup> Profile is round but outside of rim is not particularly toolled or shaped. Sometimes there is a slight ledge between the upper wall and the rim. Main difference between y and s is in the lid locator on the inner face of the rim; this is formed from a wide groove - the <sup>or diameter</sup> top of the top of the groove is less than that of the bottom of the groove. If a lid was to seat properly it would have to have been inserted stantwise into the groove.

y1 = 614 - 659.

y2 - as y1 but the rear of the rim top has an inward sloping chamfer cut into it with a slight step at the inside.  
? another lid locator.

y2 = 660 - 662.

There seem to be 2 basic colour schemes:

1) orange-brown with a surface rather in the same colour

or in a very pale, slightly creamy brown - often burnished. Many of the examples of forms were in this colour.

- 2) more red brown than orange brown with a smooth deep dark grey outer surface.

There do not seem to be any signs of contrasting well defined core colours in form y.

There does not seem to be any particular association between colour and inclusion texture or type.

There are however 3 sets of a wholly dark grey body colour (nos 653, 655-6) all of which are in the L & Q inclusion type category. Is this significant - I doubt it.

There are too few of form yz to see if there is any association between the form and fabric attributes.

Form 3 - Minimalist casseroles

3 = 663 - 670.

no 663 is possibly "real" A.R.S.

Form aa <sup>aa1</sup> shallow casserole or dish. Only (671) shows sufficient of profile - sharp concave in vessel wall. Rim is thickened with plain external moulding. Well defined groove inside rim as lid creaser.

aa2 - similar to aa1 but not so sharply defined in execution.

No concave visible - prob. wall simply rounded convex.

External rim moulding not so sharply defined as aa1



Included lid locator more strongly defined (as a V-shaped notch) than a<sub>9</sub>.

? are a<sub>91</sub> and a<sub>92</sub> really the same form.

Form ab - This is a "sack" form containing all the "left over" nos 674-694 vessels not readily assignable to any of the other categories. It probably contains quite a lot of "late" forms - i.e. post ③ Ab.

The group is quite small and with no commensality of form there may be no significant fabric associations.

Nevertheless there are certain vessels whose ~~fabrics~~ inclusion texture and type stands out above the usual quartz-limestone "groundwell" of the north-African fabrics. These are:

676 - high proportion of black vitreous grains - ? (Companion).

675, 680, 683, 689, 691 - The common attribute is a fine component (S-25) of the inclusions smt with quite a high proportion of limestone. This component is often quite difficult to see - hence the name "non-discrete" fine component - it tends to blend into the clay matrix; it is particularly hard to discern in a grey fired fabric though this may be because of the lack of contrast. The question is - is this fine component added temper or was it in with the original clay deposit. This fine component is often accompanied by occasional much larger (usu. 35) grains of lime or quartz giving the impression of a v. poorly sorted inclusion smt. There is difficulty in recording the texture: - if there are only a few of the larger grains it can be recorded as S or 25 which accurately represents the fine component but if there are more then it must be recorded as 35 or 45 which ~~does~~ ignores the presence of the fine component. This is why I have

added the comment in the inclusions section "non-discrete" line component. This fabric could be distinctive and could be associated with later casseroles. It could be the same fabric as at least some of nos 4, 19, 56, 46 from URS LM 4.

680 - distinguished by angularity of quartz and presence of chert.

679, 685 - distinguished by texture (45) and high proportion of quartz and by discreteness. ? late forms.

690, 693 - distinguished by presence of grains of red/black iron. V. similar to fabric of forms h and n - so-called "proto African black top" ware (Hayes).

30-9-87

CasserolesAdjustments to ~~previous~~ 1st variationForm s<sub>1</sub> — subdivided.s<sub>1</sub> = old s 559-571 573-578 2445-2462.s<sub>2</sub> is more upright, taller

572, 2464-2485

than s<sub>1</sub>; tendency for lid locator  
not to be so deeply cut — to point  
in some examples where it is  
plane.

t<sub>1</sub> = old t Similar to s<sub>1</sub> but

579-590 677 2509

rim shape is more amorphous 2514

outside of gripping rim does  
not have the regular convex 45°  
beveled facet of s<sub>1</sub> but is much  
more irregular, often leaving a projecting  
lip above. lid locator groove is often  
wider at bottom than top.

t<sub>2</sub> (atypical ex. of t<sub>1</sub>)

674 2504

y<sub>1</sub> = old y<sub>1</sub> Similar to s+t but rim shape 614-659even more amorphous than t. Often 2482<sup>th</sup> 2492

hardly any beveling on the outside face  
of the rim and lid locator often wider  
at bottom than top. Rim has become almost  
a simply bevel of round section set on top  
of the wall. There is also a possibility of a  
subtle change in the development of forms s<sub>1</sub> s<sub>2</sub>  
t, y<sub>1</sub>. The ~~own~~ forms themselves are not really  
discrete entities but part of a developing process.

tends to be hunched in narrow horizontal strips or corrugated with horizontal groove more or less deeply cut and more or less sharply toothed or delineated. 605-607.  
2506.

y7 longer legs of y6. 608, 609, 679, 2505

y8. Prob. related to y6. Rim curved in a smooth 2507, 2508,  
curve. Lid locator well articulated on inner 2510.  
face below rim. Fabric quite fine. Execution good.

y9. Similar to y6. Flared rim, with concave outer face, lid locator not particularly well articulated. Particularly distinctive is the execution. Vessels are finely made and finished. Surfaces are finely beaded and the rim is beaded at its outer edge to a fine edge. Outer surfaces have parallel horizontal grooves sharply toothed. 681, 682, 2511,  
2512.

y10 Slight oddity 2503.

y11a Sim. to S1 - upright rim, beaded outer face, 2500 - 2502.  
lid locator. Thick coarse fabric - ? Parthian.  
? hand-made.

y11 b oddity, 2515.



and there seems to be in form y1 in particular more in a harder (?and finer) fabric often with a black outer surface.

### New Series Continues at y3

- y3 - ? A development of type s1. Rim is taller + thinner and tending to lean out more. The similarity to s1 is mainly in the faceted treatment of the outer face of the rim. lid locator is broad with often a ridged lower step. 2493, 2495-7 680.  
Possible similarity in fabric with s1.
- y4. - ? further development of s1. Rim is even taller, leaning slightly out. Outer face of rim is faceted quarter round. lid locator tends to be broad and shallow. 2513.
- y5 - Upright rim, projecting beak, flat top, deeply cut lid locator. 684, 685, 688  
2498-2499.
- y6. - Basic differences from type s1 etc: Rim tends to be everted projection rather than upright faceted moulding. Outer face of rim is basically convex. lid locator tends to be less well articulated than s1 etc prob. because the everted rim already provides a resting surface on its inner face. Outer surface

BRAZIER

which determine gross morphology

The 3 functional elements of these  $h$  are as follows:

- ① Pan stand
- ② Fire basket
- ③ Ash box

These can be combined in a number of ways. Basically ① and ② are always present (in the extant examples) whereas ③ may be — its presence is a refinement which marks a difference in types.

The constituent components of the functional elements are roughly as follows:

- ① Pan stand — rim form, <sup>presence of handles</sup> leg form, decoration —
- ② Fire basket — entirely functional — no apparent variation in functional form.
- ③ Ash box — size and shape of vent.

Fig 26. shows a generative diagram for the various <sup>types</sup> of brazier. It represents what is ~~not~~ <sup>inferred</sup> evident or can be reasonably ~~inferred~~ from the extant fragments of brazier. It does NOT represent a generalized generative diagram for all braziers. The direction of generation is from left to right and the different elements which make up a particular form become associated by proceeding through the diagram on a particular path. Right-handed branches represent options, only one of which may be selected. Backtracking is not allowed. Solid lines represent relationships between different elements which actually exist in the extant fragments; dotted lines represent relationships which can be implied — eg there is only one solid pathway to Form ac because there is only one extant fragment <sup>large enough</sup> in which enough is preserved to show the relationship "pan rim + pan leg + fire basket + freestanding foot" and this provides the archetype for the form. Other associations within the form are implied on the basis of eg. similarity

of form, presence of certain common attributes or the showing of a common fabric. The smallness of some of the extant fragments (while almost certainly leading to the non-significant, non-appearance of certain features) has ~~been~~ necessitated the provision of certain pathways through the diagram which might not ~~be~~ represent actual options. EG a pathway representing no lug at all (a mill production) is provided in Form ac since many of the extant

→ rim fragments do not contain any part of a lug. ~~However~~ <sup>actually</sup> However, it is extremely unlikely that a lugless vessel ever ~~existed in real life~~ Add note on lugs

Form ac. - Essentially a freestanding, lugged firebasket resting on small projecting feet.

|                                                              |                     |
|--------------------------------------------------------------|---------------------|
| Plain rim + plain lug + firebasket + freestanding foot       | = 716. ✓            |
| Plain lugless rims                                           | = 722 - 765 ✓       |
| Plain rim + plain lug                                        | = 695-715 717-721 ✓ |
| Plain rim + triangular lug                                   | = 766-770           |
| Plain rim + knobbed lug                                      | = 771               |
| Hammer head rim - no lug - no dec                            | = 802, 803          |
| Hammer head rim - no lug - needed dec.                       | = 797-799           |
| Hammer head rim - no lug - finger impressed dec              | = 800-801           |
| Hammer head rim - no lug - stabbed + lozenge dec.            | = 793-795           |
| Hammer head rim + proj. sprig lug + stabbed and lozenge dec. | = 796.              |

Form Hammer head rims associated with this form because (a) angle of upper wall implies a shallow (comparatively) form and (b) there are vent holes in wall and no breaks ~~in the~~ <sup>which could imply</sup> conjoining with integral ash boxes.

FORM ad — Essentially a hinged firebasket with integral ash box forming a base. Examples of this form are in two fabrics, one of which is the same as that used exclusively for FORM ac.

## Fabric ①

Bifid rim + no lug + no handle

= 772, 774-776,  
779-781, 784-787  
789, 791, 792

Bifid rim + lug + no handle

= 778, 788

Bifid rim + lug + handle

= 773, 777, 782, 783,  
790

Fragments of fire basket (only)

= 824 - 838

Fragments of ash box + no vent

= 817 - 821

Fragments of ash box +  $\Delta$  vent

= 839

" " " " +  $\bigcirc$  vent

= 822

" " " " +  $\square$  vent

= 841

no actual conjoined frags. of fire baskets and ash boxes in this fabric but "reasonable fit." Bifid rims associated by ① common fabric ② assuming ① then cannot

## FABRIC ②

be form ac because of sloped bifid rim upper wall and lack of vent holes in walls.

Flange rim + no lug

+ finger impressed dec = 813, 816

" " + plain horizontal lug + "

" " = 815

" " + " vertical " + "

" " = 814

No examples of fire baskets in this fabric. ? why?

Fragments of ash box + square vent

= 812.

Ruin fragments associated with ash box fragments on basis of ① fabric similarity ② general form of rim frag. wall.



FORM ac - ~~is~~ essentially a firebasket with high pedestalled legs.  
<sup>a separate ash box</sup>  
 no evidence of ~~the~~ ash box, integral or otherwise or  
 No evidence either of holes in firebasket or feet

Flange rim + pedestalled leg + fire basket = 805

Trays of flange rim only = 806 = 811

This fabric may be same as fabric 1, just better fired and better made, ~~and~~ is the geological component of the two fabrics are the same but the techno-cultural components are different.

FORM ab. - Only single example. Doesn't fit into other categories.

Not included in fig 26.

Seems to be lugged firebasket with integral ash box.

Extant fragment = 804 - has ~~double~~ lead and flange rim, plain vertical leg, firebasket. It appears that the firebasket and pan-stand were fabricated together and then joined to the ash box - has broken along this join - ash box now lost.

Extra note: position of legs is interesting on a purely functional level.

In form ac - plain rims - the rim is already incurving so the leg does not have to project into the interior of the vessel much, but simply sits on top of the rim and lifts the pan off the rim top.

In form ad where the rim is outflanged the leg has to be positioned inside the rim and project markedly into the vessel's interior.

Fig 27 shows diameters for different forms. Nothing really significant.

Examples of Braziers sent for thin sectioning.

|                         |         |
|-------------------------|---------|
| <u>705</u> <sup>1</sup> | xiv 81  |
| 716                     | xxii 8  |
| 752                     | xxii 35 |
| 767                     | xiv 92  |
| 771                     | xiv 11  |
| 777                     | xiv 11  |
| 793                     | xiv 8a  |
| 796                     | xiv 9   |
| 801                     | xxii 8  |
| 802                     | xiv 81  |
| 804                     | xiv 81  |
| 805                     | xxii 8  |
| 812                     | xiv 47  |
| 814                     | xiv 49  |
| 815                     | xiv 35  |
| 817                     | xiv 11  |
| 836                     | xiv 92. |

Bruggiers

Additions 17-1-88.

Formae

Plain lugless rim. - 3926 - 3936, 3975

Plain rim + plain lug - 3937 - 3955

Plain rim triangular lug 3956 - 3957

Hammer head + needed dec. 3959 - 3971

Hammer head + lug + impressed dec. 3972 - 3.

Hammer head rim + proj. spigot lug + stalked and lozenge dec. 3974

Formae.

Frags. of fine basket only 3976 - 3980.

Frags. of bifid rim only 3981 - 3987.

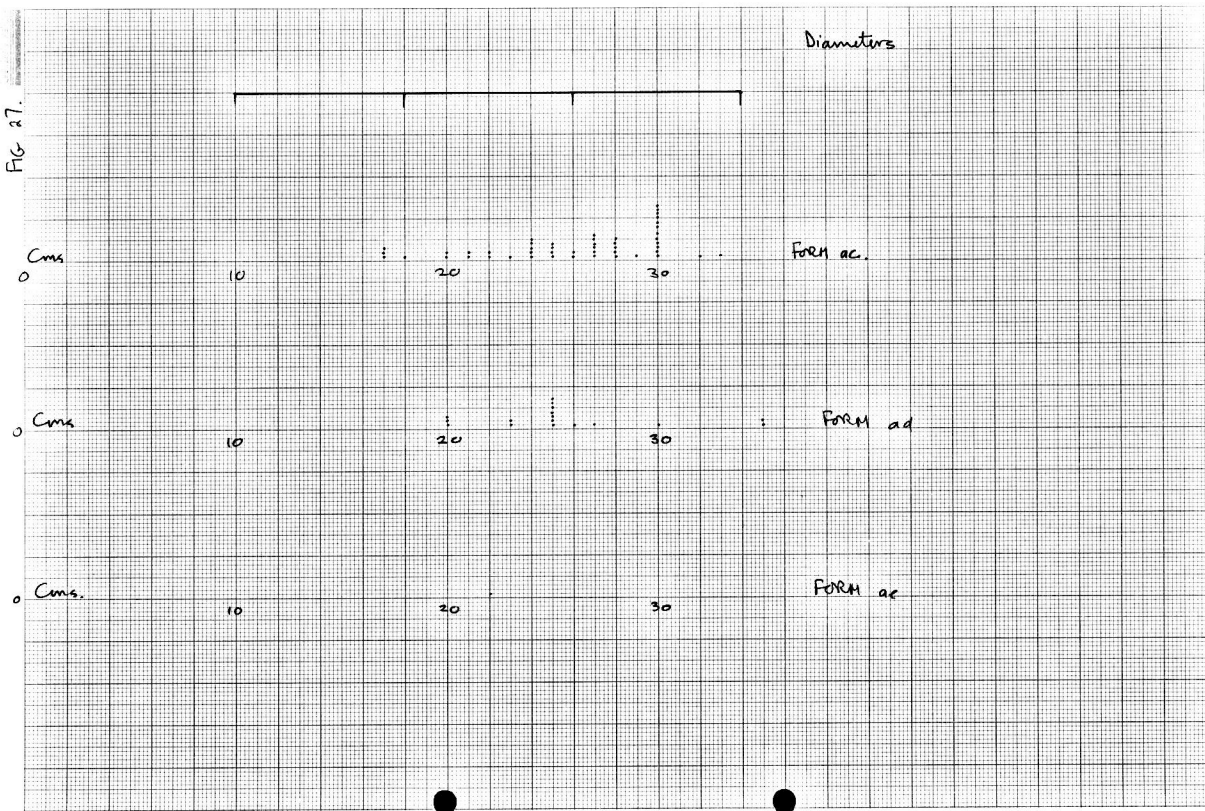
bifid rim + lug 3986 - 93

bifid rim + lug + handle 3994 - 97 (fabric 1) 3998 (fabric 2).

Frags. of ashware - no vent 3999 - 4000.

Formae. 4001 — 4012.

FIG 27.





Differences.

White strip/surface

Consistent body colour vs well camouflaged body colour.

Black-surface.

All red head vs grey head.

Form Groups.

|     |     |         |     |     |     |
|-----|-----|---------|-----|-----|-----|
| 100 | 102 | 104-111 | 117 | 113 | 115 |
| 101 | 103 |         |     |     |     |

116, 118-141

|     |     |     |                    |          |
|-----|-----|-----|--------------------|----------|
| 143 | 144 | 145 | 146 <del>147</del> | 147, 148 |
|-----|-----|-----|--------------------|----------|

|     |         |         |     |
|-----|---------|---------|-----|
| 149 | 150-155 | 156-162 | 163 |
|-----|---------|---------|-----|

164 114 165 - 171 (all separate).

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FORM

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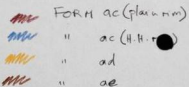
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1st Appearance.

Fenn

$$ac(\text{plain}) \subseteq BC(?) \text{ or } \subseteq BC.$$

ac (hammer head)      c BC.

ad LC AD

 $ae \perp BC$



Amphora Type vessels.

Most "meaningful" groupings.

| Nos                           | Distinguishing Characteristics                                                                                                                                                                    | Dating.                                                                              |
|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| 16, 18 - 22                   | Hard, rough/gritty feel<br>Banded orange/gray fabric<br>Greenish cream surface<br>Limestone present (often much)                                                                                  | Groups well in LBC contexts.                                                         |
| <sup>3</sup><br>1, 4, 5, (29) | Gritty feel,<br>Dirty orange fabric<br>Dirty cream surface<br>"Black sand" inclusions                                                                                                             | 3, 4, 5 group well in<br>LBC ECAD contexts<br>29 different form, sim. fabric<br>LBC. |
| 10, 11, 12 (7)                | 10, 11, 12 Gritty feel<br>Hard orange/brown fabric<br>Cream surface<br>Mainly lustrous glistering<br>quartz                                                                                       | 10, 11, 12 group well in LBC.<br>7 only gen. similar - LBC.                          |
| 31, 32                        | Rough feel<br>Dirty pale orange or brown<br>tendency to bending to grey<br>Marked greenish-cream<br>surface - almost cent.<br>"sea water" caused<br>Quartz and (much) limestone<br>in case of 32. | Group well in LBC - ECAD.                                                            |



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JOB STATISTICS : 0 CARDS, 4 PAGES, 0 CARDS PUNCHED, ENTERED FROM \*PRINT\* AT 14:13

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   q=1+gg(7s) : 1, q>l    : 1, q>l>refe : 1, q=1    : 54
3  l>q      : 7, q>l      : 8, q>l>refe : 1, q=1    : 22
   SUM = 38
4  l>q      : 1, l>q      : 4, q>l      : 1. SUM = 6
   l>q      : 1, q=1      : 3. SUM = 4
1  q>l      : 1, l=q      : 2, q>l      : 1, q=1    : 6
   SUM = 10
2  l>q      : 4, q      : 3, q>l      : 10, q=1   : 6
   SUM = 23
4  l>q      : 3. SUM = 3
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3  l>q      : 8, l=q      : 1, q>l      : 2, q=1    : 7
   q=1>refe : 1. SUM = 19
4  q=1      : 3. SUM = 3
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3  l>q      : 1, q      : 1, q>l      : 5. SUM = 7
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 Obtained at 14:13:38 Wed Apr 08/87  
 Released at 14:13:38 Wed Apr 08/87  
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9 Oklahoma Gardens (3 ponds)  
 Working  
 Chemical Studies  
 University of Michigan  
 Ann Arbor,  
 Michigan 48109 USA

|       |     |      |       |   |     |    |      |       |       |          |
|-------|-----|------|-------|---|-----|----|------|-------|-------|----------|
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| START | JOB | 4901 | 16:19 | 7 | APR | 87 | ARA2 | ***** | NUMAC | (GROUND) |

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ag b : 3, 3 : 18, 4 : 2. SUM = 23
ag b2 : 3. SUM = 3
ag a : 1, 2 : 4, 3 : 4. SUM = 9
ag b : 7, 3 : 15, 4 : 3. SUM = 25
ag 4 : 3. SUM = 3
ag 5 : 1, 3 : 7. SUM = 8
ag 6 : 1. SUM = 1
ag 7 : 5, 2 : 1. SUM = 6

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Pages printed 3

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Form 23.  
Table Federal District  
Inches in type vs column

|              |                    |      |         |                                      |
|--------------|--------------------|------|---------|--------------------------------------|
| <u>g</u>     | or/br, cr sl ori   | : 1. | SUM = 1 |                                      |
| <u>g</u>     | qa br              | :    | 2,      | pa pi/br : 1., SUM = 3               |
| <u>g27</u>   | sl                 | :    | 1.      | SUM = 1                              |
| <u>g2</u>    | pa br              | :    | 1.      | SUM = 1                              |
| <u>g2</u>    | gr/or/br co, gr sf | :    | 1,      | gr/or/co sg : 1.                     |
| <u>g</u>     | br                 | :    | 1,      | or/br, gr/br co, cr/yu esf : 1.      |
| <u>g1</u>    |                    | :    | 1.      | SUM = 4                              |
| <u>cont.</u> | gr sl ori          | :    | 1,      | gr/br, gr co : 1.                    |
| <u>g</u>     | gr or              | :    | 1,      | gr/co, gr/or sl ori : 1.             |
| <u>g</u>     | gr/h sl ori        | :    | 1,      | or/br, gr/br co, ba gr-cr/br sf : 1. |
|              |                    | :    | 1.      | SUM = 6                              |

[illegible]

```
q=le,q(7s) : 1. SUM = 1  
q=le,q  
or/br,br mj,cr ori + isf : 1. SUM = 1  
q=le,qe : 1. SUM = 1  
or/br,cr el ori  
q=le,qe,mje : 1. SUM = 1  
or/br,cr el ori
```

```

: 1. br/gr, pl/br co, cr sf
: 1. du br/gr, ye sf
: 1. du br/gr, coya/cr sf
: 1. gr/hr, or/br co, cr sf
: 1. sa/gr, or/br sa, ba gr-cr/br sf
: 1. par/hr, cr sf
: 1. par/hr, cr sl ori
: 1. par/hr, cr sl of
: 1. pr/hr, or sg
: 1. ps pl
: 1. suh = 22

```

```

a      or/br/cr sf          : 1. SUM = 1
a      mbr                  : 3. or/br,ya/cr sf          : 1. SUM = 4
a>1    cont. cr sl ori      : 1. cont. wh sl ori          : 1.
      du or/br,du br co,cr osf : 1. cr          : 1.
      or ifa=or ofa/cr sl osf : 1. or/br,cr sl ori      : 1.
      gr,cr sl ori          : 1. gr,cr sl ori + isf    : 1.
      or/br mgor/y=or/br sf : 1. or/br          : 1.
      or/br/cr osf          : 1. or/br,cr,ye osf      : 1.
      or/br,cr sl ori      : 1. or/br,dk gr osf      : 1.
      or/br gr co,ba gr or/br sf, : 1. or/br gr ggc,cr sl ori : 1.
      or/br,gr mgor sf      : 1. or/br,mgr gr co,ba gr or/br sf, : 1.
      or/br,cr osf          : 1. or/br,cr osf cr frag 1 3 : 1.
      or/br,ya/cr osf      : 1. ya/br or/br mo,cr osf & iri : 1. SUM = 25
      or/br,cr osf      : 1. cr frag 14 79

```

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1: 1. SUM = 1
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```

      mbr,br/cr sf          : 1. SUM = 1
loop
    br,br/cr co,wh sl ori   : 1. cont. cr sl ori           : 1.
    dk,rs/br,gr br co       : 1. gr/gr/cr asf            : 1.
    or/br/gr co,cr sl asf   : 1. br/gr/gr ng             : 1.
    or/br/gr ng,ba pr-or/bf : 1. SUM = 7

```

```

421 or/br,cr of : 1. SUM = 1
q=1 br/gr,gr sf : 1. du br,gr/br co,cr af : 1. SUM = 1

```

GARA2 \*\*\*\*\* GARA2 \*\*\*\*\* GARA2 \*\*\*\*\* GARA2 \*\*\*\*\* GARA2 \*\*\*\*\* GARA2 \*\*\*\*\* GARA2 \*\*\*\*\* GAR



CARA2 CARA2 CARA2 CARA2 CARA2 CARA2 CARA2 CARA2 CARA2 CARA2 CARA2 CARA2 CARA2



significant

see log29a

H<sub>0</sub> mutual independence

incl + Tex + colour

CYCLE  
5  
SCALED  
DEVIANCE  
146.6

DF  
39

| UNIT | OBSERVED | FITTED     | RESIDUAL     |
|------|----------|------------|--------------|
| 1    | 0        | 0.4611     | -0.6790      |
| 2    | 0        | 2.174      | -1.474       |
| 3    | 0        | 2.635      | -1.623       |
| 4    | 0        | 0.3623     | -0.6019      |
| 5    | 3        | 2.459      | 0.3450       |
| 6    | 16       | 11.59      | 1.295        |
| 7    | 13       | 14.05      | -0.2805      |
| 8    | 0        | 1.932      | -1.390       |
| 9    | 5        | 3.842      | 0.5907       |
| 10   | 32       | 18.11      | <u>3.263</u> |
| 11   | 19       | 21.96      | -0.6307      |
| 12   | 1        | 3.019      | -1.162       |
| 13   | 0        | 1.998      | -1.413       |
| 14   | 10       | 9.419      | 0.1893       |
| 15   | 3        | 11.42      | -2.491       |
| 16   | 5        | 1.570      | <u>2.738</u> |
| 17   | 0        | 0.1810     | -0.4254      |
| 18   | 1        | 0.8532     | 0.1589       |
| 19   | 1        | 1.034      | -0.3360E-01  |
| 20   | 0        | 0.1422     | -0.3771      |
| 21   | 0        | 0.9652     | -0.9825      |
| 22   | 3        | 4.550      | -0.7268      |
| 23   | 10       | 5.516      | 1.909        |
| 24   | 1        | 0.7584     | 0.2774       |
| 25   | 0        | 1.508      | -1.228       |
| 26   | 3        | 7.110      | -1.541       |
| 27   | 12       | 8.618      | 1.152        |
| 28   | 2        | 1.185      | 0.7487       |
| 29   | 1        | 0.7842     | 0.2436       |
| 30   | 0        | 3.697      | -1.923       |
| 31   | 7        | 4.481      | 1.190        |
| 32   | 1        | 0.6162     | 0.4889       |
| 33   | 3        | 0.9480E-01 | <u>9.436</u> |
| 34   | 1        | 0.4469     | 0.8273       |
| 35   | 3        | 0.5417     | <u>3.340</u> |
| 36   | 0        | 0.7448E-01 | -0.2729      |
| 37   | 2        | 0.5056     | 2.102        |
| 38   | 0        | 2.384      | -1.544       |
| 39   | 0        | 2.889      | -1.700       |
| 40   | 0        | 0.3973     | -0.6303      |
| 41   | 0        | 0.7900     | -0.8888      |
| 42   | 0        | 3.724      | -1.930       |
| 43   | 0        | 4.514      | -2.125       |
| 44   | 1        | 0.6207     | 0.4814       |
| 45   | 0        | 0.4108     | -0.6409      |
| 46   | 0        | 1.937      | -1.392       |
| 47   | 12       | 2.347      | <u>6.300</u> |
| 48   | 0        | 0.3228     | -0.5681      |

Form ag.

\*G2IM package

log linear model fitting

i Row = Fabric texture

j Col = Induction type

k layer = Colour.

Model = i + j + k

Significant

| CYCLE | SCALED<br>DEVIANCE | DF         |                |
|-------|--------------------|------------|----------------|
| 8     | 93.69              | 33         | + incl. colour |
| UNIT  | OBSERVED           | FITTED     | RESIDUAL       |
| 1     | 0                  | 0.6978E-04 | -0.8353E-02    |
| 2     | 0                  | 0.3289E-03 | -0.1814E-01    |
| 3     | 0                  | 0.3987E-03 | -0.1997E-01    |
| 4     | 0                  | 0.5482E-04 | -0.7404E-02    |
| 5     | 3                  | 2.620      | 0.2348         |
| 6     | 16                 | 12.35      | 1.038          |
| 7     | 13                 | 14.97      | -0.5093        |
| 8     | 0                  | 2.058      | -1.435         |
| 9     | 5                  | 4.667      | 0.1543         |
| 10    | 32                 | 22.00      | 2.132          |
| 11    | 19                 | 26.67      | -1.485         |
| 12    | 1                  | 3.667      | -1.393         |
| 13    | 0                  | 1.474      | -1.214         |
| 14    | 10                 | 6.947      | 1.158          |
| 15    | 3                  | 8.421      | -1.868         |
| 16    | 5                  | 1.158      | <u>3.571</u>   |
| 17    | 0                  | 0.1637     | -0.4047        |
| 18    | 1                  | 0.7719     | 0.2596         |
| 19    | 1                  | 0.9357     | 0.6650E-01     |
| 20    | 0                  | 0.1287     | -0.3587        |
| 21    | 0                  | 1.146      | -1.071         |
| 22    | 3                  | 5.404      | -1.034         |
| 23    | 10                 | 6.550      | 1.348          |
| 24    | 1                  | 0.9006     | 0.1048         |
| 25    | 0                  | 1.392      | -1.180         |
| 26    | 3                  | 6.561      | -1.390         |
| 27    | 12                 | 7.953      | 1.435          |
| 28    | 2                  | 1.094      | 0.8668         |
| 29    | 1                  | 0.7368     | 0.3066         |
| 30    | 0                  | 3.474      | -1.864         |
| 31    | 7                  | 4.211      | 1.359          |
| 32    | 1                  | 0.5789     | 0.5534         |
| 33    | 3                  | 0.5731     | <u>3.206</u>   |
| 34    | 1                  | 2.702      | -1.035         |
| 35    | 3                  | 3.275      | -0.1519        |
| 36    | 0                  | 0.4503     | -0.6710        |
| 37    | 2                  | 0.1637     | <u>4.538</u>   |
| 38    | 0                  | 0.7719     | -0.8786        |
| 39    | 0                  | 0.9357     | -0.9673        |
| 40    | 0                  | 0.1287     | -0.3587        |
| 41    | 0                  | 0.8187E-01 | -0.2861        |
| 42    | 0                  | 0.3860     | -0.6213        |
| 43    | 0                  | 0.4678     | -0.6840        |
| 44    | 1                  | 0.6433E-01 | <u>3.689</u>   |
| 45    | 0                  | 0.9825     | -0.9912        |
| 46    | 0                  | 4.632      | -2.152         |
| 47    | 12                 | 5.614      | <u>2.695</u>   |
| 48    | 0                  | 0.7719     | -0.8786        |

Forming.

\* GZIM package

i Row = fabric texture

j col = inclusion type

k layer = colour.

Model =  $i + j + k + j.k$

not significant

SCALED  
CYCLE DEVIANCE DF  
9 51.60 27 + incl.colour + tex.colour

Fitted.

| UNIT | OBSERVED | FITTED     | RESIDUAL     |
|------|----------|------------|--------------|
| 1    | 0        | 0.2424E-04 | -0.4923E-02  |
| 2    | 0        | 0.1757E-03 | -0.1326E-01  |
| 3    | 0        | 0.1060E-03 | -0.1030E-01  |
| 4    | 0        | 0.1818E-04 | -0.4263E-02  |
| 5    | 3        | 2.393      | 0.3927       |
| 6    | 16       | 17.35      | -0.3231      |
| 7    | 13       | 10.47      | 0.7828       |
| 8    | 0        | 1.794      | -1.340       |
| 9    | 5        | 4.262      | 0.3576       |
| 10   | 32       | 30.90      | 0.1984       |
| 11   | 19       | 18.64      | 0.8225E-01   |
| 12   | 1        | 3.196      | -1.228       |
| 13   | 0        | 1.346      | -1.160       |
| 14   | 10       | 9.757      | 0.7779E-01   |
| 15   | 3        | 5.888      | -1.190       |
| 16   | 5        | 1.009      | <u>3.972</u> |
| 17   | 0        | 0.4762E-01 | -0.2182      |
| 18   | 1        | 0.3333     | 1.155        |
| 19   | 1        | 1.429      | -0.3586      |
| 20   | 0        | 0.1905     | -0.4364      |
| 21   | 0        | 0.3333     | -0.5774      |
| 22   | 3        | 2.333      | 0.4364       |
| 23   | 10       | 10.00      | 0.3016E-05   |
| 24   | 1        | 1.333      | -0.2887      |
| 25   | 0        | 0.4048     | -0.6362      |
| 26   | 3        | 2.833      | 0.9901E-01   |
| 27   | 12       | 12.14      | -0.4100E-01  |
| 28   | 2        | 1.619      | 0.2994       |
| 29   | 1        | 0.2143     | 1.697        |
| 30   | 0        | 1.500      | -1.225       |
| 31   | 7        | 6.429      | 0.2254       |
| 32   | 1        | 0.8571     | 0.1543       |
| 33   | 3        | 1.591      | 1.117        |
| 34   | 1        | 0.3182     | 1.209        |
| 35   | 3        | 4.773      | -0.8114      |
| 36   | 0        | 0.3182     | -0.5641      |
| 37   | 2        | 0.4545     | 2.292        |
| 38   | 0        | 0.9091E-01 | -0.3015      |
| 39   | 0        | 1.364      | -1.168       |
| 40   | 0        | 0.9091E-01 | -0.3015      |
| 41   | 0        | 0.2273     | -0.4767      |
| 42   | 0        | 0.4545E-01 | -0.2132      |
| 43   | 0        | 0.6818     | -0.8257      |
| 44   | 1        | 0.4545E-01 | <u>4.477</u> |
| 45   | 0        | 2.727      | -1.651       |
| 46   | 0        | 0.5455     | -0.7385      |
| 47   | 12       | 8.182      | 1.335        |
| 48   | 0        | 0.5455     | -0.7385      |

Form ag.

\* GRIM package

i = fabric texture

j = inclusion type

k = colour

model = i + j + k + j.k + i.k

| CYCLE | SCALED<br>DEVIANCE | DF         |                                        |  |
|-------|--------------------|------------|----------------------------------------|--|
| 10    | 34.34              | 18         | + ind. column + tex. column + ind. tex |  |
| UNIT  | OBSERVED           | FITTED     | RESIDUAL                               |  |
| 1     | 0                  | 0.3766E-05 | -0.1941E-02                            |  |
| 2     | 0                  | 0.1574E-03 | -0.1255E-01                            |  |
| 3     | 0                  | 0.1059E-04 | -0.3254E-02                            |  |
| 4     | 0                  | 0.9232E-09 | -0.3038E-04                            |  |
| 5     | 3                  | 3.591      | -0.3118                                |  |
| 6     | 16                 | 16.93      | -0.2259                                |  |
| 7     | 13                 | 10.93      | 0.6266                                 |  |
| 8     | 0                  | 0.5512     | -0.7424                                |  |
| 9     | 5                  | 4.219      | 0.3802                                 |  |
| 10    | 32                 | 32.29      | -0.5043E-01                            |  |
| 11    | 19                 | 17.92      | 0.2543                                 |  |
| 12    | 1                  | 2.571      | -0.9797                                |  |
| 13    | 0                  | 0.1900     | -0.4359                                |  |
| 14    | 10                 | 8.784      | 0.4103                                 |  |
| 15    | 3                  | 6.148      | -1.270                                 |  |
| 16    | 5                  | 2.878      | 1.251                                  |  |
| 17    | 0                  | 0.3594E-01 | -0.1896                                |  |
| 18    | 1                  | 1.259      | -0.2305                                |  |
| 19    | 1                  | 0.7054     | 0.3507                                 |  |
| 20    | 0                  | 0.4852E-04 | -0.6966E-02                            |  |
| 21    | 0                  | 0.5177     | -0.7195                                |  |
| 22    | 3                  | 2.045      | 0.6674                                 |  |
| 23    | 10                 | 11.00      | -0.3013                                |  |
| 24    | 1                  | 0.4377     | 0.8500                                 |  |
| 25    | 0                  | 0.4205     | -0.6485                                |  |
| 26    | 3                  | 2.697      | 0.1846                                 |  |
| 27    | 12                 | 12.47      | -0.1334                                |  |
| 28    | 2                  | 1.411      | 0.4956                                 |  |
| 29    | 1                  | 0.2579E-01 | <u>6.066</u>                           |  |
| 30    | 0                  | 0.9990     | -0.9995                                |  |
| 31    | 7                  | 5.824      | 0.4872                                 |  |
| 32    | 1                  | 2.151      | -0.7848                                |  |
| 33    | 3                  | 2.964      | 0.2088E-01                             |  |
| 34    | 1                  | 0.7414     | 0.3003                                 |  |
| 35    | 3                  | 3.295      | -0.1623                                |  |
| 36    | 0                  | 0.5940E-04 | -0.7707E-02                            |  |
| 37    | 2                  | 0.8914     | 1.174                                  |  |
| 38    | 0                  | 0.2515E-01 | -0.1586                                |  |
| 39    | 0                  | 1.072      | -1.036                                 |  |
| 40    | 0                  | 0.1118E-01 | -0.1058                                |  |
| 41    | 0                  | 0.3604     | -0.6003                                |  |
| 42    | 0                  | 0.1651E-01 | -0.1285                                |  |
| 43    | 0                  | 0.6052     | -0.7779                                |  |
| 44    | 1                  | 0.1795E-01 | <u>7.330</u>                           |  |
| 45    | 0                  | 0.7842     | -0.8855                                |  |
| 46    | 0                  | 0.2170     | -0.4658                                |  |
| 47    | 12                 | 10.03      | 0.6227                                 |  |
| 48    | 0                  | 0.9709     | -0.9853                                |  |



SCALED  
 CYCLE DEVIANCE DF  
 10 0.9534E-03 0  
 ----- NO CONVERGENCE BY CYCLE 10

| UNIT | OBSERVED | FITTED     | RESIDUAL    |
|------|----------|------------|-------------|
| 1    | 0        | 0.2270E-04 | -0.4764E-02 |
| 2    | 0        | 0.2270E-04 | -0.4764E-02 |
| 3    | 0        | 0.2270E-04 | -0.4764E-02 |
| 4    | 0        | 0.2270E-04 | -0.4764E-02 |
| 5    | 3        | 3.000      | 0.1652E-05  |
| 6    | 16       | 16.00      | 0.3815E-05  |
| 7    | 13       | 13.00      | 0.3439E-05  |
| 8    | 0        | 0.2270E-04 | -0.4764E-02 |
| 9    | 5        | 5.000      | 0.2132E-05  |
| 10   | 32       | 32.00      | 0.5395E-05  |
| 11   | 19       | 19.00      | 0.4157E-05  |
| 12   | 1        | 1.000      | -0.6954E-06 |
| 13   | 0        | 0.2270E-04 | -0.4764E-02 |
| 14   | 10       | 10.00      | 0.3016E-05  |
| 15   | 3        | 3.000      | 0.3304E-05  |
| 16   | 5        | 5.000      | 0.4265E-05  |
| 17   | 0        | 0.2270E-04 | -0.4764E-02 |
| 18   | 1        | 1.000      | 0.7987E-06  |
| 19   | 1        | 1.000      | 0.1548E-05  |
| 20   | 0        | 0.2270E-04 | -0.4764E-02 |
| 21   | 0        | 0.2270E-04 | -0.4764E-02 |
| 22   | 3        | 3.000      | 0.0         |
| 23   | 10       | 10.00      | 0.3016E-05  |
| 24   | 1        | 1.000      | 0.8983E-06  |
| 25   | 0        | 0.2270E-04 | -0.4764E-02 |
| 26   | 3        | 3.000      | 0.1652E-05  |
| 27   | 12       | 12.00      | 0.3304E-05  |
| 28   | 2        | 2.000      | 0.1602E-05  |
| 29   | 1        | 1.000      | 0.8898E-06  |
| 30   | 0        | 0.2270E-04 | -0.4764E-02 |
| 31   | 7        | 7.000      | 0.0         |
| 32   | 1        | 1.000      | 0.2466E-06  |
| 33   | 3        | 3.000      | 0.3304E-05  |
| 34   | 1        | 1.000      | 0.9986E-06  |
| 35   | 3        | 3.000      | 0.1652E-05  |
| 36   | 0        | 0.2270E-04 | -0.4764E-02 |
| 37   | 2        | 2.000      | -0.9272E-06 |
| 38   | 0        | 0.2270E-04 | -0.4764E-02 |
| 39   | 0        | 0.2270E-04 | -0.4764E-02 |
| 40   | 0        | 0.2270E-04 | -0.4764E-02 |
| 41   | 0        | 0.2270E-04 | -0.4764E-02 |
| 42   | 0        | 0.2270E-04 | -0.4764E-02 |
| 43   | 0        | 0.2270E-04 | -0.4764E-02 |
| 44   | 1        | 1.000      | 0.3346E-06  |
| 45   | 0        | 0.2270E-04 | -0.4764E-02 |
| 46   | 0        | 0.2270E-04 | -0.4764E-02 |
| 47   | 12       | 12.00      | 0.0         |
| 48   | 0        | 0.2270E-04 | -0.4764E-02 |



Form ag.  
Simple Stats Package (JNB)

RESULTS  
CHISQUARE = 22.89517  
DF= 6  
1 OR MORE EXPECTED VALUES <5  
WAITING OPTIONS; 5 FOR MENU  
? 6  
\*EE\*IH

Adjusted Residuals

Var= 1  
0.4876824  
-0.5703439

1.13987  
-1.646839

Var= 2  
0.5439188  
0.4288837

0.1466741  
-1.849699

Var= 3  
-1.322393

0.1260439  
-1.590812

4.482829

RESULTS

CHISQUARE = 7.268581  
DF= 9

1 OR MORE EXPECTED VALUES <5

RESULTS

CHISQUARE = 39.06785  
DF= 6

1 OR MORE EXPECTED VALUES <5

WAITING OPTIONS; 5 FOR MENU  
? 6  
\*EE\*IH

Adjusted Residuals

Var= 1  
-0.4381731  
5.421354

-4.769004  
-0.5687701

Var= 2  
-1.580159

-3.361185  
3.685413

0.9401025  
Var= 3

2.664815  
-3.514602

2.154883  
-0.386541

RESULTS

CHISQUARE = 59.94926  
DF= 6

1 OR MORE EXPECTED VALUES <5

WAITING OPTIONS; 5 FOR MENU  
? 6  
\*EE\*IH

Adjusted Residuals

Var= 1  
-3.985324

Gry/ham

Incl. vs Tex.

see table = fig 29 & 9

~~i = texture~~ ~~Strata~~ = colour

~~Str~~

i = texture

j = inclusion type.

Or/Br

Incl. vs Tex.

see fig 29 (b)

colour vs Tex.

G/L Or/Br Other

1

2

3

4

colour vs Incl.

see fig 29 (c).

$q \geq 6$   $q=1$   $6 > q$

Gry/h

Or/Br

Other.

-0,1674951

5,975584

Var= 2

0,6910067

0,8739713

-2,122358

Var= 3

3,206883

-0,5087667

-3,98103

Var= 4

-2,411632

-0,2451288

3,800832

Sabratha Finds Project \*glim package Form(s) ag grey/laminar fabric vs  
or/br

Figures from his 29.

[illegible]

```

Lines printed      156
Pages printed      4

```



Form ag.

|                |   | q | Inclusions     |                |     | L |       |
|----------------|---|---|----------------|----------------|-----|---|-------|
|                |   | q | q>L            | q=L            | L>q | L |       |
| Fabric Texture | 1 | 3 | 5 <sub>3</sub> | 5 <sub>5</sub> | 1   |   | 1 1 1 |
|                | 2 | 2 | 1 <sub>4</sub> | 3 <sub>7</sub> | 10  |   | 1 2 1 |
|                | 3 | 4 | 2 <sub>4</sub> | 3 <sub>4</sub> | 22  |   | 1 3 1 |
|                | 4 | 0 | 1              | 4              | 6   | 1 | 1 4 1 |

no significance.

|       |
|-------|
| 1 1 1 |
| 1 2 1 |
| 1 3 1 |
| 1 4 1 |
| 2 1 1 |
| 2 2 1 |
| 2 3 1 |
| 2 4 1 |
| 3 1 1 |
| 3 2 1 |
| 3 3 1 |
| 3 4 1 |
| 4 1 1 |
| 4 2 1 |
| 4 3 1 |
| 4 4 1 |

\* glim 1.1.1  
units 112  
Data count  
Binout 7  
Factor incl. 4 tex 4  
form 7

calc incl = %GL(4,4)  
calc tex = %GL(4,1)  
calc form = %GL(7,28)  
good count  
error P

fit

|         | 1 |     |     |     | 2  |     |     |     | 3 |     |     |     | 4 |     |     |     | 5 |     |     |     | 6 |     |     |     | 7 |     |     |     |
|---------|---|-----|-----|-----|----|-----|-----|-----|---|-----|-----|-----|---|-----|-----|-----|---|-----|-----|-----|---|-----|-----|-----|---|-----|-----|-----|
|         | q | q>L | q=L | L>q | q  | q>L | q=L | L>q | q | q>L | q=L | L>q | q | q>L | q=L | L>q | q | q>L | q=L | L>q | q | q>L | q=L | L>q | q | q>L | q=L | L>q |
| Texture | 1 | 0   | 1   | 3   | 1  | 0   | 1   | 3   | 0 | 0   | 1   | 0   | 0 | 0   | 0   | 0   | 0 | 0   | 0   | 0   | 0 | 0   | 0   | 0   | 0 | 0   | 0   | 0   |
|         | 2 | 1   | 13  | 30  | 10 | 0   | 1   | 8   | 1 | 0   | 7   | 4   | 0 | 0   | 0   | 0   | 0 | 1   | 0   | 0   | 0 | 0   | 0   | 0   | 0 | 0   | 0   | 0   |
|         | 3 | 0   | 9   | 22  | 7  | 3   | 10  | 6   | 4 | 0   | 2   | 9   | 8 | 0   | 0   | 1   | 2 | 1   | 5   | 0   | 1 | 0   | 0   | 0   | 0 | 0   | 0   | 0   |
|         | 4 | 0   | 1   | 0   | 4  | 0   | 0   | 0   | 3 | 0   | 0   | 3   | 0 | 0   | 0   | 0   | 0 | 0   | 0   | 0   | 0 | 0   | 1   | 0   | 0 | 0   | 0   | 0   |

5

incl + Tex + form + Tex.form + ind.form

Form = 1-3

fit incl + Tex + form 75.78 DF 39

incl + Tex + form 204 DF 102

0 = significant residuals.

+ Tex.form 160.3 93

QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\*  
 QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\*  
 QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\*  
 QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\* QARA2 \*\*\*\*\*

|                 |       |           |      |       |                |       |
|-----------------|-------|-----------|------|-------|----------------|-------|
| START JOB 25531 | 15:52 | 12 MAY 87 | ARA2 | ***** | NUMAC (GROUND) | START |
| START JOB 25532 | 15:52 | 12 MAY 87 | ARA2 | ***** | NUMAC (GROUND) | START |
| START JOB 25533 | 15:52 | 12 MAY 87 | ARA2 | ***** | NUMAC (GROUND) | START |
| START JOB 25534 | 15:52 | 12 MAY 87 | ARA2 | ***** | NUMAC (GROUND) | START |
| START JOB 25535 | 15:52 | 12 MAY 87 | ARA2 | ***** | NUMAC (GROUND) | START |
| START JOB 25536 | 15:52 | 12 MAY 87 | ARA2 | ***** | NUMAC (GROUND) | START |

JOB STATISTICS : 0 CARDS, 3 PAGES, 0 CARDS PUNCHED, ENTERED FROM \*PRINT\* AT 15:48

Form=ag Focode2 against Dia

|    |    |           |          |       |          |       |       |       |
|----|----|-----------|----------|-------|----------|-------|-------|-------|
| 1  | 26 | 13        | 1, 20    | 1, 21 | 2, 22    | 1, 24 | 1, 25 | 1, 26 |
| 26 | 13 | 1, 20     | 1, 21    | 2, 22 | 1, 24    | 1, 25 | 1, 26 | 1, 27 |
| 41 | 40 | SUM = 103 | 6, 36    | 3, 38 | 11, 33   | 4, 40 | 10    |       |
| 2  | 28 | 21        | 1, 22    | 2, 24 | 1, 25    | 1, 26 | 2, 27 | 6     |
| 39 | 29 | 40        | 3, 30    | 1, 31 | 2, 32    | 1, 35 | 1, 38 | 3     |
|    |    |           | 4, 41    | 1, 36 | SUM = 39 |       |       |       |
| 3  | 30 | 15        | 1, 18    | 1, 26 | 4, 27    | 1, 28 | 3, 29 | 3     |
| 41 | 31 | 34        | 1, 33    | 1, 35 | 1, 37    | 3, 39 | 3, 40 | 4     |
|    |    |           | SUM = 34 |       |          |       |       |       |
| 4  | 29 | 1, 32     | 1, 36    | 1, 38 | 1, 40    | 2, 41 | 2, 42 | 2     |
|    |    | SUM = 2   |          |       |          |       |       |       |
| 5  | 14 | 1, 15     | 1, 25    | 3, 26 | 1, 28    | 1, 29 | 2, 30 | 9     |
|    |    | SUM = 1   |          |       |          |       |       |       |
| 6  | 35 | 1, 36     | 1, 38    | 1, 40 | 2, 41    | 2, 42 | 2, 43 | 2     |
|    |    | SUM = 1   |          |       |          |       |       |       |
| 7  | 30 | 1, 33     | 1, 36    | 1, 38 | 1, 40    | 2, 41 | 2, 42 | 2     |
|    |    | SUM = 6   |          |       |          |       |       |       |

Job No. QARA2 1, 33 NUMAC Computing Service at Newcastle - Michigan Terminal System 15:48:02 BST Tue May 1

User: ARA2 Project: NARD

Obtained at 15:48:02 Tue May 12/87

Released at 15:48:02 Tue May 12/87

Lines printed 105  
 Pages printed 3

|               |       |           |      |       |                |     |
|---------------|-------|-----------|------|-------|----------------|-----|
| END JOB 25531 | 15:52 | 12 MAY 87 | ARA2 | ***** | NUMAC (GROUND) | END |
| END JOB 25532 | 15:52 | 12 MAY 87 | ARA2 | ***** | NUMAC (GROUND) | END |
| END JOB 25533 | 15:52 | 12 MAY 87 | ARA2 | ***** | NUMAC (GROUND) | END |
| END JOB 25534 | 15:52 | 12 MAY 87 | ARA2 | ***** | NUMAC (GROUND) | END |
| END JOB 25535 | 15:52 | 12 MAY 87 | ARA2 | ***** | NUMAC (GROUND) | END |
| END JOB 25536 | 15:52 | 12 MAY 87 | ARA2 | ***** | NUMAC (GROUND) | END |



Fitted model =

| Incl. + Tex. + colour + incl. colour<br>+ Tex. colour<br>Texture | Grey/Laminar |     |     |     | Or/Br. |     |     |     | Other |     |     |     | Totals |       |       |     |
|------------------------------------------------------------------|--------------|-----|-----|-----|--------|-----|-----|-----|-------|-----|-----|-----|--------|-------|-------|-----|
|                                                                  | q            | q>l | q=l | L>q | q      | q>l | q=l | L>q | q     | q>l | q=l | L>q | G/L    | Or/Br | Other |     |
| 1                                                                |              | 3   | 5   |     |        |     |     |     | 3     | 2   |     |     | 8      | 1     | 5     | 14  |
| 2                                                                |              | 16  | 32  | 10  | 1      | 3   | 3   |     | 1     |     |     |     | 58     | 7     | 1     | 66  |
| 3                                                                |              | 13  | 19  | 3   | 1      | 10  | 12  | 7   | 3     |     |     | -12 | 35     | 30    | 15    | 80  |
| 4                                                                |              |     | 1   | -5  |        | 1   | 2   | 1   |       |     |     | -1  | 6      | 4     | 1     | 11  |
| 5                                                                |              |     |     |     |        |     |     |     |       |     |     |     |        |       |       |     |
| ①                                                                |              | 32  | 57  | 18  | 2      | 14  | 17  | 9   | 7     | 2   | 1   | 12  | 107    | 42    | 22    | 171 |

|   |   |   |
|---|---|---|
| 1 | 1 | 2 |
| 1 | 2 | 2 |
| 1 | 3 | 2 |
| 1 | 4 | 2 |
| 2 | 1 |   |
| 2 | 2 |   |
| 2 | 3 |   |
| 2 | 4 |   |
| 3 | 1 |   |
| 3 | 2 |   |
| 3 | 3 |   |
| 3 | 4 |   |
| 4 | 1 |   |
| 4 | 2 |   |
| 4 | 3 |   |
| 4 | 4 |   |

| Tex | G/L | Or/Br | Other |
|-----|-----|-------|-------|
| 1   | 8   | 1     | 5     |
| 2   | 58  | 7     | 1     |
| 3   | 35  | 30    | 15    |
| 4   | 6   | 4     | 1     |

$\chi^2 = 39.07$   $df = 6$   
 $H_0$  rejected.

○ = significant residual.

⑥

| colour | Incl. |     |     |     |
|--------|-------|-----|-----|-----|
|        | q     | q>l | q=l | L>q |
| G/L    | 0     | 32  | 57  | 18  |
| Or/Br  | 2     | 14  | 17  | 9   |
| Other  | 7     | 2   | 1   | 12  |

$\chi^2 = 59.95$   $df = 6$   
 $H_0$  rejected

○ = significant residual

③

74 863  
81 865

168.82  
173.66

14  
22  
3

Fig 29 shows contrasting fabric data for this form.

Row variable = fabric texture

Column variable = inclusion type and proportion

Major variable = colour

Inclusion type and proportion:  $q(\text{units})$

$$q > L(\text{line})$$

$$q = L$$

$$L > q$$

Column: essentially a fabric column which gives an indication

of a reducing kiln atmosphere at some period during

firing - ie grey fabric, grey core, grey margins - ie

a notable area of break in vessel wall section.

② or 1b - essentially a single existing column in the

break suggesting a continuous existing

atmosphere in the kiln.

③ other - essentially existing but at any rate a

substantially different line from ② suggesting

a different clay composition.

Fitting of log-linear models suggests that a model which includes the main effects of the three variables together with the effects of an interaction between both inclusion and texture, and colour provides a reasonable approximation to the data. The model is one of conditional independence - ie inclusion type and texture are conditionally independent in each level of colour but both are associated with colour.

To a certain extent this can be brought out by the testing of 2 dimensional tables - colour vs inclusions  
colour vs texture

both of these yield significant results.

This suggests the following summary of the fabric characteristics:

- ① Crystalline colour: inclusions: no  $q$ ,  $q > l \rightarrow l > q$  but mostly  $q > l$  or  $q = l$ ,  
texture: 1-4 but mostly 2 or 3

Crystalline

$q > l$  /  $q = l$  but mostly  $q = l$   
2s / 3s but mostly 2s.

- ② Cr./Br. colour: inclusions  $q - l > q$  but mostly  $q > l$ ,  $q = l$   
texture 1-4 but mostly 3s.

Cr./Br.

$q > l$   $q = l$   
3s.

- ③ Other: not really a fabric - just everything else.  
More  $q$ , more  $l > q$ .

Basic differences between ① and ②:

Colour

- ① has narrower range than ②.  
① essentially finer grained inclusions than ②.

Conclusion: There <sup>are</sup> ~~the~~ probably real differences between ① ② ③. Those between ① and ② are more marked (or more obvious) than between

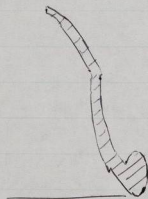


① and ②. Differences between ① and ② are essentially techno-cultural - much the same inclusion smelt is being used though the texture is slightly different, the colour differences are presumably due to different firing techniques -  $\therefore$  essentially techno-cultural. Differences between ①+② and ③ are geological - inclusion smelt is both different texture and type - and also probably techno-cultural - ie colour indicating different firing conditions.

# Form ag - Cemented Basins.

Sub-forms.

ag 1



Flange edge wastant.

Gripping flange edge does not project much beyond wall.  
Gripping flange is continuation of interrupted upper wall.

ag 1 a 845 - 862, 864, 866, 867 - 871, 873 - 912

914 - 935, 936, 961, 977

ag 1 b 863, 865

Flange edge not so undulant as ag 1.  
more beyond line of vessel wall.  
Gripping flange more nearly horizontal, projects

ag 2 1528 ag 2 a: 908, 943, 947-948, 950, 954

ag 5 - 967, 969, 970, 972

ag 2 b: 936, 937, 941, 944, 946, 949, 951 - 953, 955, 957 - 959, 963, 964, 968, 971, 973 - 975, ag 2 b 2: 936, 939

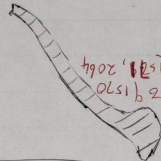
Gripping flange projects horizontally

Flange edge not so markedly undulant as ag 1.

More probably a shallow dish-like vessel

Gripping flange edge slightly undulant.  
lid located by means of "notch" - projecting

lead.



ag 4.

1529 1570 978-979, 1571, 1573, 2064



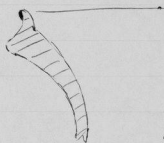
ag 5

976, 981, 1013, 1018 - 1022

Gripping flange projects horizontally.  
Flange edge not markedly undulant.  
lid rests on horizontal upper face of flange,  
located by projecting lead at flange edge.

ag 6.

960

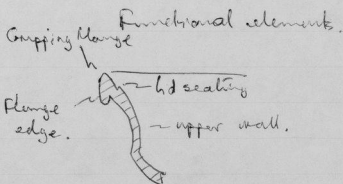


Gripping flange simply a continuation of upper wall. Flange edge - slight projection, no undercutting. Bird nests at top of inner surface of flange, located by projecting bead.

ag 7 - Taller narrower "siphonate" vessels with decorated rims.

982-984, 1023-1025

In ag 1 - 6 a and b mark divisions into fabric 1 and fabric 2.



Additions to 1st series

13-10-87.

Form ag.

Additions in red.

NB. distinction in fabric a:b removed.

ag 1 - ~~ag 6~~ Remain as before.

ag 7  $\rightarrow$  ag 7a

ag 7b = smaller finer version of ag 7a.

ag 8 - new form - as ag 1 but without lid seating cut in inner face.

ag 9 - Probably a much deeper vessel than ag 1-6. Upper wall is almost vertical. Rim projects and lip has deep overhang. Upper surface of rim makes an almost continuous curve with the inner face of the upper wall. There is no lid seating.



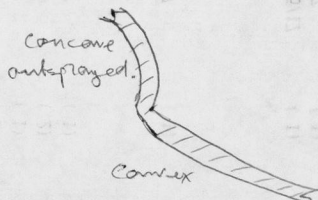


# Earlier rough form guide.

## Compound bowls

### Basic shape

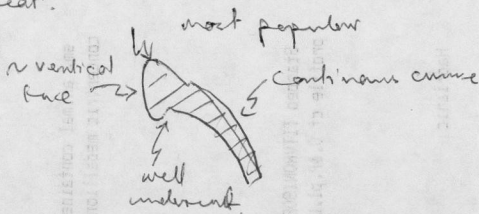
| SL  | SG  | SS  |
|-----|-----|-----|
| 8-7 | 7-2 | 2-1 |



### Functional elements



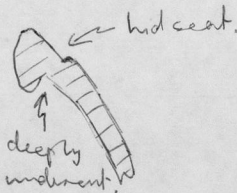
"roll-over" can be used with a m hip



### Form variations

~~Rim~~ Rim is basically continuation of outplayed upper vessel wall with attached gripping edge.

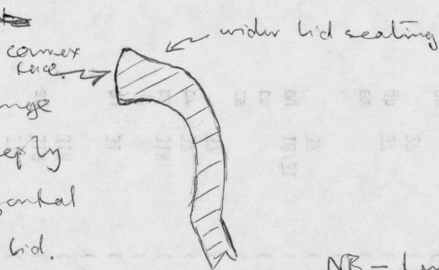
hid seat is small notch cut in inner face. Outer face of gripping flange is a vertical and slightly convex. Gripping flange is deeply undercut — it has to be to provide a good grip as the flange doesn't project v. far from vessel wall.



|        |       |      |                                                                                                                                                     |
|--------|-------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------|
|        | 27    | ( 1) |                                                                                                                                                     |
| bi     |       | ( 1) |                                                                                                                                                     |
| bp     | 37    | ( 1) |                                                                                                                                                     |
| ct     |       | ( 2) |                                                                                                                                                     |
| cv     | 37    | ( 1) | ovolo:d.b.&c.p.,tongue w.trifid<br>tip;pt.of panel showing male<br>figure blowing pipes; late =<br>A.D.90-110                                       |
| dr     | 37    | ( 1) | 235 frag.of frieze:und.scroll contain<br>sm.acanthus term.bead<br>row(RogersK25-Drusus,S.&S.fig.4no.9<br>-X3).arrange.dec.suggests Traj/Had<br>date |
|        | 15/17 | ( 1) |                                                                                                                                                     |
| eo     | 37    | ( 1) |                                                                                                                                                     |
|        | 37    | ( 1) | sm. animal contained in double<br>concentric medallions                                                                                             |
|        | 31    | ( 1) |                                                                                                                                                     |
|        | 31    | ( 1) |                                                                                                                                                     |
|        | 31    | ( 1) |                                                                                                                                                     |
|        |       | ( 1) |                                                                                                                                                     |
| er     | 37    | ( 1) |                                                                                                                                                     |
| et     | 37    | ( 1) |                                                                                                                                                     |
|        | 37    | ( 1) |                                                                                                                                                     |
| Lud.Bb |       | ( 1) | 217 Stamped TITVRONISOF ?? for<br>profile cf O.&P.pl.LV no.23                                                                                       |
|        | 33    | ( 1) |                                                                                                                                                     |
|        | 31    | ( 1) |                                                                                                                                                     |
|        | 31R   | ( 1) |                                                                                                                                                     |
|        |       | ( 2) |                                                                                                                                                     |
| ex     | 37    | ( 1) | Hadrianic                                                                                                                                           |
|        | 31R   | ( 1) |                                                                                                                                                     |
|        | 31R   | ( 1) |                                                                                                                                                     |

Rim sweep over ~~to~~  
near horizontal.

More of gripping flange  
projecting, so less deeply  
undercut. More horizontal  
seating surface for lid.  
Gripping flange face corner.



NB - tangent  
on inner  
face.

As above. General  
inclination of rim still  
diagonal, little undercutting  
of rim. Gripping flange face tooled concave.



Features:

Inner face tangent - inclined  
more or less  
Gripping flange - ~~with~~ undercut - mostly less.  
projecting



Inner face is approaching horizontal more - presenting  
more area ~~for~~ as seating surface for lids.

Rim edge is beveled to act as "lid stop"

|             |           |      |                       |
|-------------|-----------|------|-----------------------|
|             |           | ( 2) |                       |
|             | mv        | ( 1) |                       |
| 0Year: 1967 |           |      |                       |
|             | ah 18/31R | ( 1) |                       |
|             | ah        | ( 1) |                       |
|             | ai 31R    | ( 1) |                       |
|             | 31R       | ( 1) |                       |
|             |           | ( 2) |                       |
|             | ak 31     | ( 1) |                       |
|             |           | ( 2) |                       |
|             | 37        | ( 1) | 226 stamped AVGIILLAM |
|             | aq 31R    | ( 1) |                       |
|             | 31R       | ( 1) |                       |
|             |           | ( 1) |                       |
|             | bj 31     | ( 1) |                       |
|             |           | ( 1) |                       |
|             | bl 31R    | ( 1) |                       |
|             | br 37     | ( 1) |                       |
|             | 37        | ( 1) |                       |
|             | ce        | ( 2) |                       |
|             | cm        | ( 2) |                       |
|             | dy 18/31  | ( 2) |                       |
|             | 37        | ( 1) |                       |
|             |           | ( 3) |                       |
|             | ew        | ( 1) |                       |
|             | gh 37     | ( 1) | 770-90                |
|             | 27        | ( 1) |                       |
|             | gv        | ( 1) |                       |
|             | gw        | ( 3) |                       |
|             | hv 37     | ( 1) | 120-150               |
|             | jt 18     | ( 1) |                       |
|             | 18        | ( 1) |                       |
|             | 37        | ( 1) |                       |



lid chop. lid seat - wide groove.  
 inner base to horizontal  
 & horizontal.

gripping

flange projecting  
 more or less indented.

lid chop.

IFT ~ horizontal

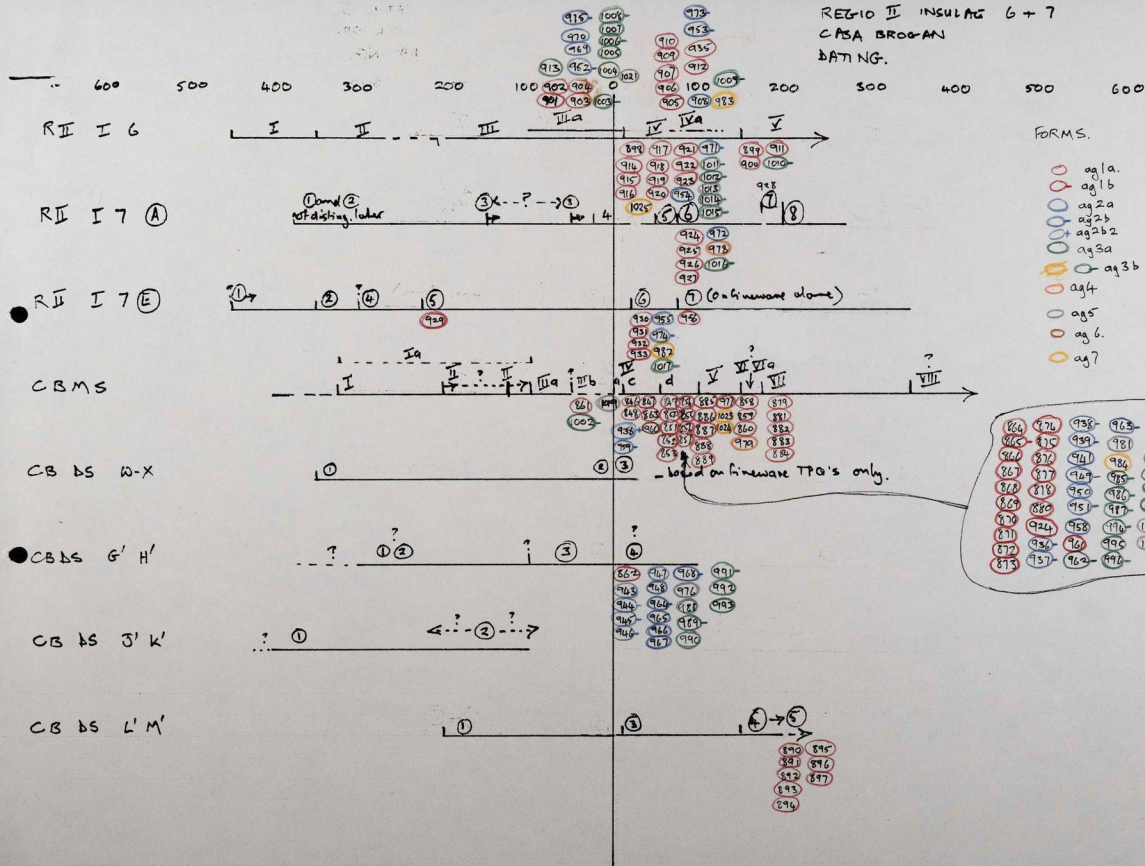
projecting  
 not indented.

Recessed eye.

|    |         |      |
|----|---------|------|
|    | 33      | ( 1) |
|    | ?18/31R | ( 1) |
|    |         | ( 4) |
|    | 37      | ( 1) |
| as | 31      | ( 1) |
| ca | 18/31   | ( 1) |
| cf |         | ( 1) |
| cl | 18/31R  | ( 1) |
|    |         | ( 1) |
| cn | ?31     | ( 1) |
| cp | 18/31R  | ( 1) |
|    | 18/31R  | ( 1) |
|    | 18/31R  | ( 1) |
| cu |         | ( 1) |
| ee |         | ( 2) |
| ej | 37      | ( 1) |
|    | 31R     | ( 1) |
|    | 27      | ( 1) |
|    |         | ( 2) |
| fn | 18      | ( 1) |
|    |         | ( 1) |
| fy | 31      | ( 1) |
| gv |         | ( 1) |
| gw | 37      | ( 1) |
| hl | 37      | ( 1) |
| if | 29      | ( 1) |
| iw | 29      | ( 2) |

A.D. 90-110

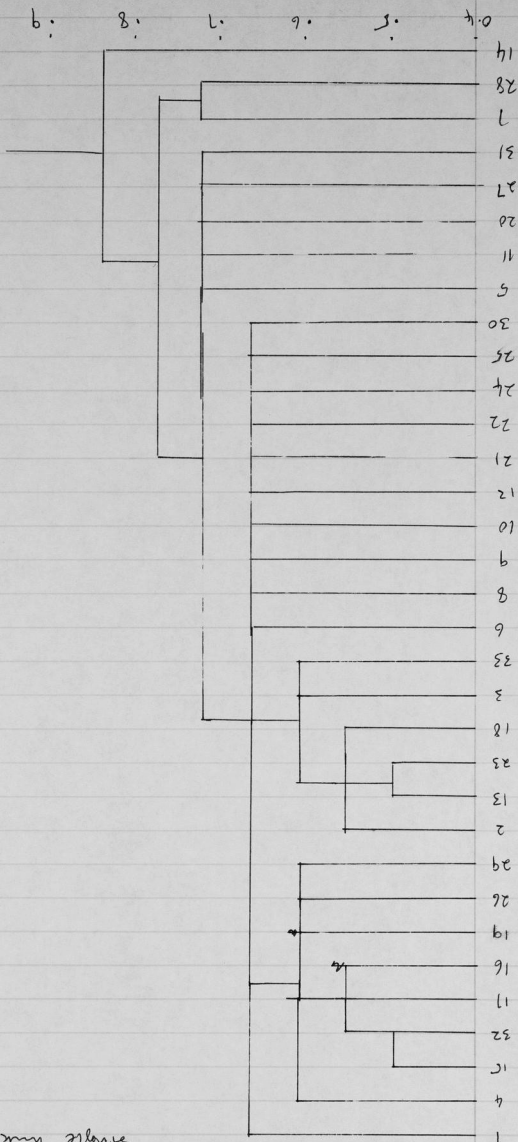
ovolo:sm.d.b.&c.p.,tongue  
w.trifid tip  
212 showing gadroons and chevrons  
u.f.:undulating scroll & tendrils  
w. arrow shaped leaf & poppy  
hd.terminals,small birds in  
field;med.zone:cordon bet.bead  
rows;l.f.:zone of gadroons above



Form 93.

Graville link Russell-Race

$$1 - \frac{A}{A+B+C+D}$$



0.4 5. 6. 7. 8. 9.



Report of the Director of the Bureau of Plant Industry, United States Department of Agriculture, for the year 1907.

| Year                                     | Number of plants introduced |       |       |       |       |       |       |       |       |       |
|------------------------------------------|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                                          | 1900                        | 1901  | 1902  | 1903  | 1904  | 1905  | 1906  | 1907  | 1908  | 1909  |
| Plants introduced from foreign countries | 1,234                       | 1,567 | 1,890 | 2,123 | 2,456 | 2,789 | 3,123 | 3,456 | 3,789 | 4,123 |
| Plants introduced from the United States | 567                         | 678   | 789   | 890   | 901   | 1,012 | 1,123 | 1,234 | 1,345 | 1,456 |
| Total                                    | 1,801                       | 2,245 | 2,679 | 3,013 | 3,357 | 3,801 | 4,246 | 4,690 | 5,134 | 5,579 |

| Year                                     | Number of plants introduced |       |       |       |       |       |       |       |       |       |
|------------------------------------------|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                                          | 1900                        | 1901  | 1902  | 1903  | 1904  | 1905  | 1906  | 1907  | 1908  | 1909  |
| Plants introduced from foreign countries | 1,234                       | 1,567 | 1,890 | 2,123 | 2,456 | 2,789 | 3,123 | 3,456 | 3,789 | 4,123 |
| Plants introduced from the United States | 567                         | 678   | 789   | 890   | 901   | 1,012 | 1,123 | 1,234 | 1,345 | 1,456 |
| Total                                    | 1,801                       | 2,245 | 2,679 | 3,013 | 3,357 | 3,801 | 4,246 | 4,690 | 5,134 | 5,579 |

| Year                                     | Number of plants introduced |       |       |       |       |       |       |       |       |       |
|------------------------------------------|-----------------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                                          | 1900                        | 1901  | 1902  | 1903  | 1904  | 1905  | 1906  | 1907  | 1908  | 1909  |
| Plants introduced from foreign countries | 1,234                       | 1,567 | 1,890 | 2,123 | 2,456 | 2,789 | 3,123 | 3,456 | 3,789 | 4,123 |
| Plants introduced from the United States | 567                         | 678   | 789   | 890   | 901   | 1,012 | 1,123 | 1,234 | 1,345 | 1,456 |
| Total                                    | 1,801                       | 2,245 | 2,679 | 3,013 | 3,357 | 3,801 | 4,246 | 4,690 | 5,134 | 5,579 |



FIGURE 1.—Plants introduced from foreign countries and the United States, 1900-1909.



FIGURE 2.—Plants introduced from foreign countries and the United States, 1900-1909.



FIGURE 3.—Plants introduced from foreign countries and the United States, 1900-1909.



FIGURE 4.—Plants introduced from foreign countries and the United States, 1900-1909.



FIGURE 5.—Plants introduced from foreign countries and the United States, 1900-1909.



FIGURE 6.—Plants introduced from foreign countries and the United States, 1900-1909.



DATE: \_\_\_\_\_

NAME: \_\_\_\_\_

CLASS: \_\_\_\_\_

TEACHER: \_\_\_\_\_

SCHOOL: \_\_\_\_\_

STREET: \_\_\_\_\_

CITY: \_\_\_\_\_

STATE: \_\_\_\_\_

COUNTRY: \_\_\_\_\_

ZIP: \_\_\_\_\_

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COUNTRY: \_\_\_\_\_

ZIP: \_\_\_\_\_

PHONE: \_\_\_\_\_

FAX: \_\_\_\_\_

E-MAIL: \_\_\_\_\_

WEBSITE: \_\_\_\_\_

| $\frac{V_1}{\Sigma}$ | X    |
|----------------------|------|
| 6                    | -5.4 |
| 9                    | -2.4 |
| 18                   | 6.6  |
| 12                   | 0.6  |
| 14                   | 2.6  |
| 11                   | 0.4  |
| 5                    | -6.4 |
| 8                    | -3.4 |
| <u>20</u>            | 8.6  |
| 103                  |      |

| $\frac{V_2}{\Sigma}$ | Y    |
|----------------------|------|
| 10                   | -0.8 |
| 16                   | 5.2  |
| 21                   | 10.2 |
| 8                    | -2.8 |
| 4                    | -6.8 |
| 13                   | 2.2  |
| 4                    | -6.8 |
| 7                    | -3.8 |
| <u>14</u>            | 3.2  |
| 97                   |      |

$$\mu V_1 = 11.4$$

$$\mu V_2 = 10.8$$

$$\text{Variance } V_1 = 23.6$$

$$SD V_1 = 4.9$$

$$\text{Variance } V_2 = 29.1$$

$$SD = 5.4$$

$$\Sigma X^2 = 212.24$$

$$\Sigma Y^2 = 261.56$$

$$\Sigma XY = 124.64$$

$$r = .53$$

$$\text{Regression } y = a + bx$$

$$\beta = r \sqrt{\frac{\Sigma Y^2}{\Sigma X^2}} = .59$$

$$\alpha = \bar{y} - b \bar{x} = 4.1$$

$$y = 4.1 + .59x$$

|   |   |   |   |   |   |   |    |    |
|---|---|---|---|---|---|---|----|----|
| 1 | 4 | 1 | 2 | 3 | 1 | 4 | 14 | 32 |
| 2 | 5 | 4 | 5 | 6 | 2 | 5 | 32 | 77 |
| 3 | 6 |   |   |   | 3 | 6 |    |    |

$$\begin{array}{r} 16 \\ 25 \\ \hline 36 \\ 77 \end{array}$$

$$0 = 9.0 - 261 \quad 771$$

$$0 = 8.0 \quad 771 \quad 801$$

$$0 \quad 8.0 \quad 801 - \quad 771$$

$$0 = 9.0 \quad 771 \quad 261 -$$

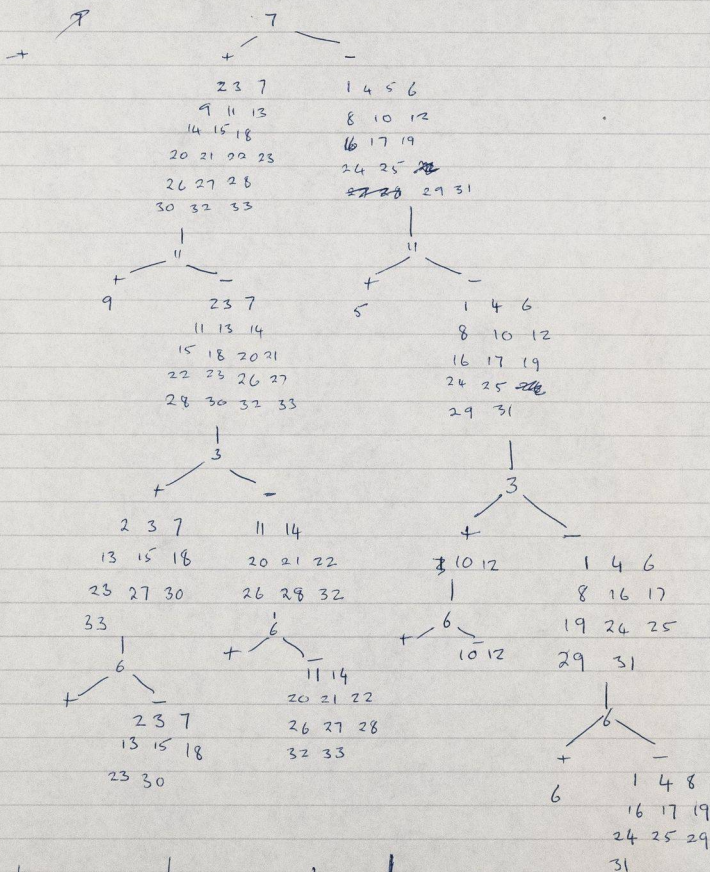


LM4. Plain rim dish fabrics.

- ✓ Rim top - pointed or not.
- ✓ Rim internal - present or not - defined as present when tangent to inner face of vessel having approached the vertical from one direction, <sup>then</sup> crosses it and begins to slope the other way.
- ✓ Wall thickness - constant or not - maximum girth bulge.
- ✓ Slip Bimish - present or not - on either face.
- ✓ Slip Reserved from bimish just below rim inside - presence or not.
- ✓ Fabric colour - easily distinguishable lamination - thin oxidized surfaces with grey core. - Presence or absence.
- ✓ White slip - presence or absence.
- ✓ Internal rim bulge.
- ✓ Outer wall immediately below rim - tooled, ribbed or flumed.

Variables 7 11 3 6 0

Longhand Divisive procedure.



|   |          |          |   |       |   |          |
|---|----------|----------|---|-------|---|----------|
| 9 | 2 3 7    | 11 14 20 | 5 | 10 12 | 6 | 1 4 8    |
|   | 13 15 18 | 21 22 26 |   |       |   | 16 17 19 |
|   | 23 30    | 27 28 32 |   |       |   | 24 25 29 |
|   |          | 33       |   |       |   | 31       |

## Classification. A.D. Gordon.

Cluster desiderata - internal cohesion,  
external isolation.

"The human mind is very flexible, and quite capable of thinking up sensible explanations for any groupings which do emerge, even if these groupings have no real significance."

"It should thus be clear that any classification produced should be related to the features in which the investigator is interested and that it is quite possible and even desirable for there to be several different classifications of the same set of objects."

## Aims

Simplification (of data)

Prediction.

Stability - no effect from small errors in recording vars.  
additions to objects  
additions to variables

Objectivity

1 post trench running north-south, fill described as "sandy soil with pebbles".

Annotated Section : 1 post trench running north-south, no fill description, but relationships with contexts above and below demonstrated.

In this case we could state the descriptive identifier of this context record as "North-south post-trench in trench 4, filled with yellow sand with pebbles, below <context(s)>, above <context(s)>". This description has been formed from the union of all the data presented above but it has only been possible to do so by interpreting the data for this context with reference to other contexts in the same trench (the only post trench shown on the plan with a description which includes "sand" is a north-south one so it is likely that the site book entry refers to this trench)

and by making use of the semantic dimension of the language symbols





| site | Big | Ears | hans | ETrs | LTrs. |
|------|-----|------|------|------|-------|
| 1    | +   | +    | +    | +    | -     |
| 2    | +   | +    | +    | -    | -     |
| 3    | -   | +    | +    | +    | -     |
| 4    | -   | -    | -    | +    | +     |

|   | 1            | 2 | 3 | 4 |
|---|--------------|---|---|---|
| 1 |              |   |   |   |
| 2 | <del>3</del> |   |   |   |
| 3 | <del>1</del> |   |   |   |
| 4 | <del>2</del> |   |   |   |

|   | 1          | 2          | 3          | 4 |
|---|------------|------------|------------|---|
| 1 |            |            |            |   |
| 2 | 3 0<br>1 1 |            |            |   |
| 3 | 3 0<br>1 1 | 2 1<br>1 1 |            |   |
| 4 | 1 1<br>3 0 | 0 2<br>3 0 | 1 1<br>2 1 |   |

the location and composition of one context as well as its relation to other contexts and the finds groups recovered from it. Each context is has a token identifier consisting of an integer number.

- 5) Photographs. A collection consisting of 35 mm monochrome negatives (accompanied by contact positive prints and selected enlargements) and 35 mm colour transparencies exists. These are mapped to the context records.

### Method

The main problem in constructing a published report from the documentary record concerns the lack of token identifiers for the context records. This has enforced a reliance on the recorded descriptions of the context records (the descriptive identifiers) which involves all the ambiguities inherent in a natural language such as English. Let us examine the hypothetical example of a context record whose descriptive identifier is distributed between drawings in plan and section and site- and finds-book entries. The different items of information are as follows:

- |                |                                                                                                                                     |
|----------------|-------------------------------------------------------------------------------------------------------------------------------------|
| Finds book     | : "North-south post-trench in trench 4"                                                                                             |
| Site book      | : "Post-trench filled with yellow sand in trench 4"                                                                                 |
| Annotated Plan | : 2 post trenches running east-west, fill of northerly described as "clay and stones", fill of southerly described as "dirty fill"; |



• Classification types:

Partitioning  
Hierarchical  
Clustering

} cluster methods

Geometrical.

Set of  $n$  objects

described by set of  $p$  variables.

### Types of Variable

Numeric variables  $\begin{cases} \text{ratio} \\ \text{interval} \end{cases}$

Nominal (disordered multistate attributes)

Ordinal

Binary

Conditionally-present (serially dependent)

Standardization:

divide each value by its S.D. or range.

is associated with each context record.

- 5) Photographs. A collection of 35 mm colour transparencies exists.

The extant documentary record for the excavations conducted in 1980 consists of the following:

- 1) Portable finds. Each find is a member of a finds group.
- 2) Plans and sections. These are drawn on drafting film, in metric measurements, at scales of 1:20 and 1:10.
- 3) Findsbooks. These record the contents of each finds group, the date on which it was processed on site and the archaeological context from which it came. Each finds group has a token identifier formed from a combination of a two letter code of the form XX where X is any letter A-Z, and the last two digits of the year of excavation, ie AB80. The finds groups are mapped to the context records.
- 4) Site books. These comprise a set of context records. Pro-forma sheets were used to try and ensure a consistent standard of recording. Each record contains information on





|   | 1                  | 2                | 3                  | 4 |
|---|--------------------|------------------|--------------------|---|
| 1 | 11                 |                  |                    |   |
| 2 | .8 · 2<br>.75 · 25 |                  |                    |   |
| 3 | .8 · 2<br>.75 · 25 | .6 · 4<br>.5 · 5 |                    |   |
| 4 | .2 · 8<br>.2 · 8   | 0 1<br>0 1       | .4 · 6<br>.25 · 75 |   |

|      | 1  | 2       | 3   | 4   | 5  |     |
|------|----|---------|-----|-----|----|-----|
| 1    | 6  | 4       | 15  | 25  | 8  |     |
| 2    | 5  | 5       | 22  | 14  | 3  | Σ   |
|      | 1  | 1       | 49  | 121 | 25 |     |
|      | 30 | 20      | 330 | 350 | 24 | 754 |
|      |    | 14 · 04 |     |     |    |     |
|      | 36 | 16      | 225 | 625 | 64 | 966 |
| .89. | 25 | 25      | 484 | 196 | 9  | 739 |

Discussion of components and relationships.

the location and composition of the context as well as its relation to other contexts and the finds groups recovered from it. Each context is has a token identifier consisting of an integer number.

- 5) Photographs. A collection consisting of 35 mm monochrome negatives (accompanied by contact positive prints and selected enlargements) and 35 mm colour transparencies exists. These are mapped to the context records.

PROCEDURE including parameters and limitations

Description and explanation of report format

Discussion of components and relationships.

is associated with each context record.

- 5) Photographs. A collection of 35 mm colour transparencies exists.

The extant documentary record for the excavations conducted in 1980 consists of the following:

- 1) Portable finds. Each find is a member of a finds group.
- 2) Plans and sections. These are drawn on drafting film, in metric measurements, at scales of 1:20 and 1:10.
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- 4) Site books. These comprise a set of context records. Proforma sheets were used to try and ensure a consistent standard of recording. Each record contains information on



the 1990s, the number of people with a diagnosis of schizophrenia has increased in the United Kingdom (Meltzer 1996). The prevalence of schizophrenia in the United Kingdom is estimated to be 1.2% (Meltzer 1996). The prevalence of schizophrenia in the United States is estimated to be 1.1% (Meltzer 1996).

There is a growing awareness of the need to improve the lives of people with schizophrenia. The World Health Organization (WHO) has developed a set of guidelines for the management of schizophrenia (WHO 1993). The guidelines recommend that people with schizophrenia should be treated with a combination of medication and psychosocial interventions. The guidelines also recommend that people with schizophrenia should be treated in a community setting, rather than in a hospital. The guidelines also recommend that people with schizophrenia should be treated by a multidisciplinary team, including psychiatrists, psychologists, nurses, and social workers.

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|    |          |           |   |        |   |        |
|----|----------|-----------|---|--------|---|--------|
| 1  | Fracture | Fl Sm.    | ✓ | Common | ✓ | Indur. |
| 2  |          | F1        |   | Common |   |        |
| 3  |          | F1        |   | Common |   |        |
| 4  |          | Fl Sm.    |   | Mod    |   | Common |
| 5  |          | Hardly    |   | Mod    |   | Common |
| 6  |          | Hardly    |   | Mod    |   | Common |
| 7  |          | F1        |   | Common |   | ✓      |
| 8  |          | Smooth    |   | Mod    |   | Mod    |
| 9  |          | F1        |   | Mod    |   | Mod    |
| 10 |          | Smooth    |   | Mod    |   | Mod    |
| 11 |          | Hardly F1 |   | Mod    |   | Mod    |
| 12 |          | Smooth    |   | Mod    |   | Mod    |
| 13 |          | F1        |   | Common |   | ✓      |
| 14 |          | F1        |   | Mod.   |   |        |
| 15 |          | F1        |   | Mod    |   | Mod    |
| 16 |          | Smooth.   |   | Mod    |   | Mod    |
| 17 |          | Smooth    |   | Mod.   |   |        |
| 18 |          | Fl F1     |   | Mod    |   | Mod    |
| 19 |          | Smooth    |   | Mod.   |   |        |
| 20 |          | F1        |   | Mod    |   | Mod    |
| 21 |          | Fl        |   | Mod    |   | Mod    |
| 22 |          | F1        |   | Com.   |   | ✓      |
| 23 |          | F1        |   | Mod    |   | Mod    |
| 24 |          | Sm.       |   | Mod.   |   |        |
| 25 |          | Fl Sm.    |   | Com.   |   | ✓      |
| 26 |          | F1        |   | Mod    |   | Mod    |
| 27 |          | F1        |   | Com.   |   | ✓      |
| 28 |          | F1        |   | Mod    |   | Mod    |
| 29 |          | Sm.       |   | Mod.   |   |        |
| 30 |          | F1        |   | Mod    |   | Mod    |
| 31 |          | Sm.       |   | Mod.   |   |        |
| 32 |          | Fl F1     |   | Mod.   |   | Mod.   |
| 33 |          | F1        |   | Mod    |   | Mod    |

[illegible]

$$\text{Arithmetic mean} = \frac{\sum x}{n} = \bar{x}$$

$$\text{Standard deviation} = \sqrt{\frac{\sum (x - \bar{x})^2}{n}}$$

$$\text{Variance} = \frac{\sum (x - \bar{x})^2}{n}$$

$$\text{Correlation} = \frac{\sum xy}{\sqrt{\sum x^2 \sum y^2}}$$

$$(W - Z_1 I)f_i = 0$$

$$\left( \begin{bmatrix} 212.24 & 124.64 \\ 124.64 & 261.58 \end{bmatrix} - \begin{bmatrix} 364 & 0 \\ 0 & 364 \end{bmatrix} \right) f_i = \begin{bmatrix} 0 \\ 0 \end{bmatrix}$$

$$\begin{array}{cc} -151.76 & 124.64 \\ 124.64 & -102.44 \end{array} \quad \begin{array}{c} x \\ y \end{array} = \begin{array}{c} 0 \\ 0 \end{array}$$

$$-151.76x + 124.64y = 0$$

$$124.64x - 102.44y = 0$$

$$-18,915.4x + 15,535.1y = 0$$

$$18,915.4x - 15,546.3y = 0$$

$$-336x + 252y = 0.$$

$$-11.2y = 0$$

$$y = 1.3x.$$

$$x = 0.75y.$$

$$-192x + 144y = 0$$

$$144y = 192x$$

$$y = \frac{192x}{144}$$

$$144x - 108y = 0$$

$$144x = 108y$$

$$x = \frac{108y}{144}$$

$$\frac{192x}{y} = 144$$

$$x = \frac{144}{192} \times 108 \times \frac{192x}{144} \times \frac{1}{144}$$

$$\frac{108y}{x} = 144$$

$$x = \frac{20,736x}{20736}$$

$$x = x.$$

$$\frac{1}{x} \times y = 1.3$$

$$y = 1.3x$$

$$\frac{y}{x} = 1.3$$

$$x = 3$$

$$x = 0.75y.$$

$$y = 4.$$

$$\frac{1}{y} \times x = 0.75$$

$$\frac{x}{y} = 0.75$$



|     |     |      |                  |       |       |       |       |
|-----|-----|------|------------------|-------|-------|-------|-------|
| f = | 0.3 | 0.4  | 9.46             | -1.94 | 8.88  | -1.92 | 3.73  |
|     | 0.4 | -0.3 | <del>12.76</del> | 1.36  | 8.28  | -2.52 | -3.43 |
|     |     |      | 17.46            | 6.06  | 10.38 | -0.42 | -2.55 |
|     |     |      | 10.46            | -0.94 | 11.88 | 1.08  | -1.02 |
|     |     |      | 9.46             | -1.94 | 13.88 | 3.08  | -5.96 |
|     |     |      | 12.4             | 1     | 10.75 | -0.05 | -0.05 |
|     |     |      | 6.76             | -4.64 | 10.28 | -0.52 | 2.41  |
|     |     |      | 8.88             | -2.52 | 10.88 | -0.22 | 0.66  |
|     |     |      | 15.26            | 3.86  | 13.28 | 2.48  | 9.57  |

90.86.

27.34

$$\begin{array}{rcl} 212.24 & 124.64 & - 109.9 \quad 0 \\ 124.64 & 261.66 & 0 \quad 109.9 \end{array}$$

$$\begin{array}{rcl} 102.34 & 124.64 & x = 0 \\ 124.64 & 151.66 & y = 0 \end{array}$$

$$\begin{array}{lcl} 102.34x + 124.64y = 0 & 102.34x = -124.64y \\ 124.64x + 151.66y = 0 & x = \frac{-124.64}{102.34} y \end{array}$$

$$x = -1.2y$$

$$y = -0.82x$$

Cases

 $V_1$  $V_2$ 

$$\bar{X} V_1 = 11.4$$

$$\bar{X} V_2 = 10.8$$

$$6 \quad -5.4 \quad 10 \quad -0.8$$

$$9 \quad -2.4 \quad 16 \quad 5.2$$

$$18 \quad 6.6 \quad 21 \quad 10.2$$

$$12 \quad .6 \quad 8 \quad -2.8$$

$$\text{Variance } V_1 = 23.6$$

$$14 \quad 2.6 \quad 4 \quad -6.8$$

$$SD V_1 = 4.9$$

$$11 \quad .4 \quad 13 \quad 2.2$$

$$\text{Variance } V_2 = 29.1$$

$$5 \quad -6.4 \quad 4 \quad -6.8$$

$$SD = 5.4$$

$$8 \quad -3.4 \quad 7 \quad -3.8$$

$$9 \quad 20 \quad 8.6 \quad 14 \quad 3.2$$

$$212.24 \quad 261.56$$

$$124.64$$

$$r = -.53$$

$$X = x - \bar{x}$$

$$Y = y - \bar{y}$$

Product.

$$-5.4$$

$$-0.8$$

$$-2.4$$

$$5.2$$

$$6.6$$

$$10.2$$

$$-6$$

$$-2.8$$

$$2.6$$

$$-6.8$$

$$.4$$

$$2.2$$

$$-6.4$$

$$-6.8$$

$$-3.4$$

$$-3.8$$

$$8.6$$

$$3.2$$

$$\sum X^2 = 212.24$$

$$\sum Y^2 = 261.56$$

$$\sum XY = 124.64$$

$$W = \begin{matrix} 212.24 & 124.64 \\ 124.64 & 261.56 \end{matrix}$$

$$\text{Total sum of squares} = 473.8$$

$$|W - \lambda_i I| = 0$$

$$\begin{vmatrix} 212.24 - \lambda_i & 124.64 - 0 \\ 124.64 - 0 & 261.56 - \lambda_i \end{vmatrix} = 0$$

$$(212.24 - \lambda_i)(261.56 - \lambda_i) - (124.64 - 0)(124.64 - 0) = 0$$

$$(55,513.5 - 212.24\lambda_i - 261.56\lambda_i + \lambda_i^2) - 15,535.1 = 0$$

$$39,978.4 - 473.8\lambda_i + \lambda_i^2 = 0$$

$$\lambda_i^2 - 473.8\lambda_i + 39,978.4 = 0$$

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$\lambda_i = \frac{473.8 \pm \sqrt{224,486.4 - 159,913.6}}{2}$$

$$= \frac{473.8 \pm 254.1}{2}$$

$$\lambda_i = 364 \text{ or } 109.9$$

$$\begin{array}{r} 212.24 \quad 124.64 \quad - \quad 364 \quad 0 \\ 124.64 \quad 261.56 \quad 0 \quad 364 \end{array}$$

$$\begin{array}{r} -151.76 \quad 124.64 \quad x = \\ 124.64 \quad -102.44 \quad y \end{array}$$

$$-151.76x + 124.64y = 0$$

$$124.64x - 102.44y = 0$$

$$124.64y = 151.76x$$

$$y = 1.22x$$

$$124.64x = 102.44y$$

$$x = .82y$$

$$\begin{bmatrix} .5 & .61 \\ .61 & -.5 \end{bmatrix}$$

$$\begin{array}{r} 8.21 \quad -3.19 \quad 14.49 \quad 3.09 \quad -11.77 \\ 13.37 \quad 1.97 \quad 6.74 \quad -4.06 \quad -8 \\ 20.92 \quad 9.52 \quad 9.73 \quad -1.07 \quad 10.19 \\ 9.98 \quad -1.42 \quad 12.87 \quad 2.07 \quad -2.94 \\ 8.55 \quad -2.85 \quad 15.79 \quad 4.99 \quad -14.22 \\ 12.94 \quad 1.54 \quad 9.94 \quad -0.86 \quad -1.32 \\ 4.05 \quad -7.35 \quad 10.3 \quad -0.5 \quad 3.68 \\ 15.42 \quad -4.02 \quad 10.63 \quad -0.17 \quad .68 \\ 17.65 \quad 6.25 \quad 14.45 \quad 3.65 \quad 22.81 \end{array}$$

$$226.44$$

$$74.77$$

$$\boxed{-0.89}$$

|          | Fine       | Coarse    |    |
|----------|------------|-----------|----|
| Common   | 7<br>6.5   | 5<br>5.5  | 12 |
| Moderate | 11<br>11.5 | 10<br>9.5 | 28 |

18

15

33

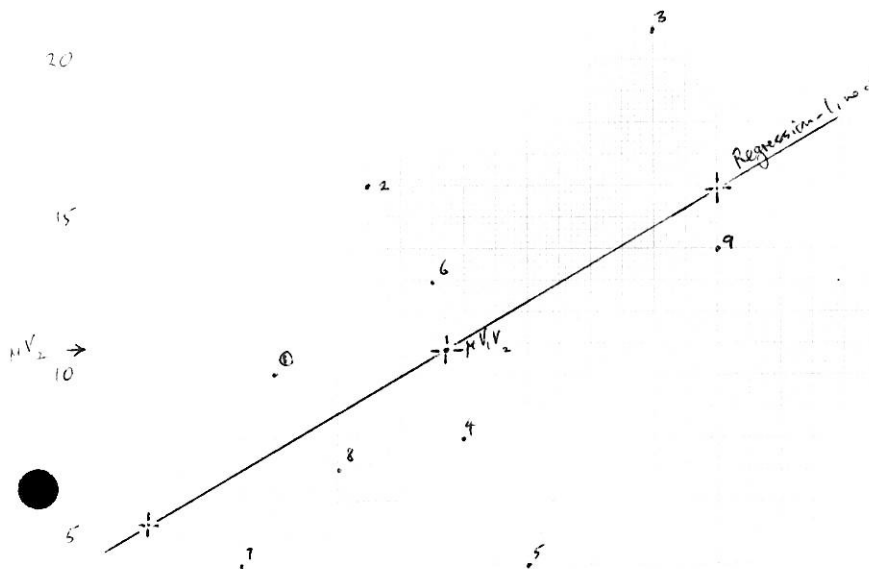
3

|               | Smooth   | F1       | Hachly  |    |
|---------------|----------|----------|---------|----|
| Mod Fine      | 8<br>4   | 3<br>6   | 0<br>.7 | 11 |
| Mod Coarse    | 3<br>3.6 | 5<br>5.8 | 2<br>.6 | 10 |
| Common Fine   | 0<br>2.5 | 7<br>4   | 0<br>.4 | 7  |
| Common Coarse | 7<br>1.6 | 4<br>2.9 | 0<br>.3 | 5  |
|               | 12       | 19       | 2       | 33 |

$$\chi^2 = 15.9$$

$$df = 6$$





1 2 3 4 5

10  $\uparrow$   $HV_1$

15

20

15

True

$HV_2$   
10

2.5"

50

15"

10

5"

L

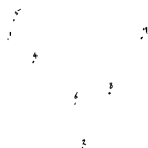
5"

10

15"

20

25"



freq.

|       | Mod |           | Common |           |    |
|-------|-----|-----------|--------|-----------|----|
| F1    | a   | 8<br>12.1 | b      | 11<br>6.9 | 19 |
| Other | c   | 13<br>8.9 | d.     | 1<br>5.1  | 14 |
|       |     | 21        |        | 12        | 33 |

9.

$$\phi_i = \frac{135}{161454} = \frac{135}{248}$$

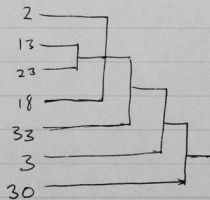
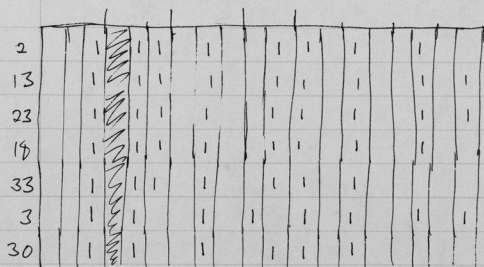
9.

Groups:

|    |    |    |
|----|----|----|
| 15 | 4  | 2  |
| 32 | 19 | 13 |
| 17 | 29 | 23 |
| 16 |    | 18 |
|    |    | 33 |

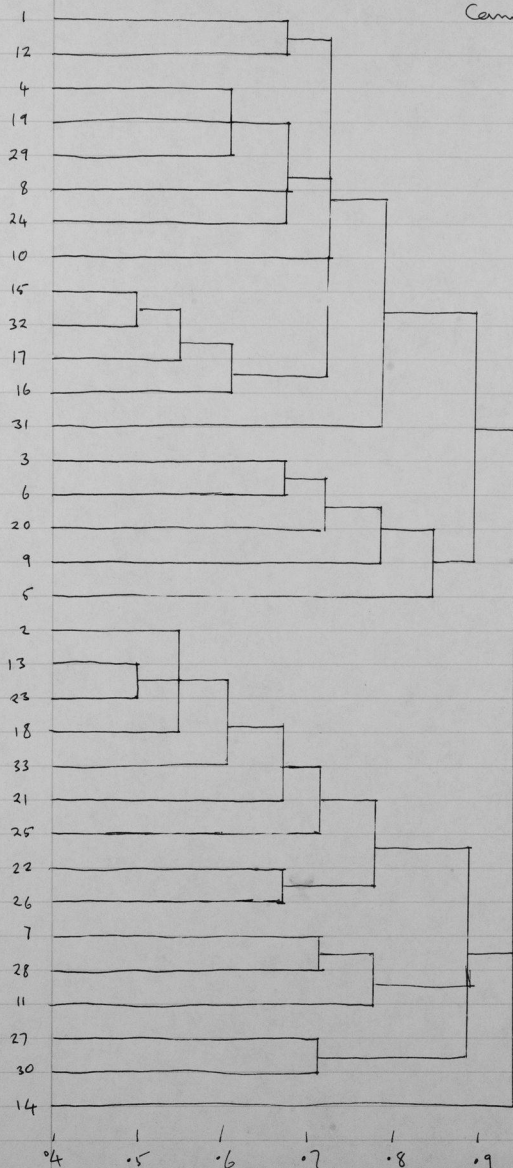
Definite outliers

14  
31  
9



Complete Link Russel-Rao

$$1 - \frac{A}{A+B+C+D}$$

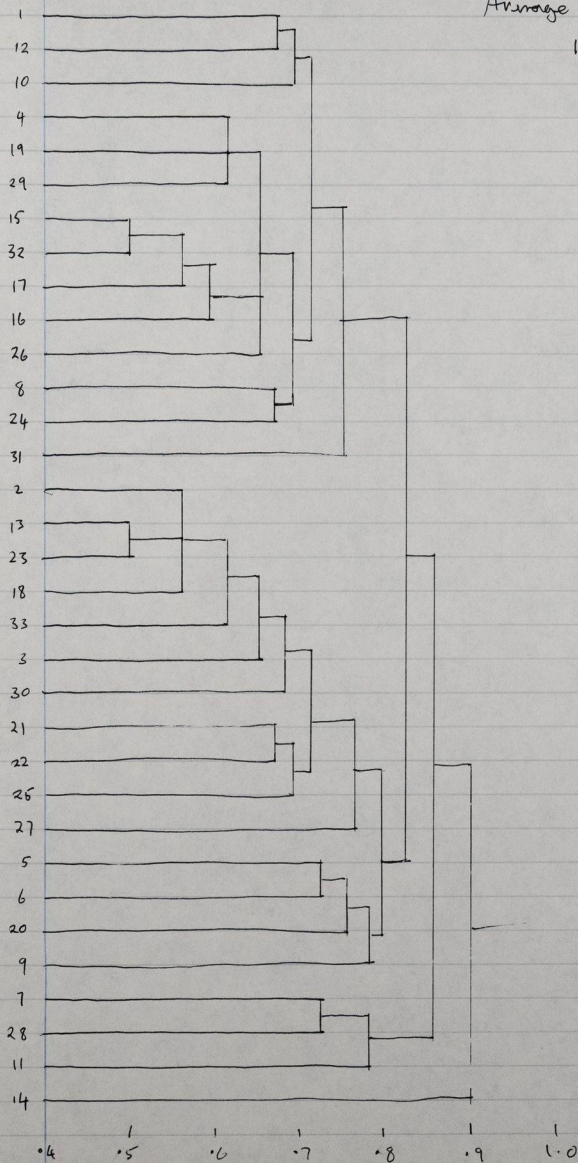


31  
5  
9  
14



Average Link Russel Rao

$$1 - \frac{A}{A+B+C+D}$$



31  
27  
20  
9  
11