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REPORT

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AUTHOR	Dr D F Williams Feb 1978
TITLE	Petrological analysis of Neolithic pottery from Skara Brae and Rinyo, Orkney

PETROLOGICAL ANALYSIS OF NEOLITHIC POTTERY FROM SKARA BRAE AND RINYO, ORKNEY

Over one hundred samples of Neolithic Grooved ware and associated undecorated pottery from the settlement sites of Skara Brae[1] and Rinyo[2] were selected for analysis as part of a current programme of petrological examination of Orcadian Neolithic pottery. The selection was made by typology as well as fabric. From an initial examination of the fabrics by binocular microscope, followed in each case by thin sectioning and study under the petrological microscope, a number of divisions could be made on the basis of the aplastic inclusions present. These are listed below following a brief description of the sherds.

1. From both the 1927 excavations (reference HA in text) and those undertaken in 1972-1973 (reference SB in text).
2. From the 1938 excavations (reference HDA in text).

Skara Brae

Group 1

HA 218a. Large bowl, applied decoration; CCA[3] (Fig.1,no.1)

HA 248. Large bowl, two horizontal grooved lines on the inside near to the rim; CCC (Fig.1,no.2).

HA 232. Large bodysherd, applied and grooved decoration : CCB (Fig.1,no.4).

HA 265. Undecorated bodysherd.

SB.1.44. Small bodysherd, applied decoration; CCA (Fig.1, no.3).

SB.1.18. Large flat base (Fig.2,no.1).

SB.11.13. Large flat base (Fig.2, no.2).

SB.1.10. Undecorated bodysherd.

SB.1.18. Small undecorated bowl (Fig.2,no.3).

SB.11.4. Undecorated bodysherd.

SB.1.26. Small flat base (Fig.2,no.5).

SB.11.15. Undecorated bodysherd.

SB.1.1. Small bowl, applied and grooved decoration: CCB (Fig.2,no.6).

SB.11.13. Thumbpot (Fig.2,no.4).

SB.11.13. Small undecorated bowl (Fig.3,no.6).

SB.1.19. Small undecorated bowl (Fig.2,no.7).

SB.1.22. Undecorated bodysherd.

SB.1.58. Small undecorated bodysherd (Fig.3,no.1).

SB.11.13. Bodysherd, applied decoration: CCA (Fig.3,no.4).

SB.1.65. Thumbpot.

SB.1.10. Undecorated bodysherd.

SB.1.50. Bodysherd, applied decoration: CCA (Fig.3,no.2).

SB.1.32. Small undecorated bowl (Fig.3,no.5).

3. Childe's (1931) three classes of decorated pottery at Skara Brae: A (applied), B (applied and grooved) and C (grooved).

SB.1.41. Large flat base, applied and grooved decoration: CCB (Fig CCB (Fig.4,no.1).

SB.1.39. Small bowl, grooved decoration: CCC (Fig.3,no.3).

The fabric of this group tends to be moderately thick, fairly hard and somewhat sandy, ranging in colour from light buff to light grey. The inclusions vary from large to moderate in size.

The inclusions are made up of both igneous and sedimentary rock fragments. The former consist of camptonite, while the sedimentary inclusions comprise slightly calcareous sandstone, plentiful discrete subangular grains of quartz, a scatter of fragments of limestone and occasional calcite. The odd grain of feldspar is also present. Sherd no. SB.1.50, also contained a large fragment of what appears to be recent shell.

Group 2

HA 285a. Small undecorated bowl (Fig.5,no.3).

HA 250. Small bowl, applied and grooved decoration: CCB (Fig.5,no1).

SB.1.22. Large undecorated bowl (Fig.5,no.2).

SB.1.53. Undecorated bodysherd.

SB.11.2. Large undecorated bowl.(Fig.5,no.4).

SB.1.65. Large undecorated bowl (Fig.6,no.1).

SB.1.39. Undecorated bodysherd.

SB.1.53. Large undecorated bowl (Fig.6,no.2).

SB.1.43. Large flat base (Fig.6,no.3).

SB.1.37. Large undecorated bowl (Fig.7,no.1).

SB.11.12. Large bowl, applied decoration: CCA (Fig.6,no.4).

Medium thick, fairly hard fabric, light buff to dark grey in colour, with a moderate amount of medium size inclusions. The fabric tends to be less sandy than Group 1.

This group has the same range of inclusions as Group 1, camptonite, sandstone, a scatter of limestone and calcite, and subangular quartz grains. However, the latter are on the whole of a smaller size than those in Group 1, and in addition are less frequent, making for a finer fabric.

Group 3

HA 249. Small sherd, grooved decoration: CCC (Fig.8,no.2).
SB.1.10. Very large bowl, applied decoration: CCA (Fig.8,no.3).
SB.1.10. Small undecorated bowl (Fig.8,no.1).
SB.1.18. Large undecorated bowl (Fig.8,no.4).
SB.1.53. Undecorated bodysherd.

Moderately thick, fairly hard fabric, variable in colour from light buff to dark grey. A moderate amount of fairly large inclusions.

Igneous and sedimentary rock fragments are again present in the form of camptonite and sandstone, together with frequent grains of subangular quartz and small amounts of limestone. This group differs from the previous ones in also containing a scatter of large siltstones throughout the clay matrix.

Group 4

HA 284. Small undecorated bowl (Fig.9,no.1).

HA 223. Large bowl, applied and grooved decoration: CCB (Fig.9,no.3).

HA 190. Small bodysherd, applied decoration: CCA (Fig.9,no.2).

HA 273. Very large undecorated bowl (Fig.9,no.4).

SB.1.2. Small undecorated bowl (Fig.10,no.1).

SB.1.2. Undecorated bodysherd.

SB.1.2. Large flat base (Fig.10,no.2).

SB.1.41. Small undecorated bowl (Fig.10,no.3).

SB.1.39. Undecorated bodysherd.

SB.1.54. Small bowl, grooved decoration: CCC (Fig.10,no.4).

Medium to thick, fairly hard fabric, ranging in colour from buff to reddish-yellow. The inclusions tend to vary from large to moderate in size.

Camptonite is again present in these sherds, but unlike Groups 1 and 2, fragments of sandstone are lacking. A small amount of limestone is present, together with frequent subangular grains of quartz.

Group 5

SB.1.32. Large bodysherd, grooved decoration: CCC (Fig.11,no.2).

Thick, fairly hard fabric, orangy-buff throughout. Medium size inclusions.

Two varieties of lamprophyre rocks are present in this single

sample, camptonite and monchiquite, together with a small amount of mudstone, frequent subangular grains of quartz and a little calcite.

Group 6

SB.1.22. Undecorated bodysherd.

Medium thick, moderately hard greyish-brown outside surface, reddish-brown inner surface and core. Numerous small fragments of shell occur throughout the fabric.

The most prominant inclusions are frequent small fragments of recent shell. Also present are fragments of camptonite and sandstone, and frequent subangular grains of quartz.

Group 7

SB.1.2. Undecorated bodysherd.
SB.1.19. Large flat base, applied decoration on base: CCA (Fig.11,no.1
SB.1.10. Very large flat base (Fig.12,no.1).
SB.1.2. Very large bowl, applied decoration: CCA (Fig.12,no.3).
HA 196h. Large bodysherd, applied decoration: CCA (Fig. 13,no.2).
SB.1.23. Undecorated bodysherd.
SB.1.22. Undecorated bodysherd.
HA 197. Small bodysherd, applied decoration: CCA (Fig.12,no2).
SB.1.18-21. Large undecorated bowl (Fig.13,no.1).

Moderately thick, fairly hard fabric, ranging in colour from reddish-buff to dark grey. Large inclusions are clearly visible.

All the samples in this group contain Bostonite in varying amounts. It may be possible, however, to subdivide the group into three on the basis of the additional inclusions. Sherd nos. SB.1.2., SB.1.19, SB.1.10 and SB.1.2 also contain camptonite, a little limestone and frequent grains of subangular quartz. Sample nos. SB.1.23, SB.1.22, SB.1.18-21 and HA 197 contain grains of siltstone, fragments of sandstone and subangular quartz. Sherd no. HA 196h is similar to the last subgroup, but lacks the siltstone inclusions.

Group 8

HA 251. Large bowl, grooved decoration: CCC (Fig.14,no.1).

Moderately thick, fairly hard fabric, dark grey outside surface, buff inner surface and core. Medium size inclusions.

The prominant inclusions in this sample are made up of igneous fragments. Camptonite is present, but so to is a fragment of olivine-basalt, with frequent subangular grains of quartz.

Group 9

HA 244. Large bodysherd, grooved decoration: CCC (Fig.14,no.2).

Thick, fairly hard fabric,orangy throughout, medium size inclusions.

This sherd contains inclusions of what appear to be large fragments of lava. Identification is difficult due to the decomposed state of the feldspars. Frequent grains of subangular quartz are also present.

Group 10

HA 243. Small base, grooved decoration: CCC (Fig.15,no.1).
SB.1.19. Small undecorated bowl (Fig.15,no.3).
SB.1.2. Thumbpot (Fig.15,no.6).
SB.11.12. Small undecorated bowl (Fig.15,no.4).
SB.1.25. Large undecorated bowl (Fig.15,no.2).
SB.1.51. Large undecarated bowl (Fig.15,no.5).

Variable fabric ranging from medium to thick, usually fairly hard, pinkish-buff to dark grey. Medium to large inclusions.

The inclusions in this grouping are made up almost entirely of sedimentary rock fragments, and comprise slightly calcareous sandstone, a small amount of limestone and calcite, the odd grain of feldspar and frequent subangular quartz grains. In sherd nos. SB.1.2., SB.11.12, SB.1.25 and SB.1.51 occasional grains of siltstone were also noted.

Group 11

HA 245. Small bodysherd, grooved decoration: CCC (Fig.16,no.1).
HA 265. Very large undecorated bowl (Fig.16,no.3).
SB.1.51. Very large undecorated bowl (Fig.16,no.4).
SB.1.68. Small bowl, grooved decoration: CCC (Fig.16,no.2).

Moderately thick, fairly hard sandy fabric, dark grey to buff in colour.

The predominant inclusion is subangular quartz grains. The odd grain of feldspar is also present, and a number of fragments of limestone were noted in SB.1.68.

Rinyo

Group A

HDA 207. Large undecorated bowl (Fig.17,no.1).
HDA 15. Very large undecarated bowl (Fig.17,no.2).
HDA 13. Large undecorated bowl (Fig.17,no.3).
HDA 21. Very large undecorated bowl (Fig.18,no.1).
HDA 211. Small undecorated bowl (Fig.18,no.2).
HDA 224. Small undecorated bowl (Fig.18,no.3).
HDA 14. Small undecorated bowl (Fig.18,no.4).
HDA 217. Large undecorated bowl (Fig.19,no.1).
HDA 28. Undecorated bodysherd.
HDA 165. Very large bowl, applied decoration: CCA (Fig.19,no.2).
HDA 93. Lug (Fig.19,no.3).
HDA 234. Small undecorated bowl (Fig.19,no.4).

Material in this group tends to be medium thick, moderately hard and darkish grey throughout. A moderate amount of inclusions of medium size are present.

The inclusions are made up of both igneous and sedimentary

rock fragments. Camptonite is present, with fine-grained micaceous sandstone and frequent grains of subangular quartz.

Group B

HDA 85. Small bodysherd, grooved decoration: CCC (Fig.20,no.1).

Medium thick, fairly hard fabric, dark grey throughout. Sparse inclusions of medium size.

Inclusions of camptonite, together with a few fragments of small sandstone and a scatter of subangular quartz grains. This fabric is much finer than those making up Group A.

Group C

HDA 29. Undecorated bodysherd.

Thick, crumbly fabric, dark grey outside surface, lighter grey inner surface and core. Numerous inclusions of large rock fragments occur throughout the fabric.

Inclusions of camptonite, large siltstones and frequent subangular quartz grains.

Group D

HDA 232. Small undecorated bowl (Fig.20,no.2).

Thin, moderately hard fabric, greyish-buff throughout. Large rock fragments are present.

The fabric is composed of very large fragments of camptonite, containing large, slightly decomposed laths of feldspar. A moderate amount of subangular quartz grains are also present.

Group E

HDA 3. Small undecorated vessel (Fig.20,no.3).

Medium thick, moderately hard fabric, buff outside surface, very dark grey inner surface and core. Medium size inclusions. Inclusions of olivine-rich camptonite, with a scatter of subangular quartz grains.

Group F

HDA 82. Small bowl, applied decoration: CCA (Fig.21,no.1).

HDA 24. Small undecorated bowl.(Fig.21,no.2).

HDA 197. Large bowl, applied and grooved decoration : CCB (Fig.21,no.3).

HDA 168. Undecorated bodysherd.

HDA 30. Large undecorated bowl (Fig.22,no.1).

HDA 38. Small flat base(Fig.21,no.4).

HDA 32. Undecorated bodysherd.

HDA 6. Large undecorated bowl.(Fig.22,no.3).

HDA 214. Very large undecorated bowl (Fig.22,no.2).

The fabric of this group is commonly dark grey, medium thick moderately hard, with sparse inclusions of a moderate size.

The inclusions consist almost entirely of sedimentary rock fragmen and comprise sandstone, siltstone and a moderate amount of subangular quartz grains. The odd grain of feldspar is also present.

Group G

HDA 225. Large undecorated bowl (Fig.23,no.1).
HDA 4. Thumbpot (Fig.23,no.2).

Medium thick, moderately hard greyish fabric, with few inclusions visible in the paste.

A scatter of fragments of fine-grained micaceous sandstone, with a moderate amount of subangular quartz grains.

Group H

HDA 45. Large flat base (Fig.23,no.3).

Medium thick, very light fabric, grey outside surface and core, light buff inner surface, with a vesicular texture.

A considerable number of elongate shaped voids occur in the clay matrix, commensurate with the vesicular nature of the sherd.

It is difficult to be precise about the nature of these vesicles, but in view of the elongate shape of many of them, it is possible that they represent some form of organic tempering. A little sandstone and quartz is also present.

Conclusions

The majority of the sherds from Skara Brae and Rinyo contain fragments of dyke rock (mainly camptonite and some bostonite, with the odd sherd containing monchiquite and olivine-basalt), together with one or more other non-plastic inclusions : sandstone, quartz, siltstone, mudstone, limestone, calcite and shell. Both sites are fairly close to deposits of Boulder Clay, and it is possible, therefore, that this range of inclusions could simply be due to the vagarities of the drift. However, examination of the sherds under the binocular microscope shows that the inclusions of dyke rock are sharply angular in shape. If this dyke material was derived from the drift, evidence of some rounding of the fragments would be expected, and this is lacking. Furthermore, the high percentage of camptonite in the pottery from both sites seems to be much more than would expect if this was just drift material, given the fairly limited outcrops of camptonite dykes in Orkney

(Mykura,1976,Fig.25). On the face of it, the angular fragments of lamprophyric rocks found in the pottery from Skara Brae and Rinyo suggests the deliberate choice of crushed dyke rock for use as a tempering medium. It is possible, therefore, that the clay and temper were derived from different sources, clay from the drift and temper from the dykes.

Skara Brae is situated very close to a camptonite dyke, and such material would thus be easily accessible; isolated dykes of bostonite and monchiquite occur within a 1½-2 mile radius of the site. Rinyo is at least two miles away from the nearest known camptonite dyke in the area, and so this material would have to be deliberately sought out for its use in local pottery making. In this connection it is interesting to compare the results of a petrological examination of the Neolithic Grooved ware from the henge site at the Stones of Stenness (Williams, 1977) and from the cairn at Quanterness (Williams,forthcoming a). At Stenness six out of fifteen sherds analyzed contained camptonite, while at Quanterness just under half of the approximately twenty-nine vessels tested contained dyke material, camptonite, bostonite, monchiquite and olivine-basalt. Isolated dykes of camptonite occur within a two mile radius of both sites, monchiquite as well in the case of Quanterness, but not bostonite and olivine-basalt.

Altogether some 65% of Grooved ware and associated vessels from the settlement sites of Skara Brae and Rinyo, the cairn at Quanterness and the henge monument at Stenness contain some form of dyke material (mainly camptonite). However, only in the case of Skara Brae is there a camptonite dyke situated in close proximity

to the finds of pottery. At first sight this might seem to suggest some form of commercial production in one place, close to easily available dyke material. However, it is noticeable that the aplastic non-dyke inclusions in the sherds examined are extremely variable, consisting of one or more of sandstone, shell, quartz, siltstone, mudstone, limestone and calcite. Taking this into account, a single centre for much of this pottery appears unlikely, indeed it is significant that the Rinyo sherds lack the limestone/calcite fragments which are common, though usually only in small amounts, in the Skara Brae pottery. Likewise, there seem to be significant differences in the fabric (minus the dyke material) when comparing Groups 2 and 4 at Quanterness (all containing prominant inclusions of camptonite or bostonite) and Group 2 at Stenness (camptonite) with similarily tempered pottery from Skara Brae and Rinyo.

If the correct interpretation has been made above regarding clay and temper, then the apparent differences in the fabric (minus dyke material) might suggest for example that a number of potters in or near Skara Brae and Rinyo were choosing their own particular clay sources (drift ?), but often adding a crushed dyke rock (mainly camptonite) to the clay. The numerous fabric groupings at Skara Brae and at Rinyo (including non-dyke sherds) suggest that the pottery was not made by a single individual for the community, but instead perhaps that each household made pottery sufficient for its own need. What we are seeing here may be a tradition of making pottery in a particular way by adding crushed dyke rock (because of its hardness in firing ?) which was fairly widespresd over the Orkneys, occuring possibly also at Quanterness and Stenness, even if this meant

going out of one's way to acquire the dyke rock.

This hypothesis, and it is no more at this stage, would call for a fair measure of contact between the various late Neolithic settlements in Orkney. On this point it may be significant that Unstan pottery of the earlier Neolithic period on Orkney has also been found to contain dyke rock fragments (Phemister, 1942). No dyke material was found by the writer in the Unstan ware pottery from Knap of Howar, Papa Westray, although in this case there are no dykes listed for the island (Williams, forthcoming b).

This evidence may tentatively point to a certain tradition of pottery making which was common both to the 'Unstan ware People' and the 'Grooved ware People'. This view would appear to support a transition from one ware to another, with the tradition of a particular type of temper used passed on, rather than envisiging both groups of people existing at the same time, sharing a deliberate common element of pottery making, but producing quite different wares. Following on from this it may also lend supporting evidence for regarding the 'Grooved ware People' as indigenous rather than intrusive to Orkney. In this connection it is interesting to find that thin sectioning of the Beaker vessel associated with the later phase at Rinyo (Childe and Grant, 1939, Fig.7), revealled a fabric quite different to any seen in the Neolithic phase of the site.[4] Two possibilities seem likely : a) that the pot was not made locally, or b) if it was, a different clay and temper source was sought out from the earlier pottery on the site, a tentative indication that there was a break in traditional pottery making on the site.

4. Large inclusions of plagioclase feldspar and a scatter of quartz.

The pottery from Skara Brae and Rinyo is by no means exclusively dyke tempered. The majority of the remaining fabric groups are characterized mainly by their sandstone content plus other inclusions. These groups probably represent local wares, since once again small fragments of limestone and calcite occur in the Skara Brae sherds and not in those from Rinyo.

Two sherds from Skara Brae call for special mention, as the igneous rock fragments present are not recorded in the Skara Brae area and so a source further afield may be indicated. The first of these is probably the most famous piece of Neolithic pottery from the Orkneys, bearing a decorative motif consisting of a double lozenge and double spiral pattern (Group 9), and recalling similar designs in the Boyne Art Style (Wainwright and Longworth,1971, 246-247). The fabric of this sherd appears petrologically different from any other piece tested from the site, as it contains large fragments of what appear to be lava. Inclusions of lava were noted in a tub-shaped vessel with applied decoration from Quanterness (Group 6,no.1), though the lava here has a different texture to that of the Skara Brae sample. The lava in the Skara Brae sherd might belong to the Hoy lavas which have a limited distribution in north and south Hoy, or to the Basic Lavas situated in the southern part of the Mainland and at Hacos Ness in Shapinsay (Wilson et al,1935). The Boyne Valley area of Ireland is non-volcanic, so it seems unlikely that this vessel represents direct contact between the two areas.

The remaining sample from Skara Brae consists of a large bowl with grooved decoration, containing a fragment of olivine-basalt (Group 8). Olivine-basalt dykes have a very limited

distribution in Orkney, only occuring on the southern edges of Loch Harray and at Benziaroth, Firth, though the Hoy lava is an olivine-basalt (Mykura,1976,Fig.25). A Grooved ware flat-based vessel with splayed walls and incised wide lines in groups of three from Quanterness also contained olivine-basalt, together with large grains of mudstone, which are lacking in the Skara Brae sherd.(Group 5,no.2).

At both Skara Brae and Rinyo there seems to be no significant demarcation in fabric between Childe's classes A, B and C and the plain wares (1931,130-131). The different types of applied and grooved wares often appear in the same fabric groupings, together with the plain wares.

D.F. Williams, Ph.D.,
Department of Archaeology,
University of Southampton.

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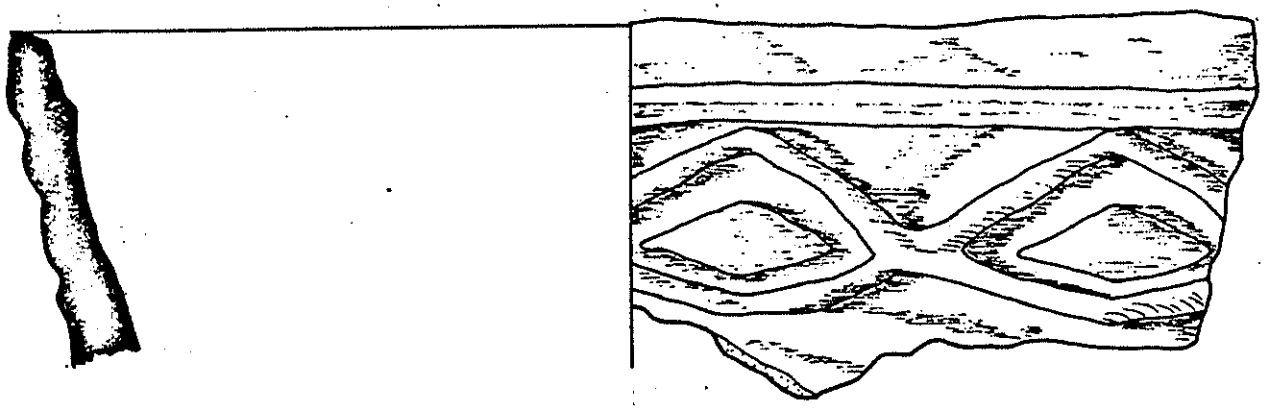
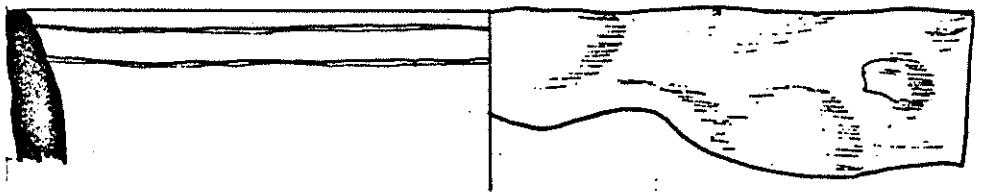
Skara Brae Fig. 1

D 22cms. F.9.



1.

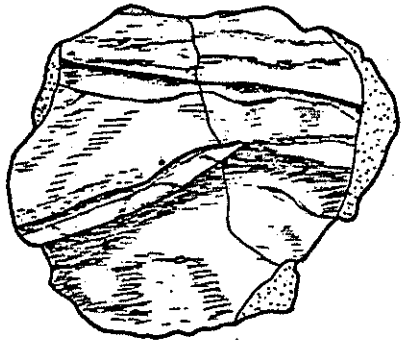
HA 248. G1
D. Mcms
F.9.



2.

SB I 44
F.9.

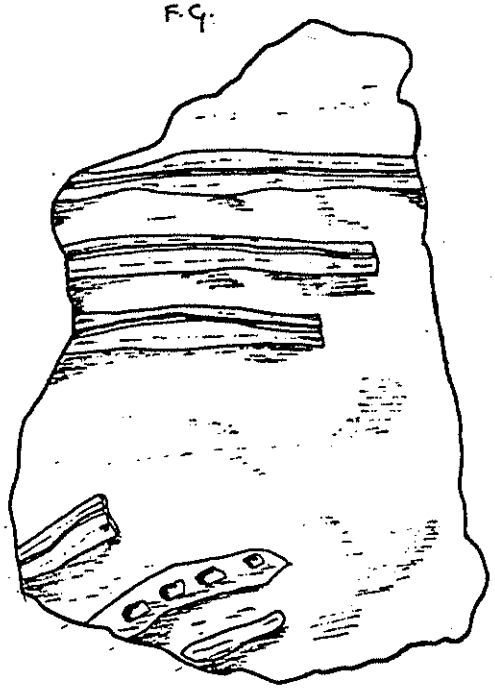
G1



3.

HA 232 L1933 1987.
F.9.

G1

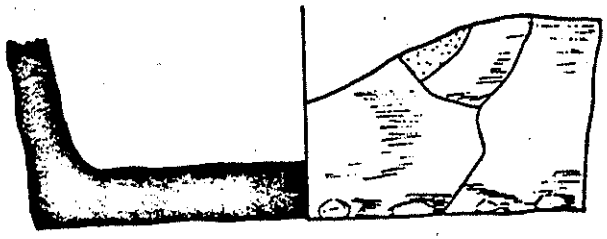


4

SB I 18

D. 9.5cm
F.G.

Gl



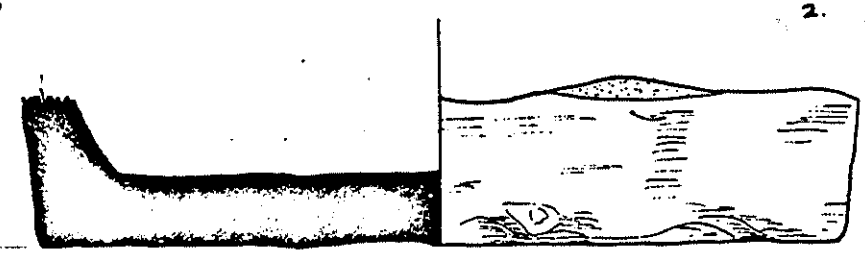
1.

SB II 8

D 14cms

F.G

Gl



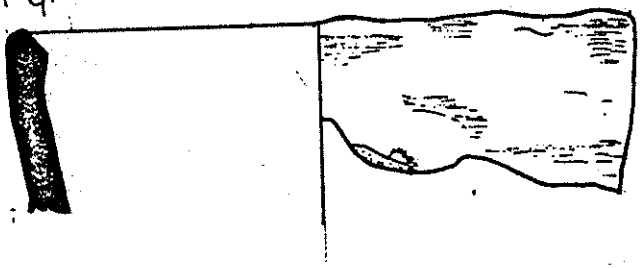
2.

SB I 18

D. 11cms

F.G.

Gl



3.

SB II 13

D 2.5cm

F.G.

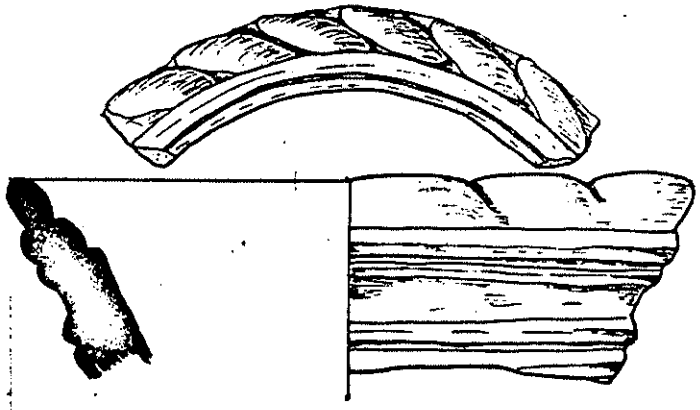
Gl

4.

SB I 1 D 12cms.

F.G.

Gl

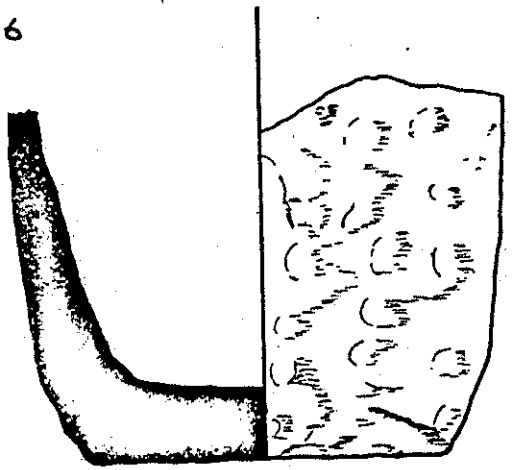


6.

SB I 26

D. 6.5cm.

F.G.

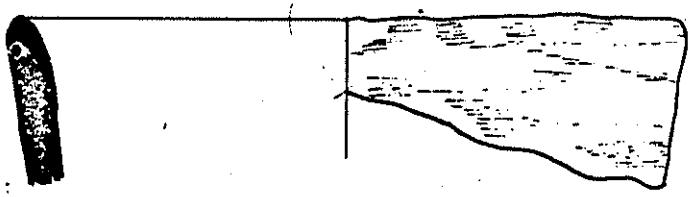


5.

SB I 19 D 12cms.

F.G.

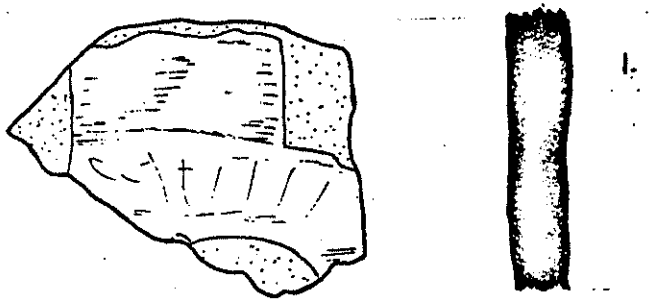
Gl



7.

Skara Brae Fig. 2

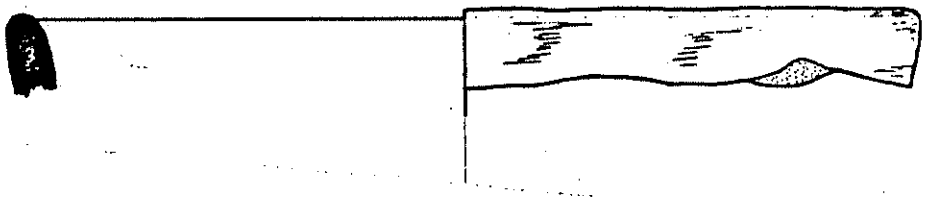
SB I 58 G2



1.

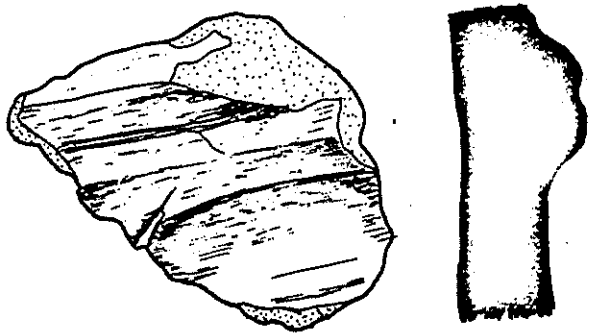
SB II 13 94 G1

O .16cm
F.G.



6.

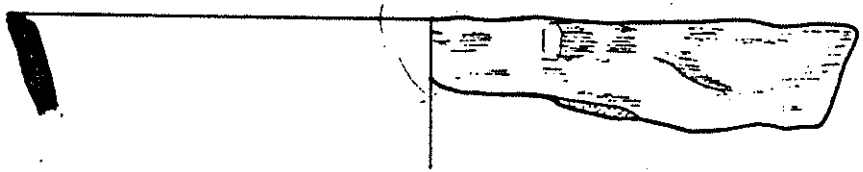
SB I 50
F.G.



2.

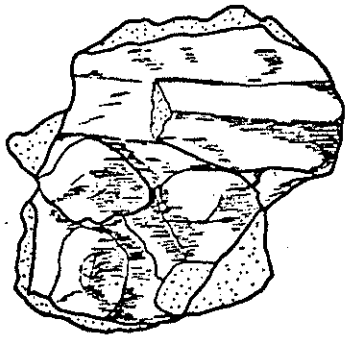
G1

SB I 32
O 15cms G1
F.G.



5.

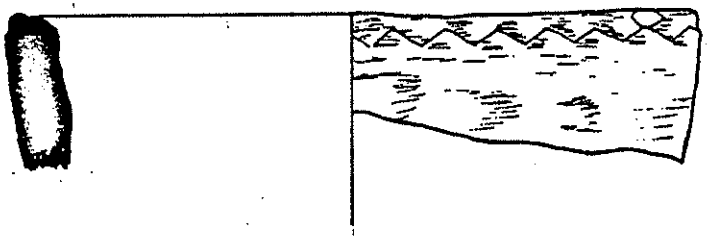
SB II 13 12
F.G.



G1

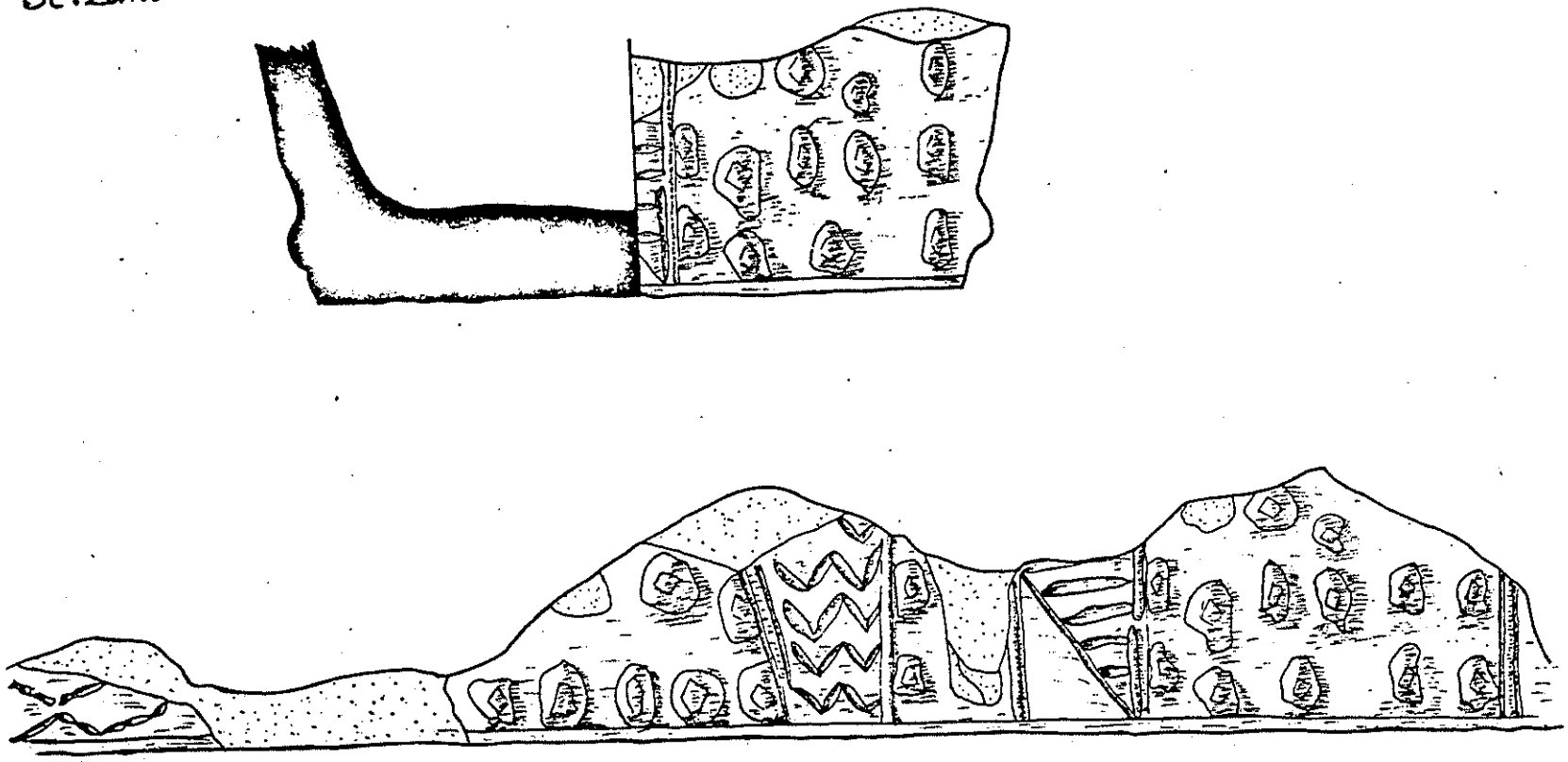
4.

3.



B I 39 G1
O 12·cm
F.G.

SB I41
Dc 12cms.



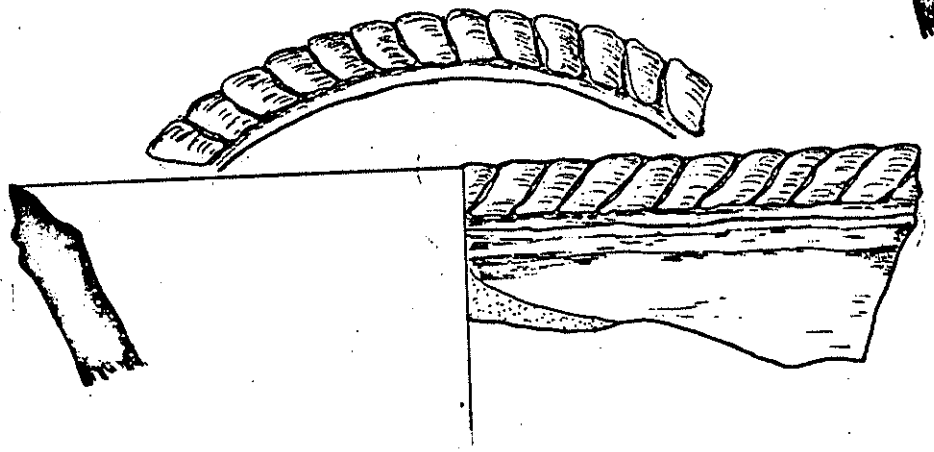
1.

91

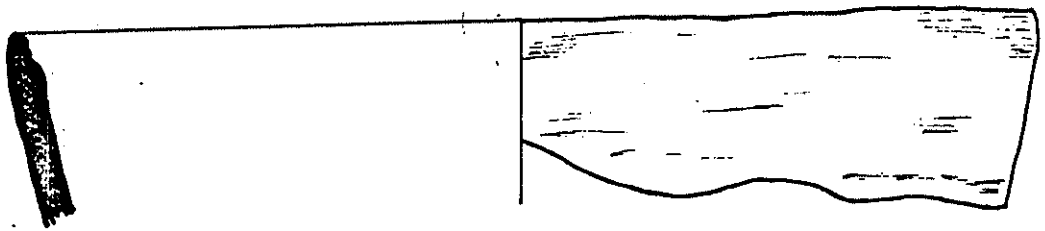
D 18cms
F.g. Gr

HA 250. L1953 1997.
D. c. 18cms
F.g.

Gr



1.

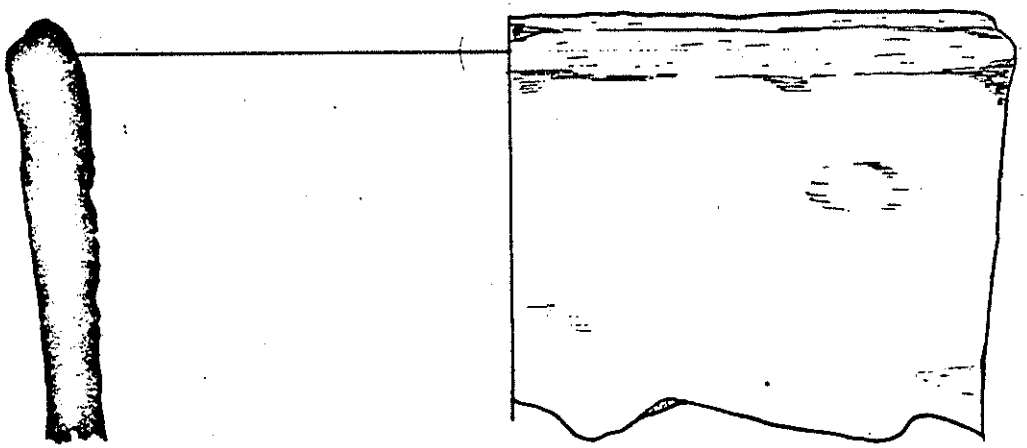


2.

Skara Brae Fig. 5

SB II 2
D 18cm
F.g.

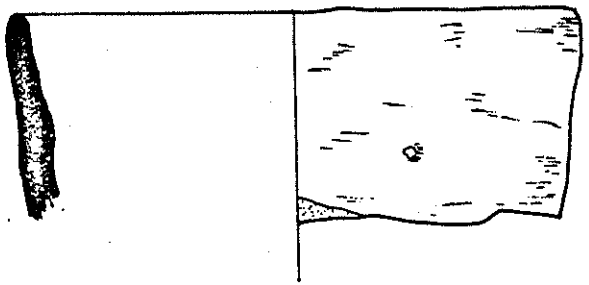
Gr



4.

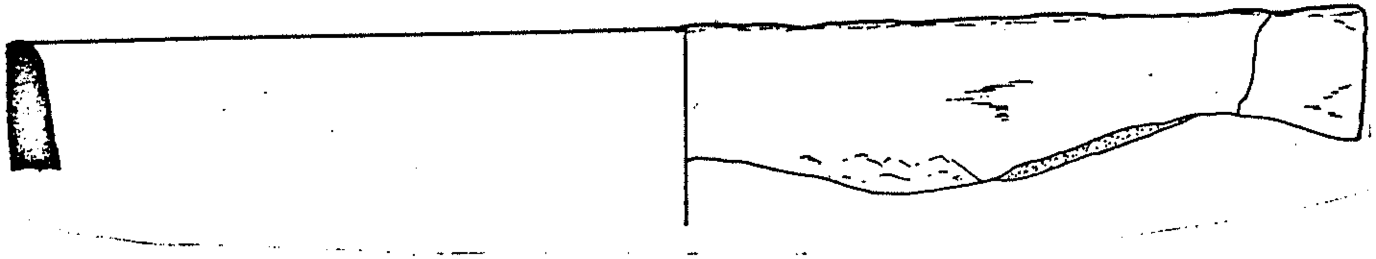
HA 285a. D. 10cms.
F.g.

Gr



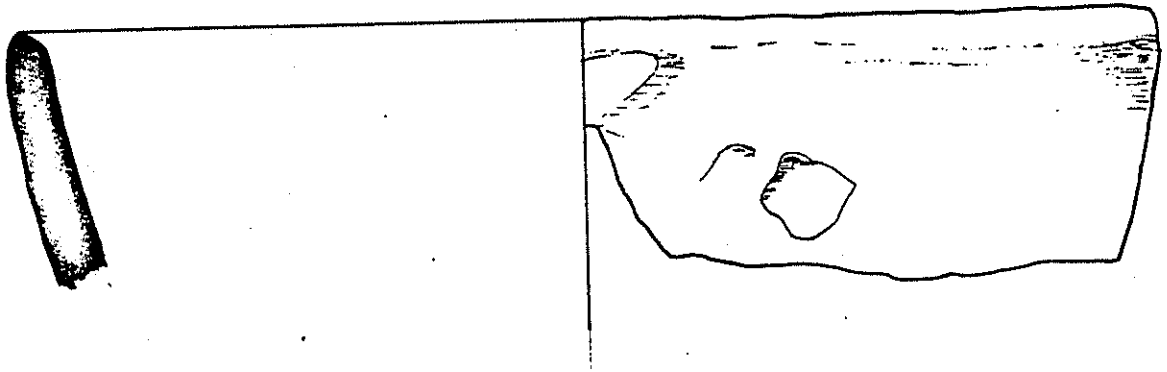
3.

F.G.



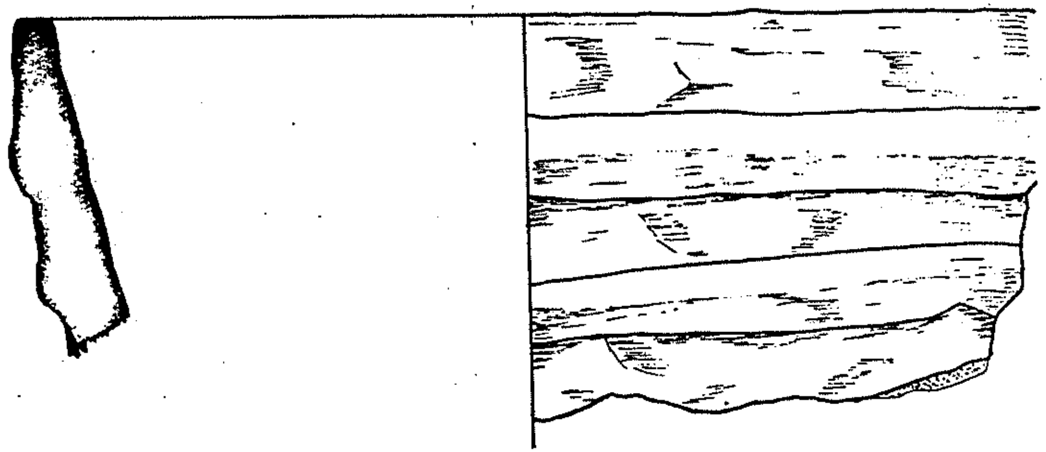
1.

SB I 53
D-20cm
F.G.
G2

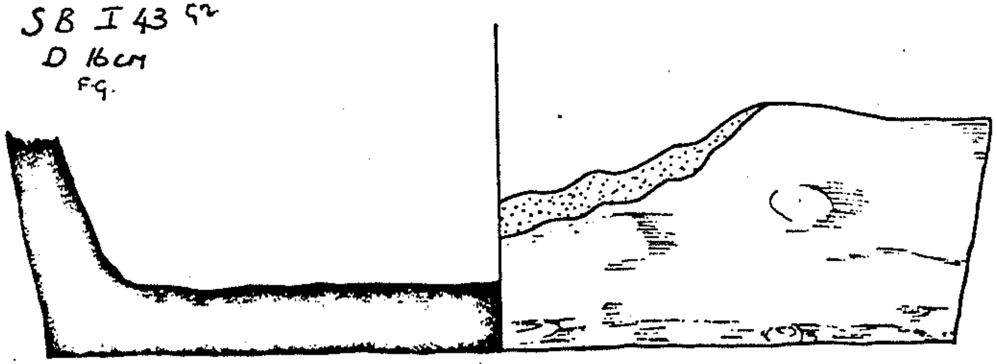


2.

SB II 12 G2
D 18CM
F.G.

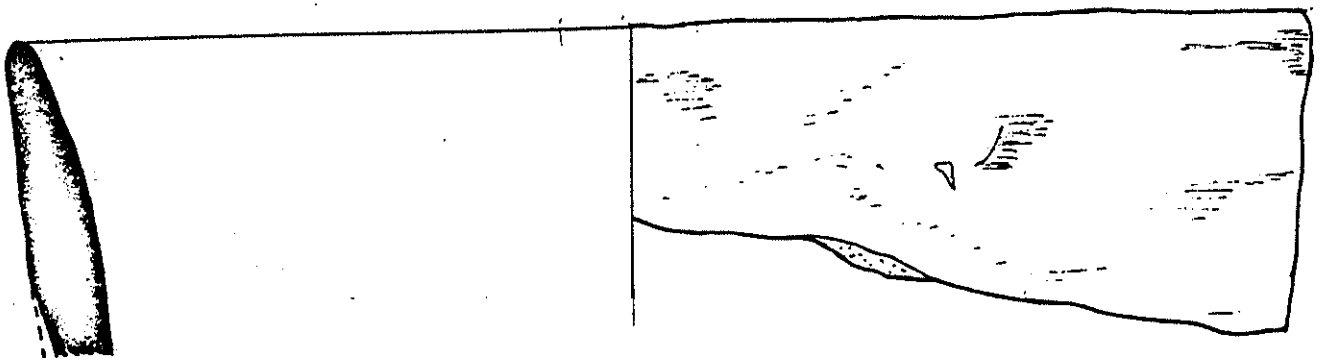


SB I 43 G2
D 16CM
F.G.



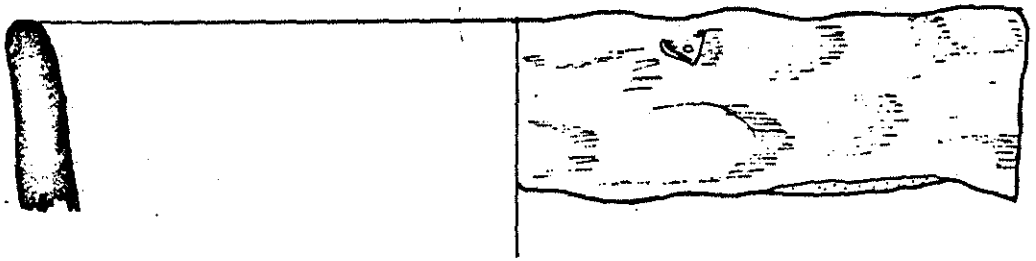
3.

SB I 37
D c.22cms. 52



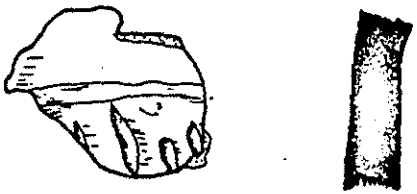
1.

SB. I. 10
D. 18cms. F.g. Q?



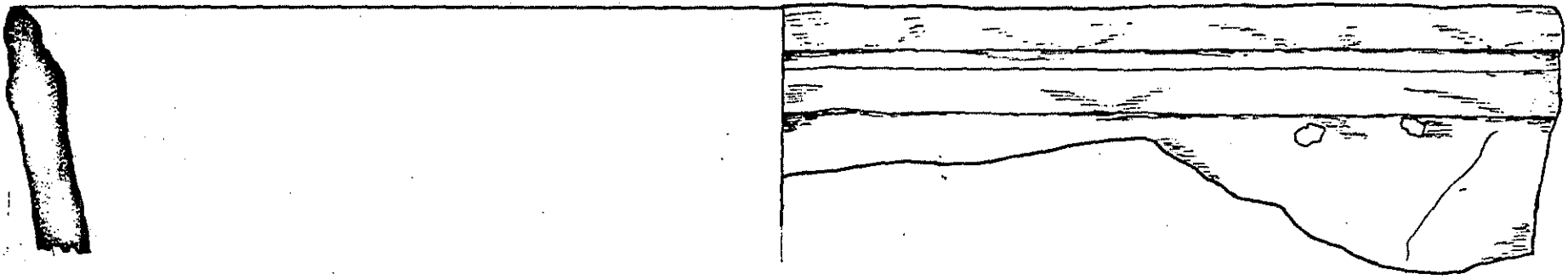
1.

HA249 47



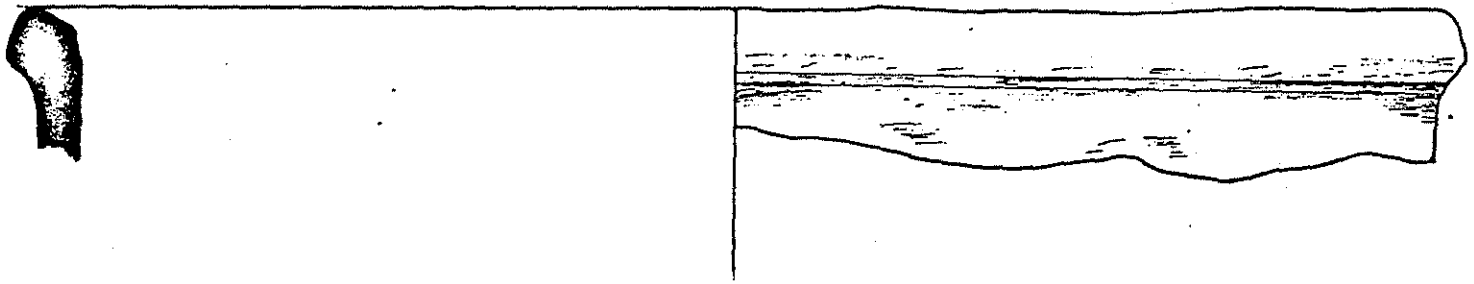
2.

SB I 10 25
D. 32cm F.g. Q?



3.

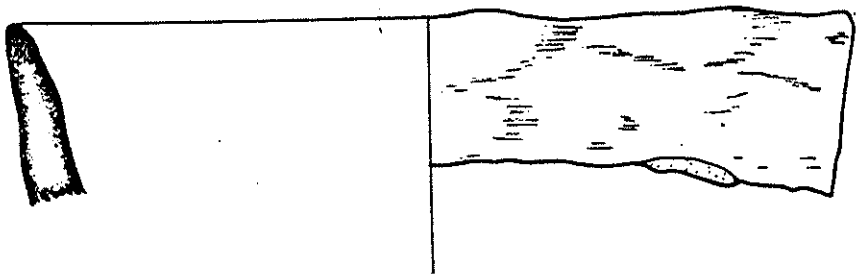
SB I 18 Q?
D 25cm
F.g.



4.

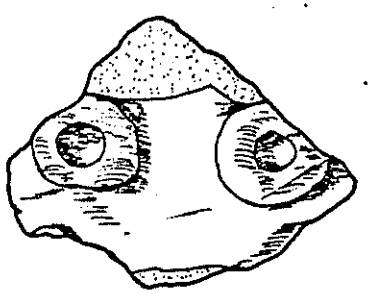
Skara Brae Fig. 8

HA 28 & D.15cms.
F.G. GH



1.

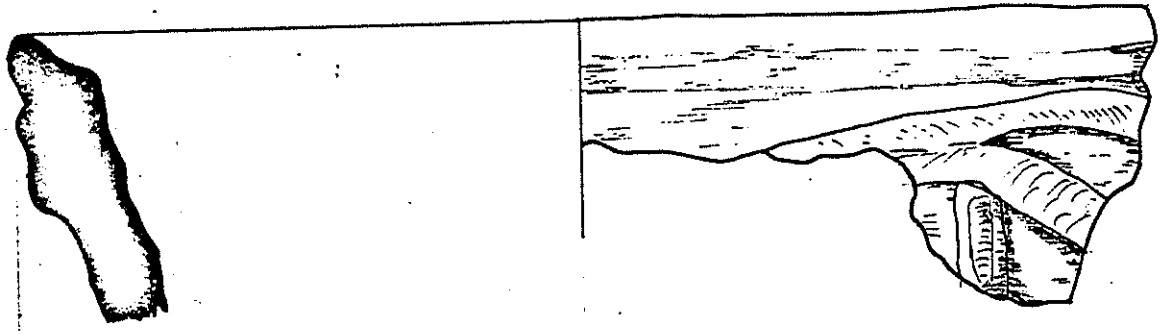
HA 190. c 1935-1976
F.G.
GH



2.

HA 223 1933-1991
D 20cms. F.G.

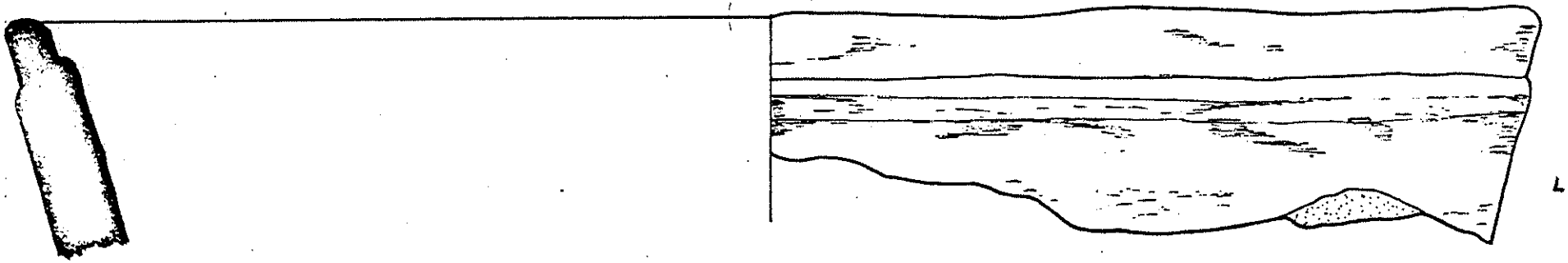
GH



3.

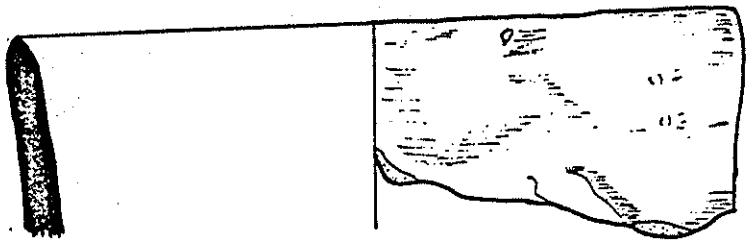
Skara Brae Fig.

HA 273
33cms.
F.G.
GH



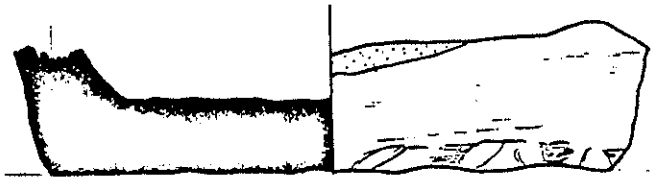
4

SB. I. 2T D. 13cms
F. G.
94

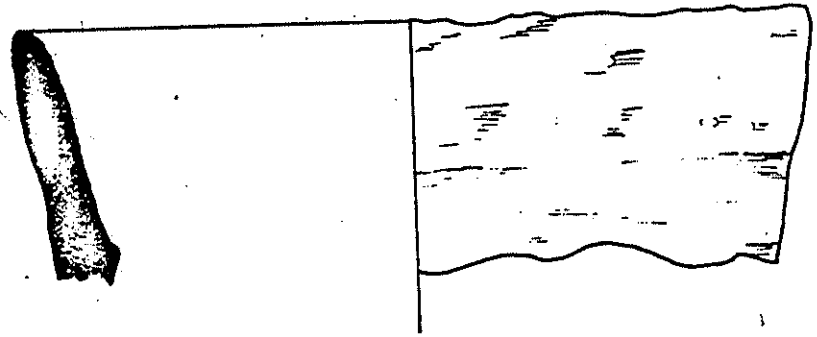


1.

SB I 2 #27
D 10cms
FG.
94

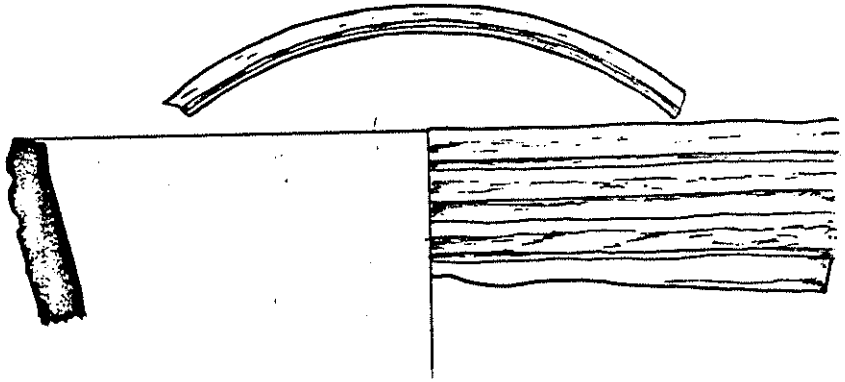


SB I41
D ·14cm
F.G.
94



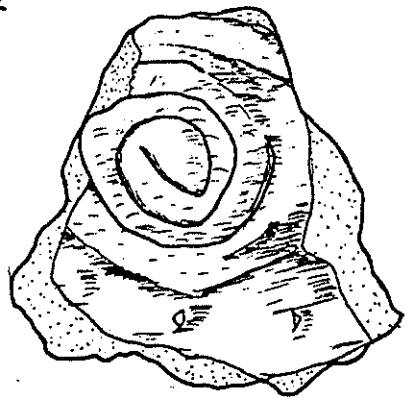
3.

SB I 54 94
D 15cms
F.G.



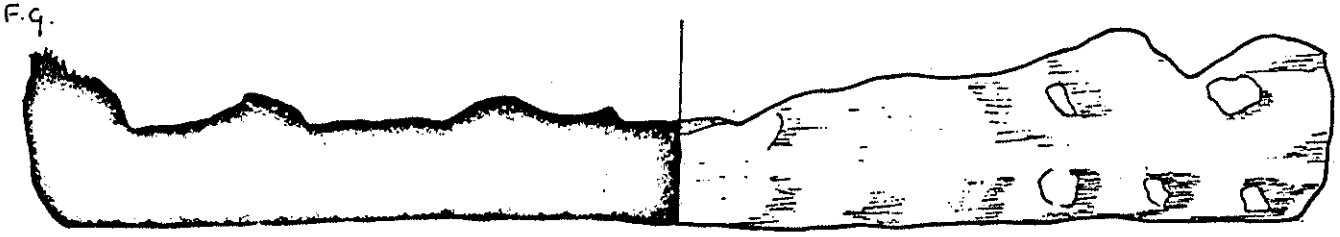
SB I 152 19
F.g.

55



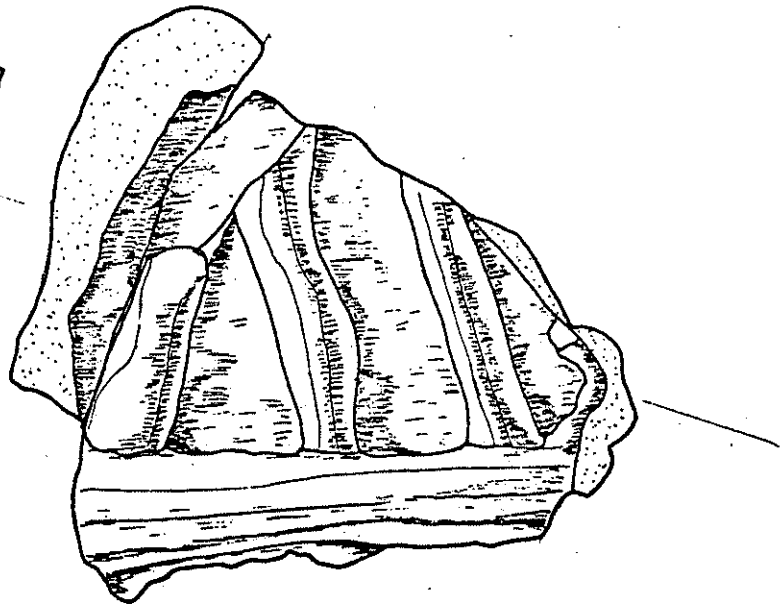
2.

SB I 199
D 22cms I 19 22cms
F.g.



1.

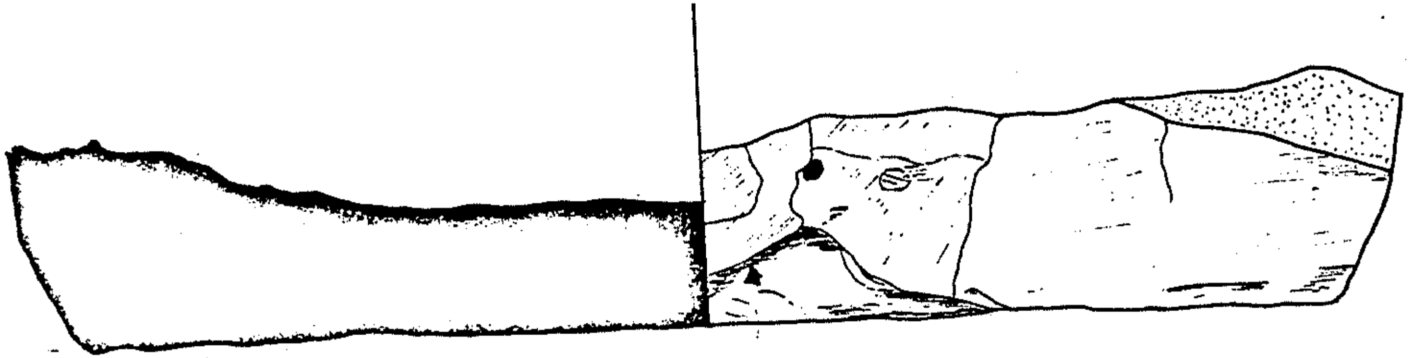
47



Skara Brae Fig. 11

Skara Brae Fig. 12

SB I 10
D. 22cm
F.G.



1.

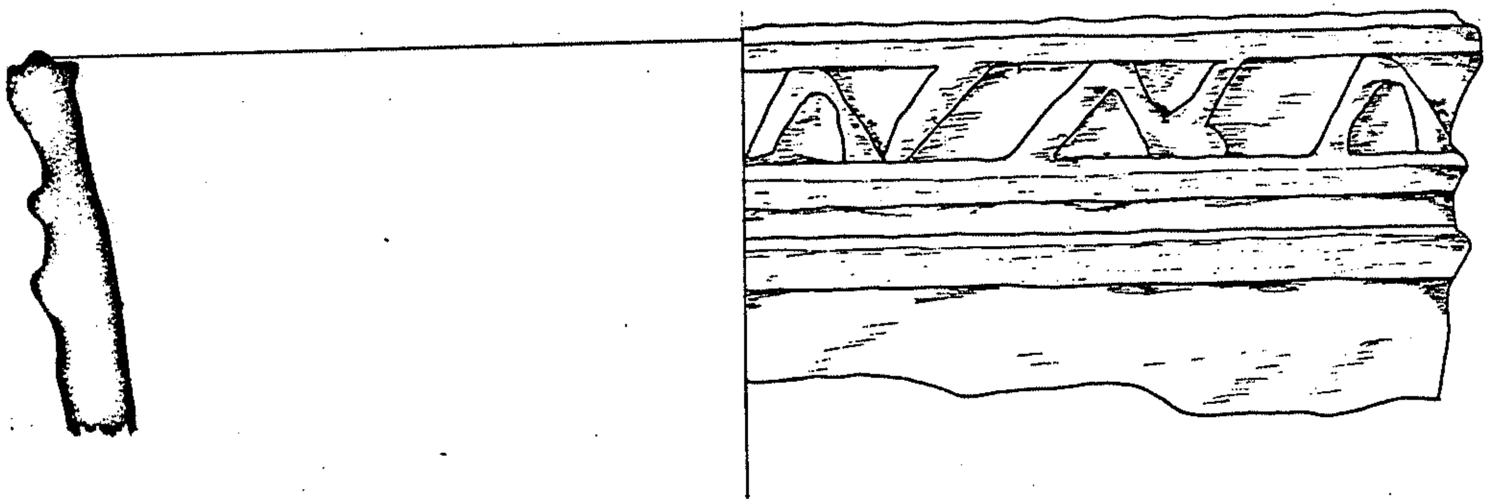
HA 197
F.G.

97

2.

SB I 2# 97
D. 26cm.
F.G.

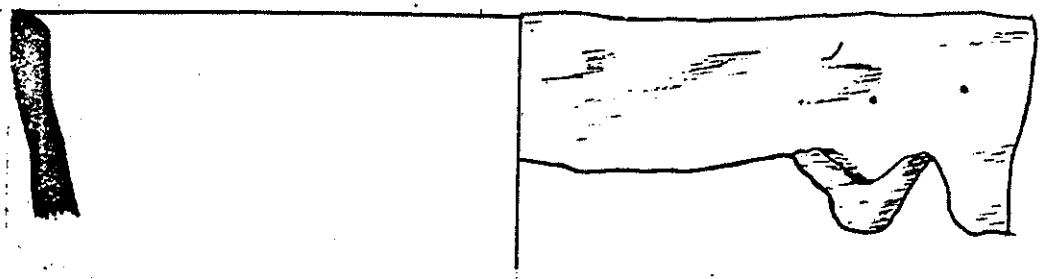
Taken [illegible]
pot including
(dagger cropped)
[illegible]



3.

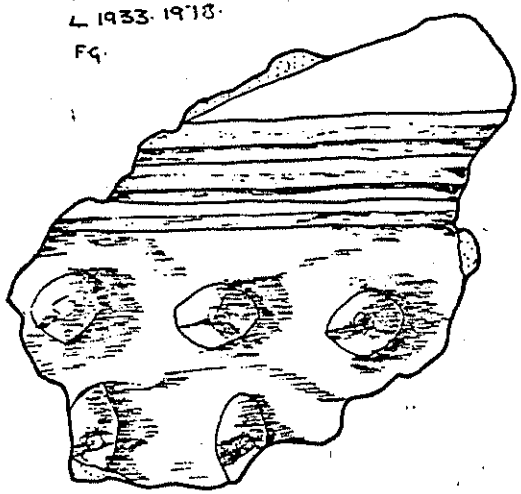
SB I 18-21

Fig. D. 18cm



1.

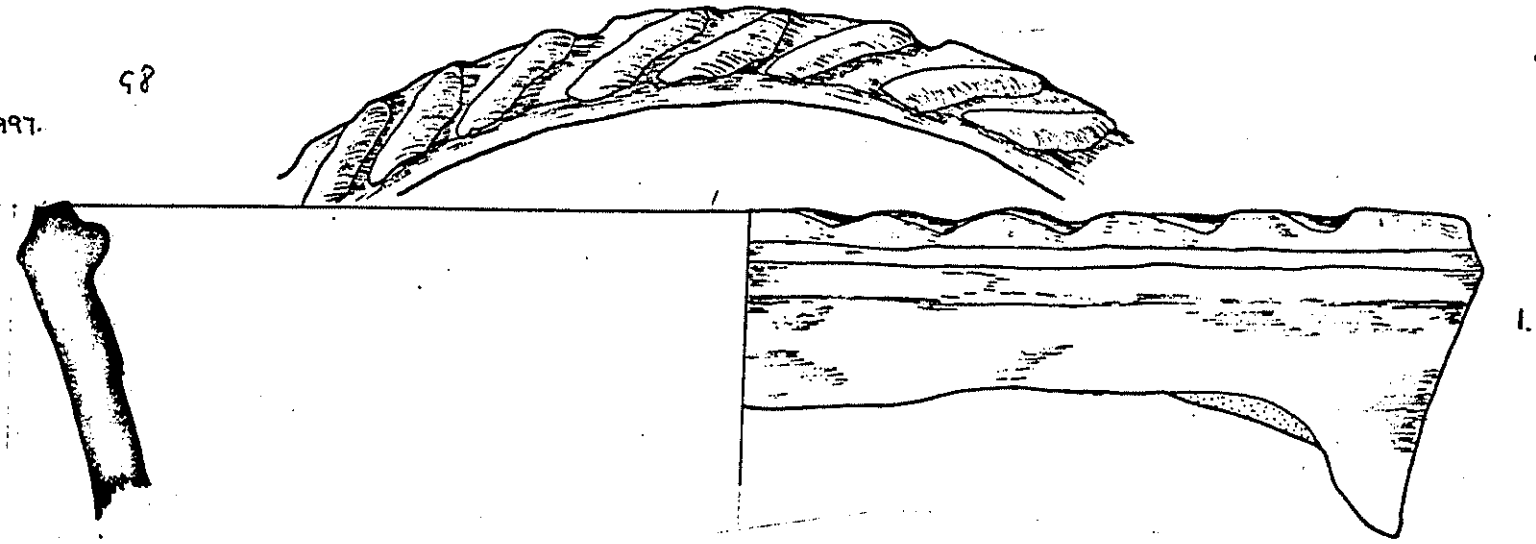
HA 1964.
L 1933. 19-18.
Fig.



2.

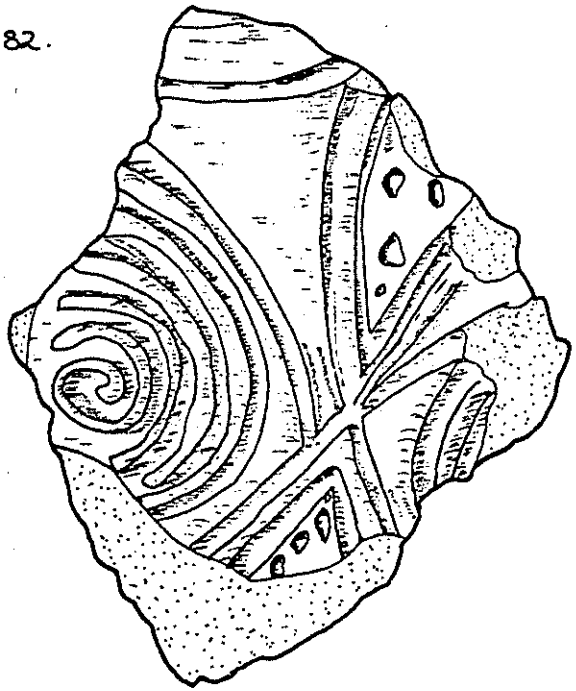
98

HA 251 L 1933 1997.
D.c.26cms. F.G.



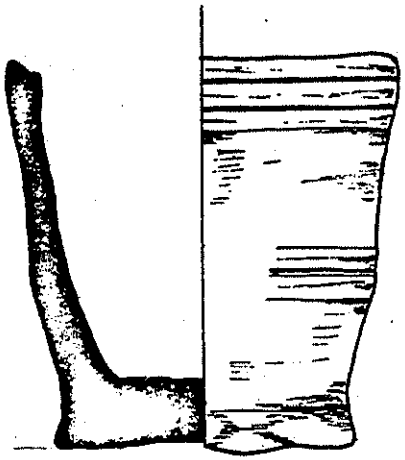
1.

HA 244
L 1933 1982.
F.G. 99



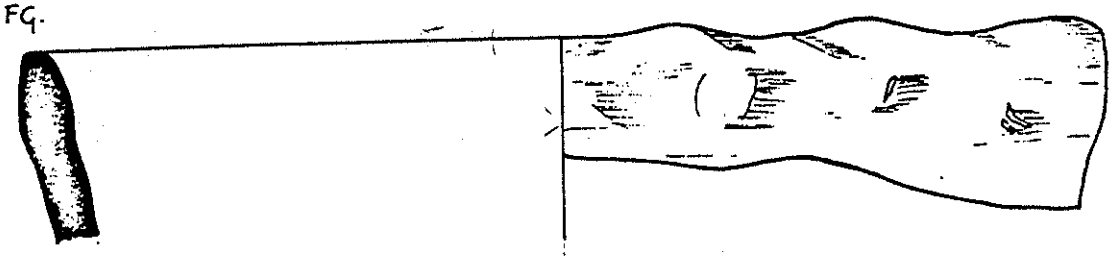
2.

HA243
L 1933 1984
F.g.
D 5cms
Q9



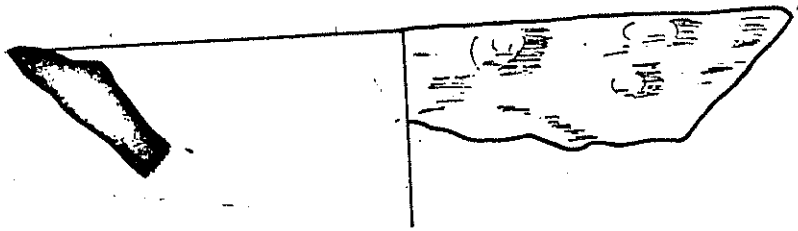
1.

D · 79cms
F.G.



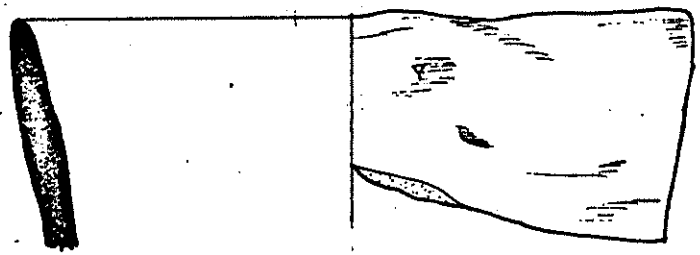
2.

SB I 19/503 Q10
D 14 cms
F.g



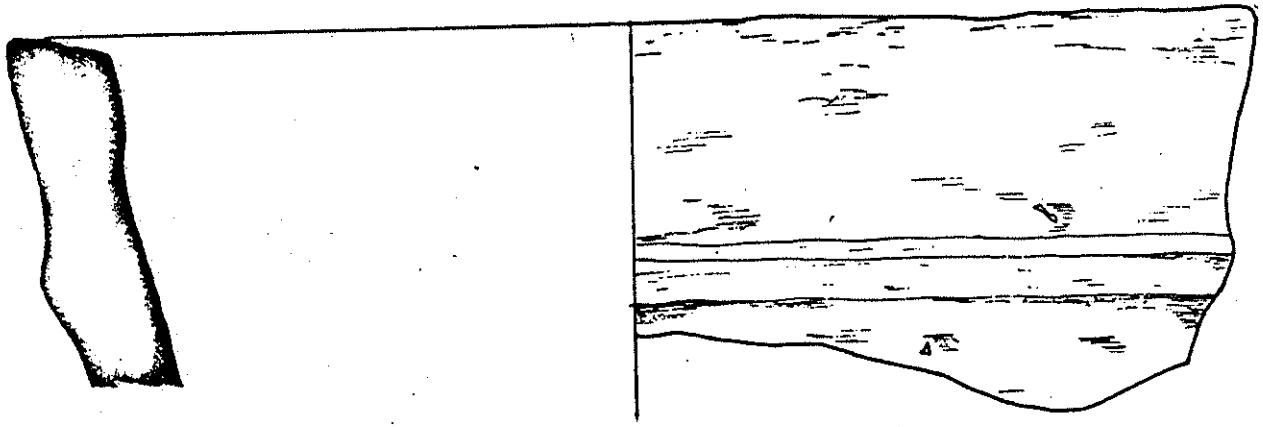
3.

SB II 12
D. 12cms
F.g. Q10



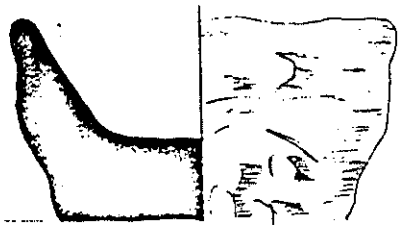
4.

SB I 51 Q9
D · 22cm
F.g.



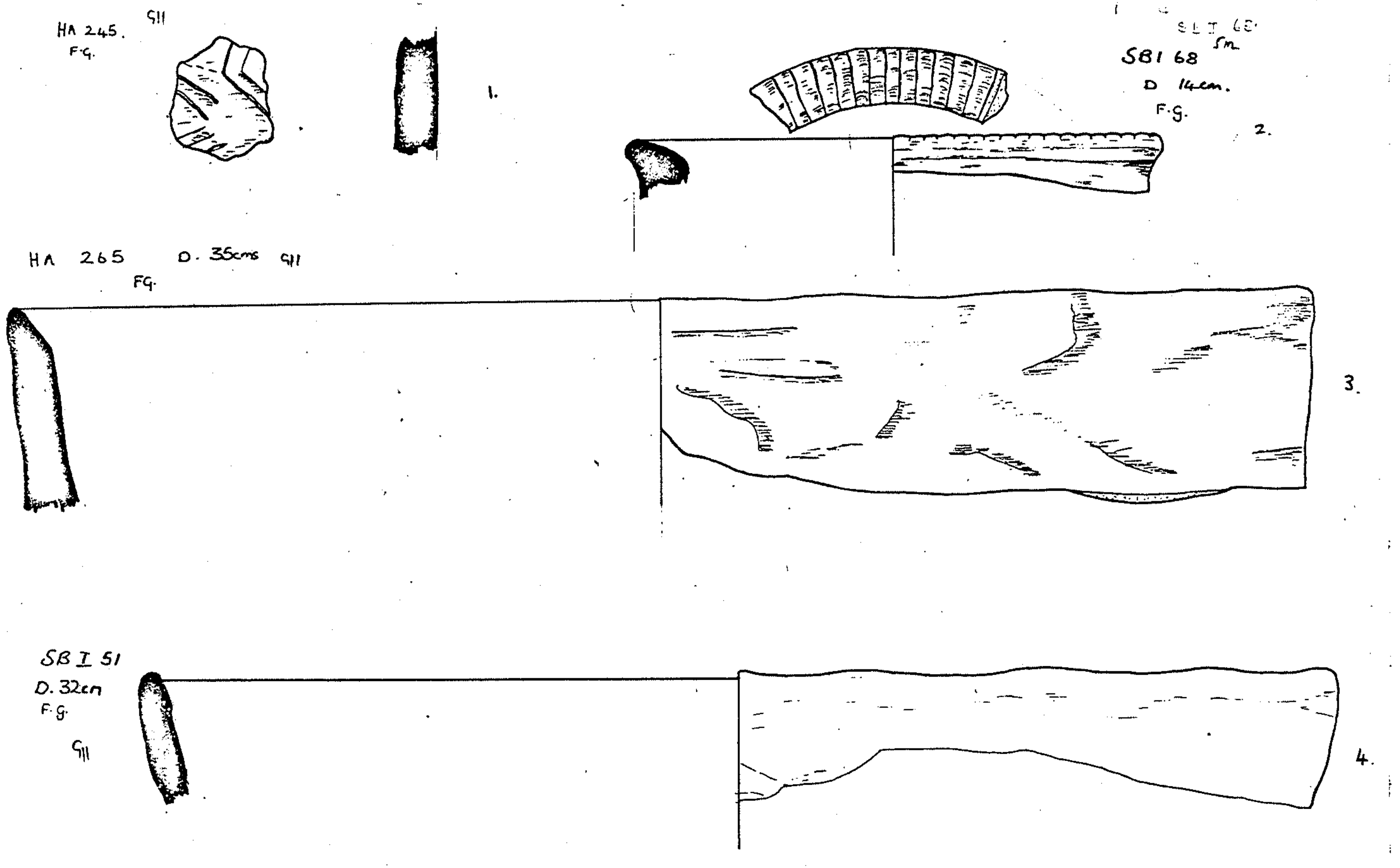
6.

SB I 2/20 Q10
D 5cms
F.g



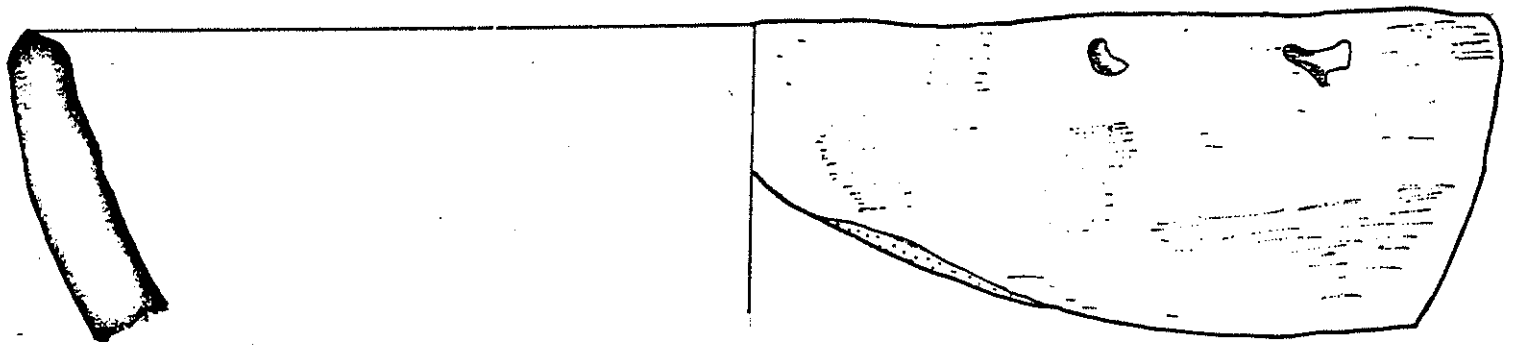
6

Skara Brae Fig. 15



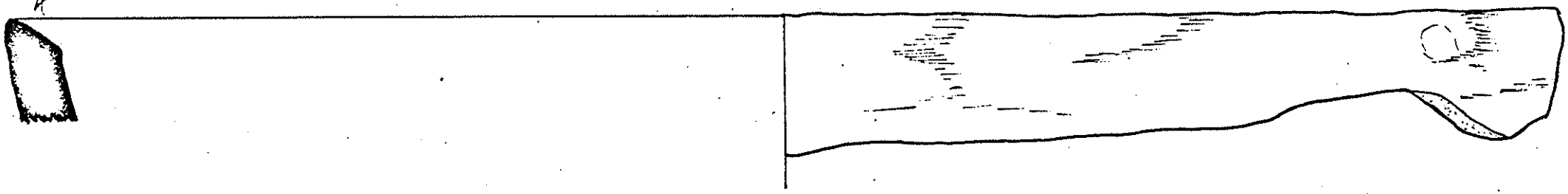
Skara Brae Fig. 16

HDA 207.
1947. 668. A
D. 26cms
F.G.



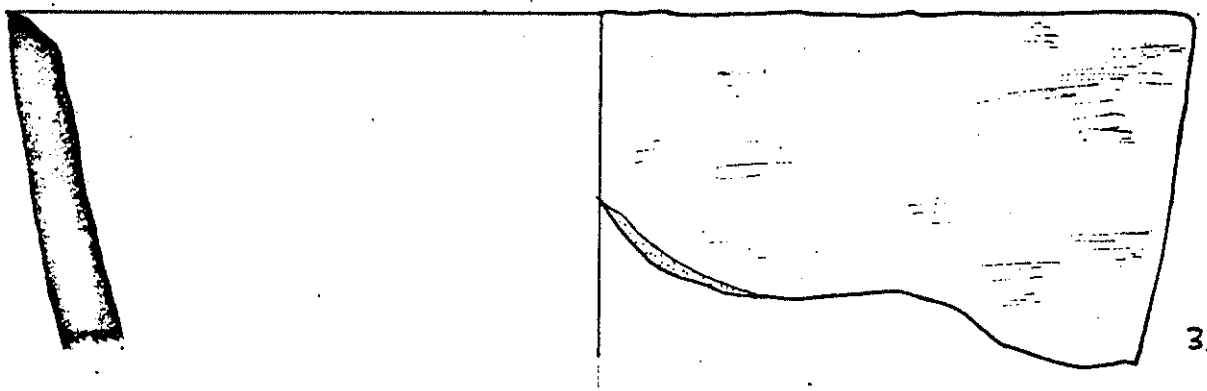
1.

HDA 15.
D. 37cms.
A



2.

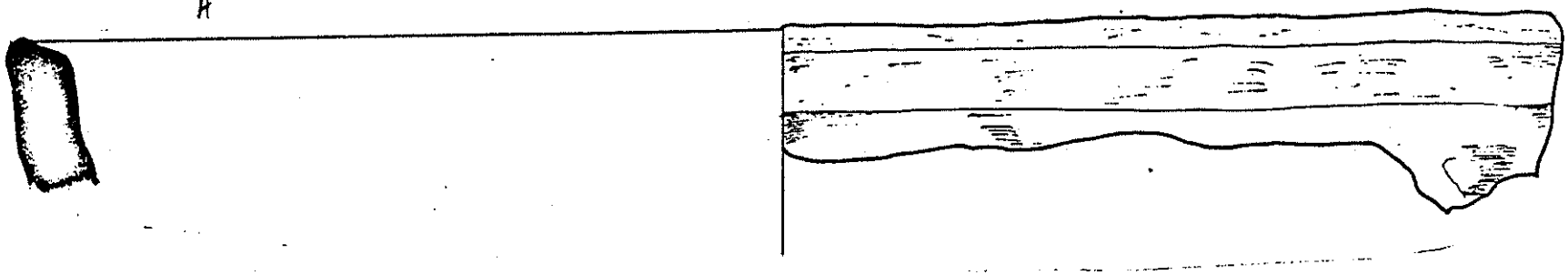
HDA 13
D. 21cms
F.G.



3.

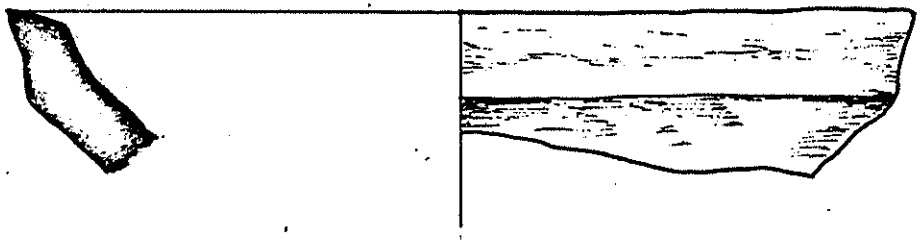
HDA 21. 1939.406.
D 30cms. F.G.

A



1.

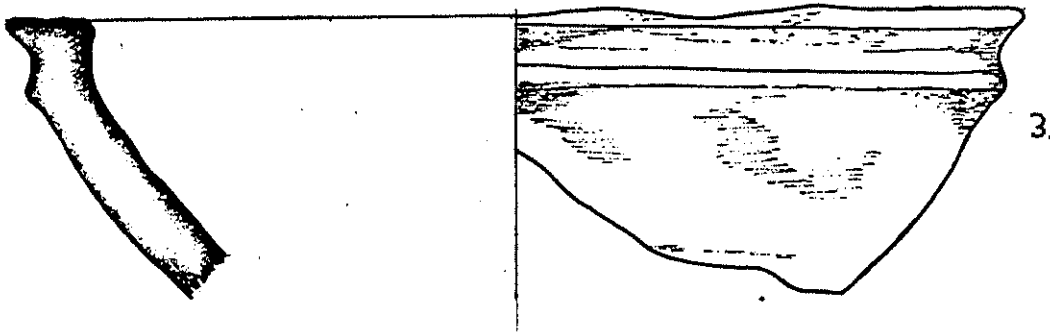
HDA 211
1947 672
D 16cms
F.G.A



2.

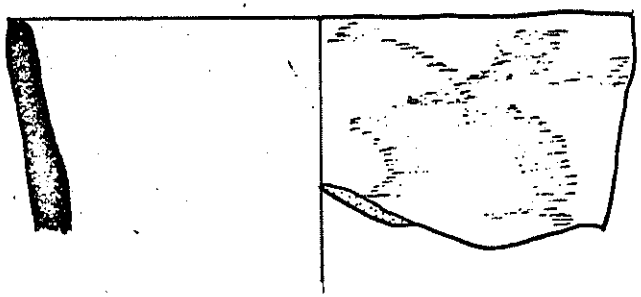
Ringo Fig. 18

HDA 224 1947685
D 18cms
F.G. A



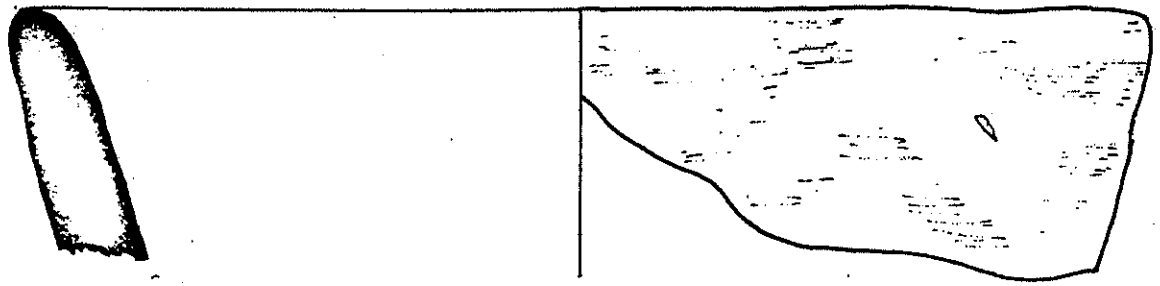
3.

HDA 14 1939 399
A F.G. D M cms



4.

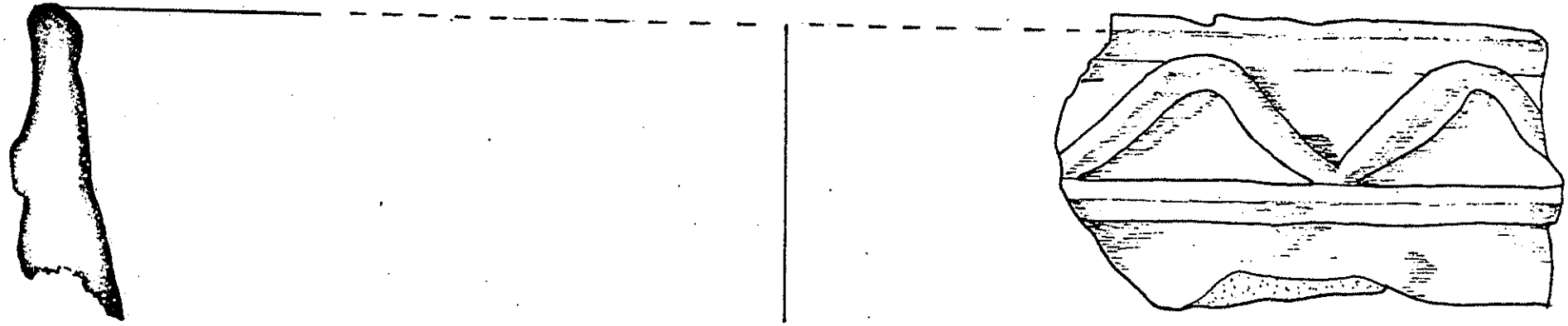
HDA 217.
1947 679. A
D. 20cms



1.

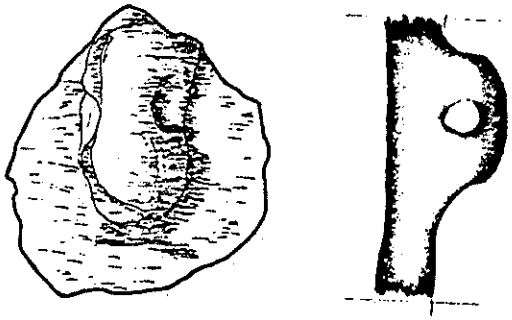
Rings Fig. 19

HDA 165
1927 626 A
Ds 48cms



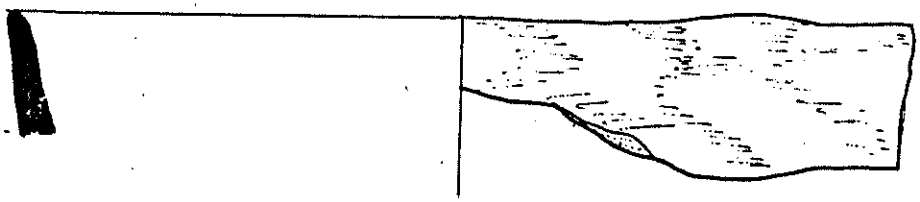
2.

H. DA 93. 1939 448. A
F.G.



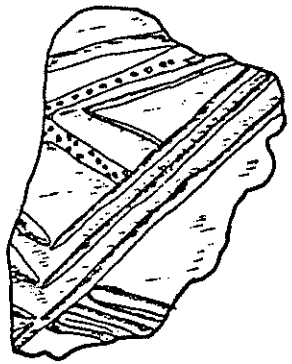
3.

HDA 234 D. 16cms. A
1947 695. F.G.



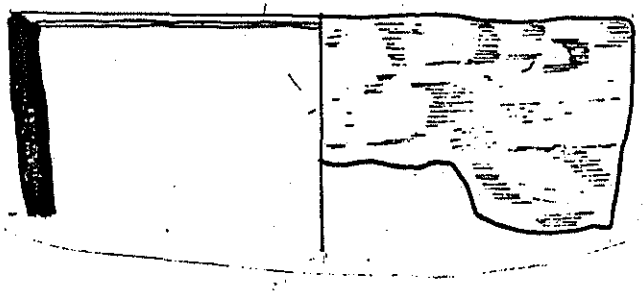
4.

HDA. 85
FG



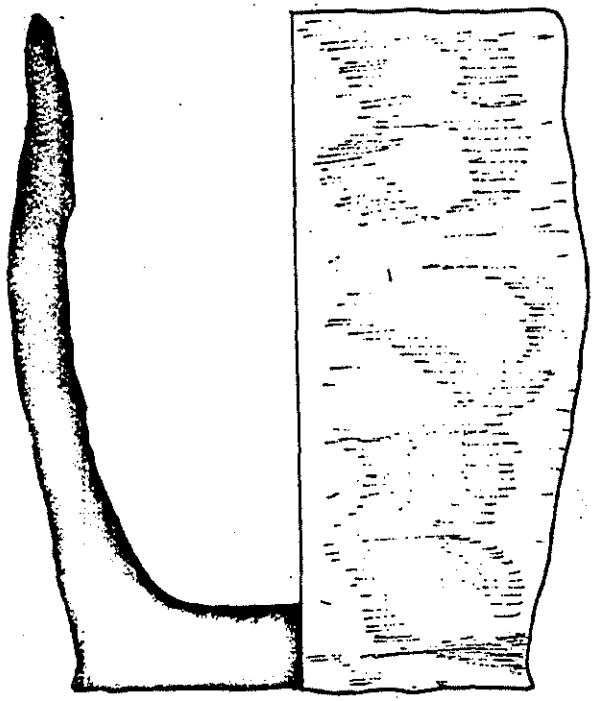
1.

HDA 232
1947 693
D. Hcms.
FG 0



2.

HDA 3 1939. 388
D 8cms.
F.G. 9E

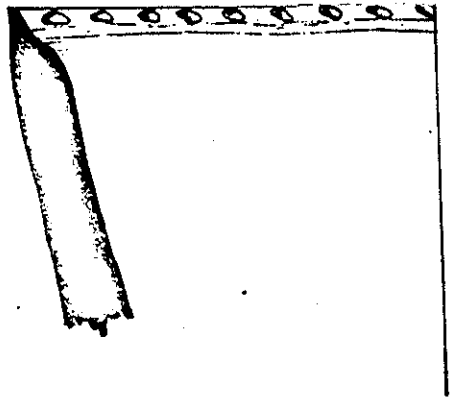


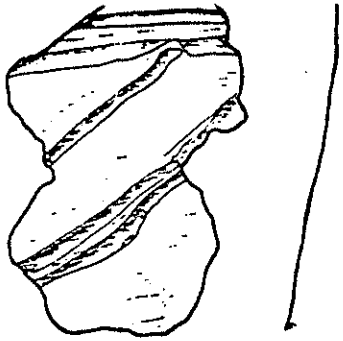
3.

Rinyo Fig 20

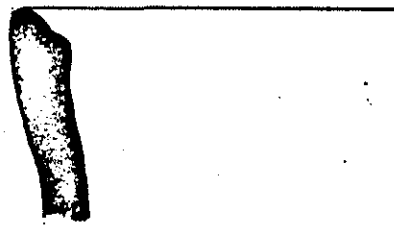
HDA 82
D. 16cms

F





D. 14cms F.G. F

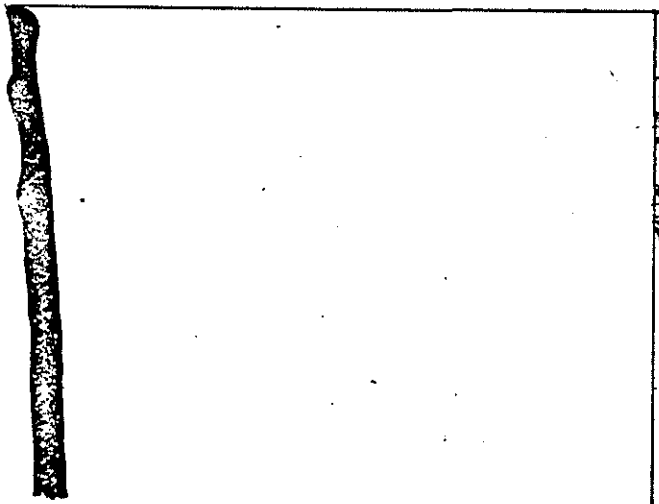


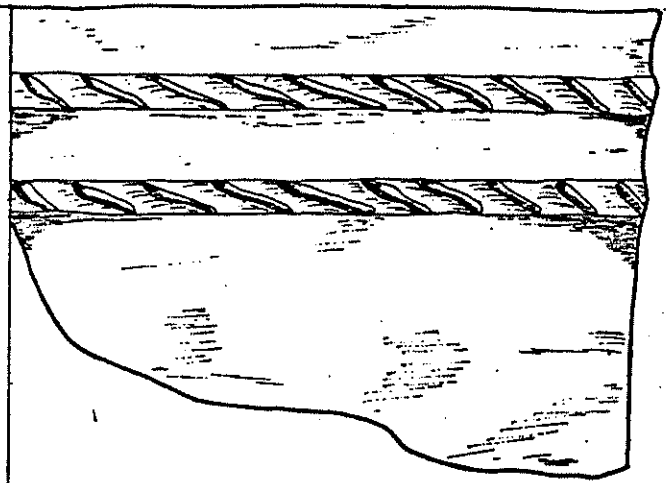
1.

2.

HDA 194.
1947 658.
D.c. 23cms
F.G

F

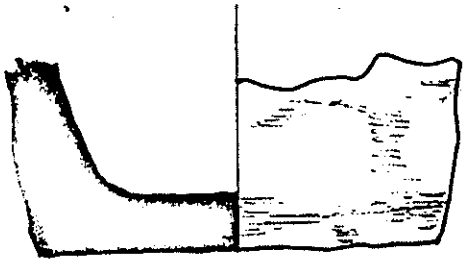




3.

HDA 38
D 7cms
FG

F

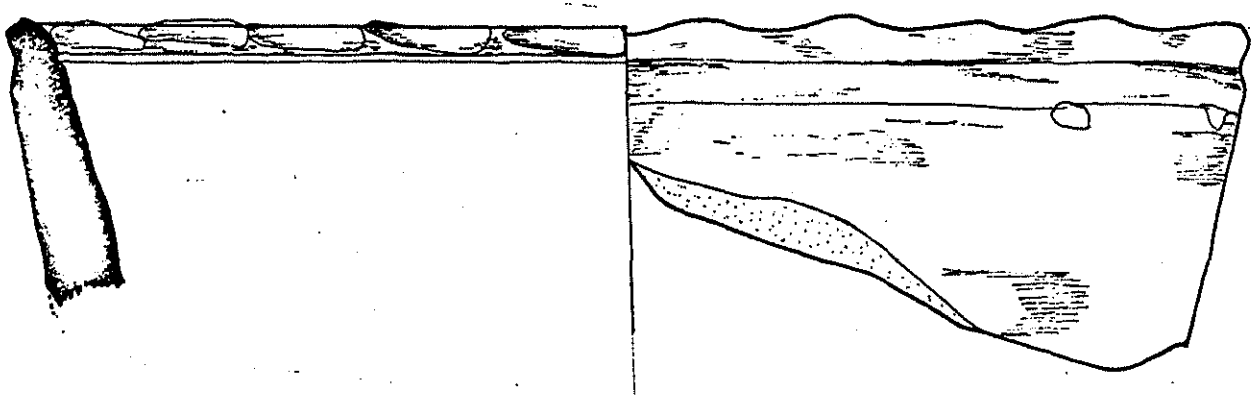


4

Ringo Fig. 21

HDA 30
D. 22cms.
F.G

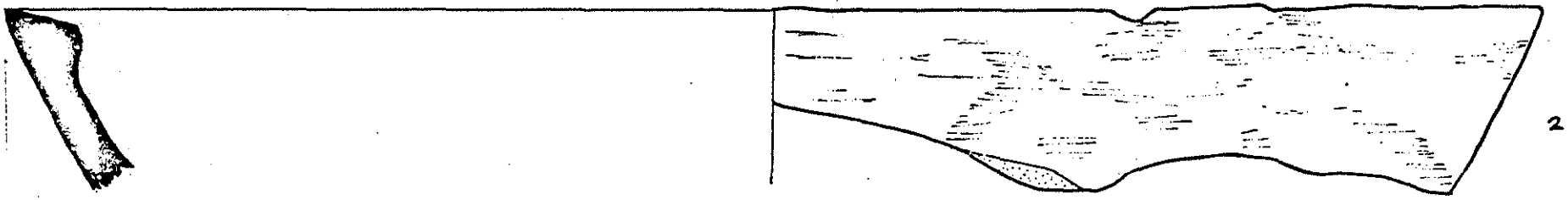
F



1.

Rinyo Fig 22

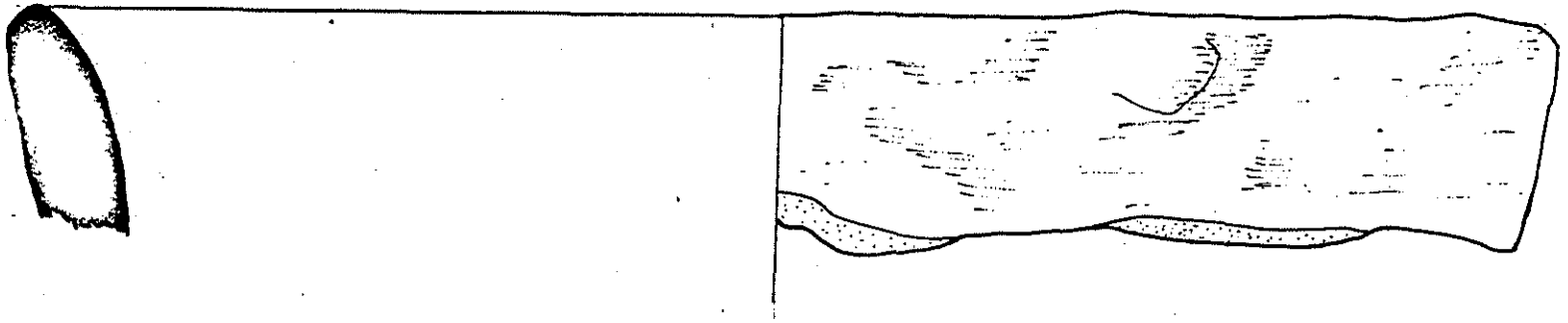
HDA 214 1947 675.
D. 32cms. F.G. F



2.

HDA6.
D. 27cms
F.G.

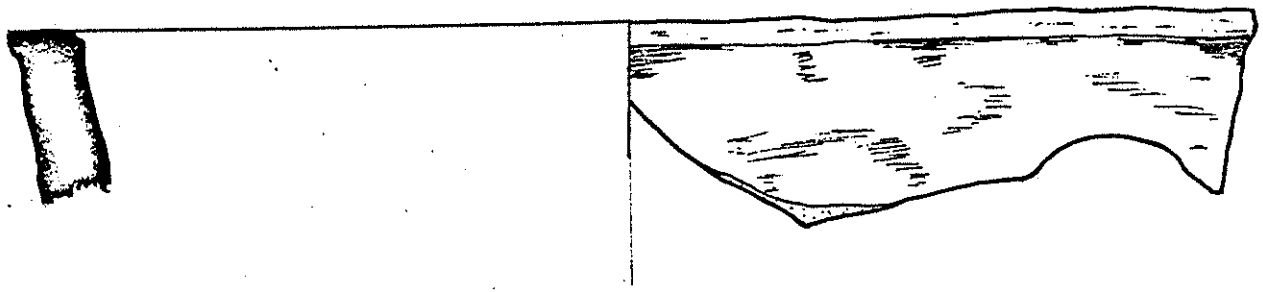
F



3.

HD A 225. 1947.686
D. 22cms. F.G.

G



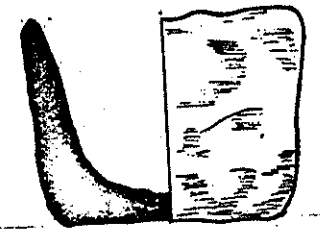
1.

HDA4 1939 389

D. 4 cms

F.G

G



2.

Rinyo Fig. 23

3.

HDA 45
D 10cms.
F.G.