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BLACK- BURNISHED[1] WARE FROM MUMRILLS : A RE-APPRAISAL OF SOURCES BY HEAVY MINERAL ANALYSIS

It gives me great pleasure to dedicate to John Gillam this brief note on black-burnished ware, a subject on which he himself has done much to advance our knowledge.

Black-burnished ware is the commonest Romano-British coarse pottery fabric, occuring principally as cooking-pots, bowls and dishes on a majority of military and civil sites dating from the second to fourth centuries A.D. It has been described and illustrated in numerous archaeological papers, the most important being Gillam's examination of this ware from the west ditch at Mumrills, where he was able to recognize two distinct types, each with their own particular forms and fabrics (1960). The clay in each case being gritty, and fired under reducing conditions during the latter stages of manufacture. BB1[2] is tempered with medium-grained sand, while BB2[2] contains a somewhat finer sand. Each category displayed distinct typological differences, though it was mistakenly reported at the time that both were handmade. The recognition of BB2 as essentially a wheel-turned product was made at a later stage (Farrar,1973,82).

Gillam's macroscopic division of the black-burnished ware at Mumrills was confirmed by spectrographic analysis conducted by Mrs. Richards of the Research Laboratory for Archaeology and the History of Art, in the University of Oxford. Richards found that it was possible to divide the Mumrills samples into two chemically distinct groups, 'A' and 'B' - corresponding to Gillam's classification Category 1 and Category 2 (1960,128). It was also claimed that both groups were each homogenous in fabric and represented the output from two separate centres. By comparing the results of previous spectrographic tests on mortaria of known provenance, Richards suggested the Herts./Middx. area for the production of BB1, and the Cantly/Rossington Bridge district of Southern Yorkshire for BB2. Interestingly enough in view of the climate of current opinion on the matter (Gillam,1973,56), Richards was apparently able to state quite firmly that the Mumrills BB2 was unlikely to have come from Colchester.

However, Richards' suggestions as to the likely areas of production of the Mumrills black-burnished ware were greeted with little enthusiasm. The two areas mentioned had not provided any archaeological evidence to support the view that the wares attributed to them had been made there, or indeed had revealed a particular concentration of them. Moreover, heavy mineral analysis by Peacock on a number of BB1 vessels from Alcester,

Warwickshire, produced a result which suggested that a large BB1 factory was situated around the shores of Poole Harbour, Dorset (1967; 1973). At the same time macroscopic similarity between northern BB2 and known Colchester examples suggested the latter site as a possible major production centre for much of the BB2 found in the northern military area (Gillam,1973,56).

In view of these new developments in the identification of possible source areas for BB1 and BB2, a small programme of heavy mineral analysis was undertaken on a selection of Mumrills black-burnished ware, from both the 1928 and 1958 excavations, to see if a different analytical technique could provide additional information on their likely origins. As both categories of black-burnished ware contain abundant inclusions of sand, it was felt that heavy mineral analysis offered a valuable alternative to spectrographic examination. Since Peacock drew attention to its potential for ceramic petrology, this technique has increasingly been used to provide an objective means for classifying sand used as a tempering agency in pottery (Peacock and Thomas,1967; Williams, 1974; Fulford,1975). The term 'heavy minerals' applies to those minerals such as zircon, garnet, epidote and tourmaline, which occur in sediments, sands in particular, and are so-called because of their high specific gravity (2.9), and which are denser than the majority of minerals constituting the bulk of the deposits. It follows, therefore, that if these minerals are

present in sands they must also occur in sand tempered pottery. Classification is based upon the wide variety of heavy minerals which are found in sediments, and distinctive combinations of these can often be assigned to a specific geological source. The basic technique of heavy mineral separation as applied to pottery has already been described by Peacock (1967), and will not be further discussed here.

Table I shows the heavy mineral results of the Mumrills samples, together with Richards' designation where applicable. The five samples taken from BB2 vessels, including two from Group 'B', revealed identical assemblages indicating a common origin. The heavy mineral suite produced by these samples is characterized by a high tenor of zircon combined by almost equal amounts of tourmaline and garnet, and a moderate amount of rutile, and this is closely comparable with analysis of a large group of BB2 vessels shown to have been made at Colchester (Williams, forthcoming, Group XII). It is worth pointing out that heavy mineral analysis of BB1 'wasters' from the second century A.D. kilns at Rossington Bridge, part of the area mentioned by Richards as a possible source for Mumrills BB2, has produced a noticeably different assemblage (ibid., Group II).

The writer has also recently been able to sample two BB2 vessels from the eastern side of the Antonine Wall at Bearsden (New Kilpatrick), apparently occupied only during the Antonine I period (about A.D. 142-158), and one from Newstead, the heavy

mineral assemblages in both cases agreeing with that from Mumrills in indicating a Colchester origin. It is clear from the results obtained so far that during the occupation of the Antonine Wall Colchester would appear to be the major, if not the sole, supplier of BB2 to the north.

In contrast to BB2, the heavy mineral suites of some eleven BB1 samples, including three from Group 'A', do not show the same degree of homogenity claimed by Richards and taken up by Gillam (Gillam and Mann,1970,32; Gillam,1973,55). Of the three tested by Richards, no. 9 (her no.1) and no. 10 (her no. 14), together with nos. 6,7,8 and 11 all have an assemblage characterized by a high percentage of tourmaline and no garnet, identical to the suite produced by pottery from the BB1 production centre around the Wareham- Poole Harbour area of Dorset (Peacock,1973; Williams,forthcoming,Group I).

The source areas of the remaining sherds are at present undesignated. Nos. 12 and 13 clearly indicate a similar origin, and also agree with samples from Milecastle 48 and Newstead (ibid., Group IV). No. 14 is similar to examples from Birdoswald (ibid., Group III) and Bearsden; the latter vessel is closely matched by the Mumrills one, both being a variation of G. 120[4], lacking the wavy line decoration round the neck. No. 15 is similar to a cooking-pot from Newstead (ibid., Group V), while no. 9 (Richards' no.22) has an assemblage quite unlike that of the other BB1 samples

analyzed from Mumrills, or so far tested from elsewhere.

Although a number of the BB1 samples mentioned above are as yet unprovenanced, the Herts./Middx. area indicated by Richards is not suggested by their mineralogy. While nos. 5 and 6 from Group 'A' fall into the large group of BB1 wares originating from Dorset.

The above results would seem to cast considerable doubt on the validity of the original spectrographic examination. The use of chemical analysis has achieved a number of practical results in the past (e.g. Catling et al, 1963), though much would seem to depend not only on which combination of trace elements are likely to achieve the best results (Peacock,1970,377), but also on the possible effect which postdeposital infiltration may have on certain mobile elements (Freeth,1967,109-111). It would appear possible that on this occasion the Mumrills BB2 samples in Group 'B' may also have been affected by chemical alteration, thereby recording a low calcium figure (as is the case with the majority of herringbone stamped mortaria from the Antonine Wall, known to have been made in Colchester, yet on analysis producing low amounts of calcium, whereas the kiln material from Colchester contained a high figure for this chemical - though even here there was an exception, no.163 from Old Kilpatrick, which had a high calcium content, Hartley and Richards,1965,36).

In addition to Mumrills, chemical analysis has also been conducted on samples of 'coarse fumed ware' (BB1) and 'fine fumed

ware' (BB2) from Castledykes (Robertson,1964,276). As both sherds produced similar results, it was suggested that they were made in the same location, though probably not in the same factory. Due to the nature of these samples, it has not been possible to study the black-burnished types which were analyzed, though taken at its face-value, the suggestion that BB1 and BB2 were made in the same area seems unlikely (Dr. Robertson has kindly informed me that the two samples of black-burnished ware were small pieces of body, not rims, and as such were not illustrated in the report). Not one of the BB1 and BB2 vessels analyzed by the writer from a variety of sites in different parts of the country have yielded a similar enough assemblage to a sample in the opposing category to suggest production in the same geological area (Williams,forthcoming). Nor indeed is there any archaeological evidence to indicate that these two wares are to be found in any quantity in the same production area. In the region where BB2 manufacture appears to be concentrated, namely around Colchester and north Kent, apart from the odd BB1 vessel turning up, the area is noticeably sparse in these types (Gillam,1955,66,map IV). Moreover, when BB1 vessels do occur they are predominantly late forms and not the earlier types which are found in such numbers at Castledykes (Robertson,1964,figs.41-45 and 47). Similarily, there is very little BB2, if any, to be found close to the known BB1 centres of Dorset and Rossington Bridge (Williams,forthcoming).

It is interesting to note, that but for the relatively low amounts of calcium and ferrous oxide in the two Castledykes sherds, these 'coarse' and 'fine' samples fit reasonably well into Mumrills 'A' and 'B' groups respectively (details of the Castledykes' analysis and Richards' average and range percentages for Groups 'A' and 'B' are reproduced in Table II). Significantly, calcium and ferrous oxide are among those elements which Freeth considers to be particularly susceptible to postdeposital migration (1967,118). It is suggested, therefore, that the spectrographic findings of black-burnished ware from Mumrills and Castledykes are open to serious doubt, particularly as there would appear to be no general agreement on the most suitable elements to measure, and that geological provenance might well affect certain elements adversely. The mineralogical evidence presented here is perhaps stronger in this respect.

Origins of the Mumrills black-burnished-ware

The total number of BB1 vessels illustrated from the 1958 excavations at mumrills was twenty-eight (nos. 1-28 in the report), said to represent a total of ninety-six vessels. A macroscopic examination was made of illustrated vessels exclusive of those which were actually analyzed, and it was found that those which appeared to have been made in Dorset probably accounted for about

50% of the total. This figure seems to fit in quite well with the results obtained from the heavy mineral analyses. Thus, of the eleven undoubted BB1 vessels analyzed (see Table I), six turned out to have assemblages suggesting a Dorset origin.This figure seems to be of the same order as that from the Antonine I levels at Bearsden, where of some twenty-five BB1 vessels represented there, about half seem to come from Dorset. The remaining BB1 vessels from Mumrills appear to be drawn from a variety of other centres, each producing a small number of BB1 types.

In contrast to BB1, the five Mumrills BB2 vessels each had similar heavy mineral assemblages, identical to BB2 ware from Colchester. A macroscopic examination of the illustrated BB2 vessels indicates that the vast majority, if not all, are homogeneous in fabric and, as such, likely also to be of a Colchester origin. A similar situation has also been noted at Bearsden.

1. The term 'black-burnished' ware is used here in the sense of Webster (1969,5) and Gillam (1970, preface), to describe a range of cooking and associated vessels in a distinctive fabric.
2. Black-burnished Category 1 (Gillam,1960,126-127).
3. Black-burnished Category 2 (Gillam,1960,126-127).

4. Refers to Gillam's Types paper (1957).

5. Refers to the paper by Gillam and Mann (1970) and the second century types of black-burnished ware illustrated in figs. 1 and 2.

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References

Catling,H.W., Richards,E.E. and Blin-Stoyle,A.E. (1963) 'Correlations between composition and provenance of Mycenaean and Minoan potter Ann. Brit. School Arch. Athens, 58(1963), 94-115.

Farrar,R.A.H. (1973) 'The techniques and sources of Romano-British black-burnished ware', in Current Research in Romano-British Coarse Pottery ed. Detsicas,A.P., CBA Res. Rep. 10 (1973 67-103.

Freeth,S.J. (1967) 'A chemical study of some Bronze Age potte sherds', Archaeometry , 10-11(1967-9),104 119.

Fulford,M.G. (1975) 'The pottery', in Cunliffe,B., Excavations at Porchester Castle, Res.Rep. Soc. Ant., no. 32 (London , 1975), 270-367.

Gillam,J.P. (1955) 'Roman pottery in the north of Britain', i Carnuntina , ed. Swobda,E., Kongress der Altertumsforscher Carnuntum 1955, 64-77.

Gillam,J.P. (1957) 'Types of Roman coarse pottery vessels in northern Britain', AA[4] , 35(1957), 180-251

Gillam,J.P. (1960) 'The coarse pottery', in Steer,K.A., 'Excavations at Mumrills Roman fort, 1958-

60', PSAS , 94(1960-1),113-129.

Gillam,J.P. (1970) Types of Roman Coarse Pottery Vessels in Northern Britain, third edition (Newcast Upon Tyne,1970).

Gillam,J.P. (1973) 'Sources of pottery found on northern military sites', in Current Research in Romano-British Coarse Pottery, ed. Detsi A.P., CBA Res. Rep. 10 (1973),53-62.

Gillam,J.P. and Mann,J.C. (1970) 'The northern British frontier from Antoninus Pius to Caracalla', AA[4], 48 (1970),1-44.

Hartley,K.E. and Richards,E.E. (1965) 'Spectrographic analysis of some Romano-British mortaria', Bull.Inst. Arch. London Univ., 5 (1965),25-43.

Macdonald,G. and Curle,A.O. (1928) 'The Roman fort at Mumrills', PSAS, 63 (1928-9),396-575.

Peacock,D.P.S. (1967) 'The heavy mineral analysis of pottery: a preliminary report', Archaeometry , 10 (1967), 97-100.

Peacock,D.P.S. (1970) The scientific analysis of ancient cerami a review', World Archaeology , 1 (1970), 375-389.

Peacock,D.P.S. (1973) 'The black-burnished pottery industry in Dorset', in Current Research in Romano-

British Coarse Pottery , ed. Detsicas, A.P., CBA Res. Rep. 10 (1973),63-65.

Peacock,D.P.S.and Thomas,A.C. (1967) 'Class 'E' imported post-Roman pottery: a suggested origin', Cornish Arch., 6 (1967),35-46.

Richards,E.E. (1960) 'Report on black-burnished ware from Mumrills', in Steer,K.A., 'Excavations at Mumrills Roman fort , 1958-60', PSAS , 94(1960-1),129-130.

Robertson,A.S. (1964) The Roman Fort at Castledykes (Edinburgh,1964).

Webster,G. (1969) Romano-British Coarse Pottery: A Student's Guide , CBA Res. Rep. 6 (London,1969).

Williams,D.F. (forthcoming) 'The Romamo-British black-burnished industry: an essay on characterization by heavy mineral analysis', in Pottery and Early Commerce: Characterization an Trade in Roman and Later Ceramics , ed. Peacock,D.P.S. (forthcoming).

Williams,J.Ll.W. (1974) 'The petrological and micro-mineralogical analysis', in Prag,A.J.N.W.,Schweizer,F and Williams,J.Ll.W., 'Hellenistic glaze wares from Athens and Southern Italy:

analytical techniques and implications',
Archaeometry, 16 (1974), 157-167.

TABLE I : HEAVY MINERAL ANALYSES

No.	Type	Reference	Mrs Richards' Classification	Percentages of Non-opaque Minerals									
				Zircon	Tourmaline	Rutile	Kyanite	Andalusite	Staurolite	Garnet	Epidote	Apatite	Anatase
1	BB2 bowl, G/M.19 5	1928 excavation	-	74.5	9.2	2.9	2.3	.5	1.1	7.0	1.1	.9	.5
2	BB2 bowl, G/M.19	1958 excavation (Gillam,1960,fig.13,no.43)	-	70.9	7.0	4.6	3.3	1.1	1.1	7.5	1.1	1.7	1.7
3	BB2 bowl, G.222	1958 excavation (Gillam,1960,fig.13,no.39)	Group B (no.9)	68.6	6.4	3.9	3.2	-	1.6	12.3	1.6	.8	1.6
4	BB2 dish, G.328	1958 excavation (Gillam,1960,fig.13,no.45)	Group B (no.12)	81.4	5.5	2.1	3.6	-	2.8	4.2	.4	-	-
5	BB2 cooking-pot, G.137	1958 excavation (Gillam,1960,fig.12,no.35)	Group B (no.34)	68.9	10.5	4.1	4.1	-	2.1	8.3	1.0	-	1.0
6	B31 beaker, G.65	1928 excavation (Macdonald and Curle,1928, fig.96,no.10)	-	32.7	56.3	1.2	4.2	1.2	3.8	-	-	-	.6
7	BB1 cooking-pot, G.128	1928 excavation (Macdonald and Curle,1928, fig.96,no.9)	-	21.6	64.9	2.7	1.3	5.4	4.1	-	-	-	-
8	BB1 cooking-pot, G.125	1928 excavation	-	18.4	73.7	3.3	.9	1.9	.9	-	-	.9	-
9	BB1 dish, G.308	1958 excavation (Gillam,1960,fig.12,no.25)	Group A (no.1)	45.1	46.3	2.5	1.5	3.1	.5	-	-	1.0	-
10	BB1 dish, G.316	1958 excavation (Gillam,1960,fig.12,no.28)	Group A (no.14)	44.1	46.1	4.1	2.2	1.1	2.2	-	-	-	.2
11	BB1 dish, G.316	1958 excavation (Gillam,1960,fig.12,no.23)	-	35.3	50.8	5.0	1.3	1.9	3.8	-	-	.6	1.3
12	BB1 dish, G.309	1928 excavation	-	63.4	18.5	2.6	-	-	-	14.6	.7	-	.2
13	BB1 cooking-pot, G.125	1958 excavation	-	64.8	15.4	3.1	-	-	-	15.4	.4	-	.9
14	BB1 cooking-pot, variation G.120	1928 excavation	-	66.2	7.6	6.4	2.0	2.1	1.4	12.0	-	1.4	.9
15	BB1 cooking-pot, G.130	1928 excavation	-	71.9	21.5	.7	-	.4	.4	4.4	-	.7	-
16	BB1 cooking-pot, G.130	1958 excavation (Gillam,1960,fig.11,no.10)	Group A (no.22)	37.3	22.9	2.4	-	3.2	4.0	26.2	-	3.2	.8

TABLE II : SPECTROGRAPHIC ANALYSIS OF BLACK-BURNISHED WARE

		$\%Na_2O$	%MgO	%MnO	$\%TiO_2$	%CaO	%FeO	Remarks
Richards Group 'A', 12 vessels (1960) (Range = average value ± 30% of average value)	Average	.16	.74	-	.77	.57	4.4	'Compare with Verulamium mortaria' (see Hartley and Richards,1965)
	Range	.11-.21	.52-.96	.01-.014	.54-1.0	.40-.74	3.1-5.7	
Castledykes, 'coarse fumed ware' 1954.73		.25	.89	-	.77	.18	1.56	
Richards Group 'B', 8 vessels (1960) (Range = average value ± 30% of average value)	Average	.30	1.46	-	1.10	.48	5.9	'Compare with Rossington Bridge/Cantley mortaria' (see Hartley and Richards, 1965)
	Range	.21-.39	1.02-1.90	1.01-0.022	.77-1.43	.34-62	4.1-7.7	
Castledykes, 'fine fumed ware, 1954.32		.40	.90	-	.87	.12	1.38	

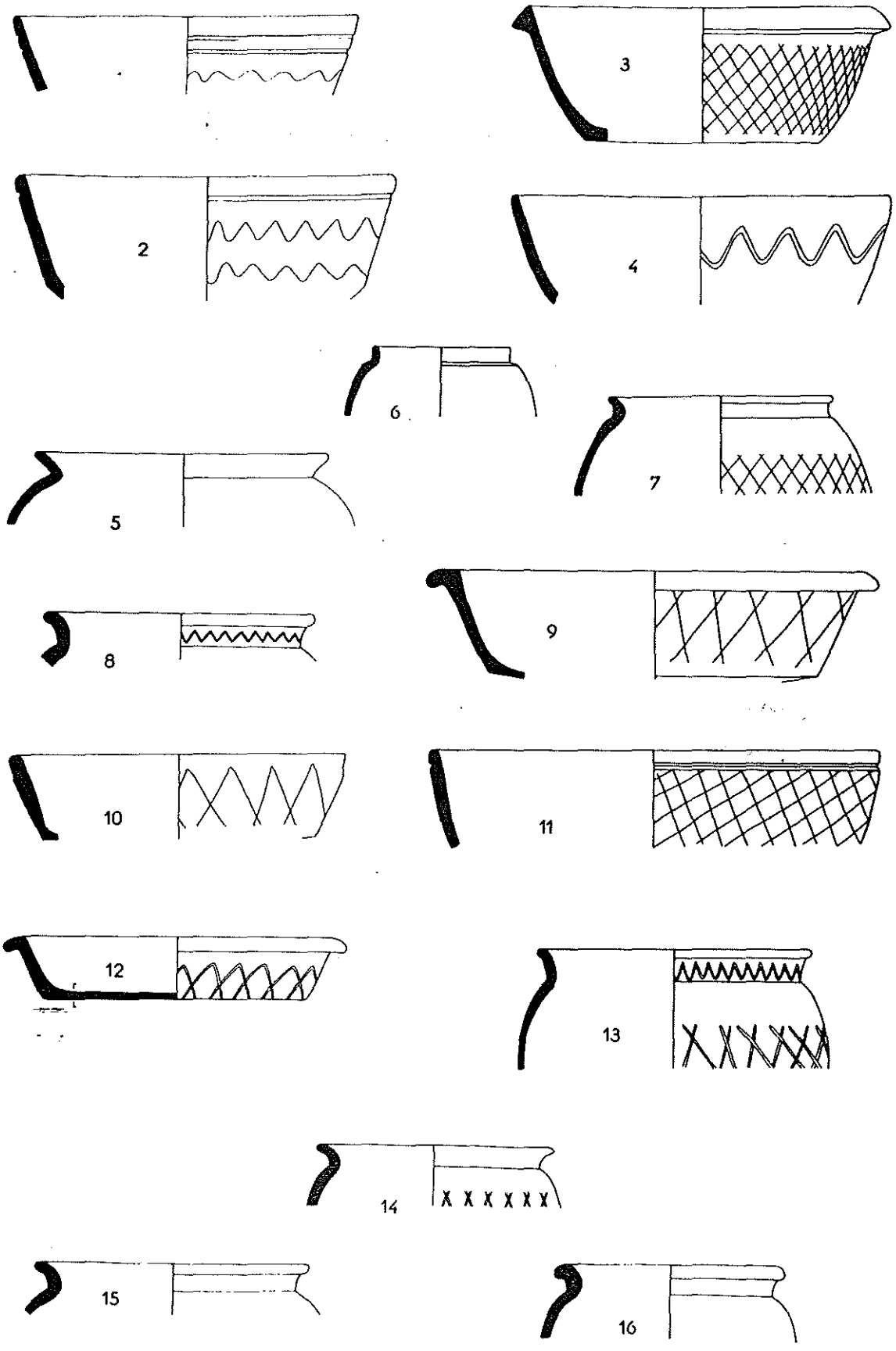

Fig.1 () VESSELS ANALIZED IN TABLE I

(for previous publication see table I)