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STANDARDIZED ANALYSES OF GLASS TRADE BEADS FROM MGUNGUNDLOVU AND ONDINI, NINETEENTH CENTURY ZULU CAPITALS*

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ABSTRACT

Renewed interest has been generated in studies of beads from southern African Iron Age sites. Statistical analyses of bead frequencies can now be undertaken, making use of a standardized, internationally recognized classification scheme. Large samples from two nineteenth century Zulu capitals, Mgungundlovu and Ondini, have been examined according to this typology. Results of statistical analyses are presented to demonstrate variability in bead frequencies within and between sites. The results show that the recovery methods of four excavators have not introduced systematic biases in the consolidated Mgungundlovu bead collection. Assemblages from different parts of the site more closely resemble each other than any of them resemble the bead collection of Ondini. These findings clear the way for more detailed physical and chemical analyses of the beads, so as to quantify the spatial and temporal variability of different bead types.

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Introduction

A strong tradition of glass bead studies in the archaeology of southern Africa became dormant in the early 1960s when radiocarbon analysis replaced beads as a dating method for Iron Age studies. From an initial impetus in the work of MacIver (1906) and Caton-Thompson (1931) at Great Zimbabwe, this tradition was continued by Laidler (1934), Van Riet Lowe (1955), Van der Sleen (1956), Schofield (1958), Summers (1958) and Kirkman (1974). A useful synopsis of the 'early phase' of bead studies was prepared by Du Toit (1961).

Iron Age research in southern Africa gained momentum since 1960, with little contribution from bead studies. This 'dormant' period in bead studies lasted until about 1985. Ironically this has been the period when bead studies flourished elsewhere, particularly in the archaeology of North America where standardized systems for bead classification were developed by K.E. Kidd and M.A. Kidd (1970), Stone (1974) and Ross (1974, 1976); Karklins (1985) expanded on Kidd & Kidd's (1970) classification system. Also in North America, the *Bead Journal* was the first magazine devoted to the study of beads. Currently, the Society of Bead Researchers publishes a newsletter, *Bead Forum*, and a journal, *Beads*. Newsletters are also published by the Bead Study Trust in the United Kingdom and by the Center for Bead Research at Lake Placid. A bead museum has been established in Prescott, Arizona.

The basic driving forces behind this florescence in bead studies have been twofold. Beads can provide better chronological precision than radiocarbon dating in recent centuries, since the earliest dates of manufacture of certain types are known. Furthermore, where the origins of beads can be determined, trade networks can be examined. Both these goals are best realized in the European colonial period for which historical records on bead manufacture and trade exist.

While the study of trade beads lay dormant in southern Africa, Davison's (1972) doctoral thesis provided a pioneering quantitative elemental analysis of some 400 beads from various sites in eastern and southern Africa. Completed at the University of Berkeley under the supervision of Desmond Clark, this study included neutron activation analysis and X-ray fluorescent spectrometry. The results are inconclusive, however, as Davison was unable to substantiate the presumed Indian origin of, for example, 'trade wind beads' found at Mapungubwe and later sites. Sourcing by means of chemical characteristics proved impossible because no glass factories of the appropriate period have been excavated in India, nor do we have securely dated examples of early Indian beads like those on sample cards of later European traders. Without such direct lines of evidence, the problem is simply too large to attack with elemental analysis as the primary tool.

Currently, appropriate methods in bead analysis are primarily those of traditional archaeology: large scale visual screening and typological classification, in essence the procedures of the ceramic analyst. To these, specialized techniques of materials science can be added.

Recent Bead Studies in South Africa

The success of North American bead studies has caused a resurgence of interest among archaeologists and ethnologists working on southern African material. For example, a bead workshop was held at the annual conference of the South African Museums Association in 1987, and David Killick recently completed a study of beads excavated from nineteenth century Cewa villages in Malawi. In South Africa, much of the interest has centered on Zulu beadwork, leading to the analysis of beads from nineteenth century sites. A preliminary study of one collection of beads excavated at Mgungundlovu (Fig. 1) was done by Roger Summers, and another collection from Ondini (Ulundi) has been studied by Tim Maggs and staff of the Natal Museum. The Mgungundlovu sample relates to a period between 1828-1839, associated with Dingane's rule over the Zulu kingdom; the bead sample from Ondini is associated with Cetshwayo's rule (1872-1879) some forty years later.

A large scale study of beads from South African sites, particularly the nineteenth century Zulu capitals at Mgungundlovu and Ondini, was started by Van der Merwe and Saitowitz in 1987. This study includes visual screening of all beads excavated at the two sites and their typological classification according to methods of manufacture and appearance. In addition, measurements of bulk density and refractive index are being taken, and an electron microprobe is being used for elemental analysis. Eventual goals of these analyses include a study of the external trade relations of the Zulu Kingdom between 1828 and 1879; an assessment of trade information obtained from beads compared with known historical records; and the provision of a large database from two

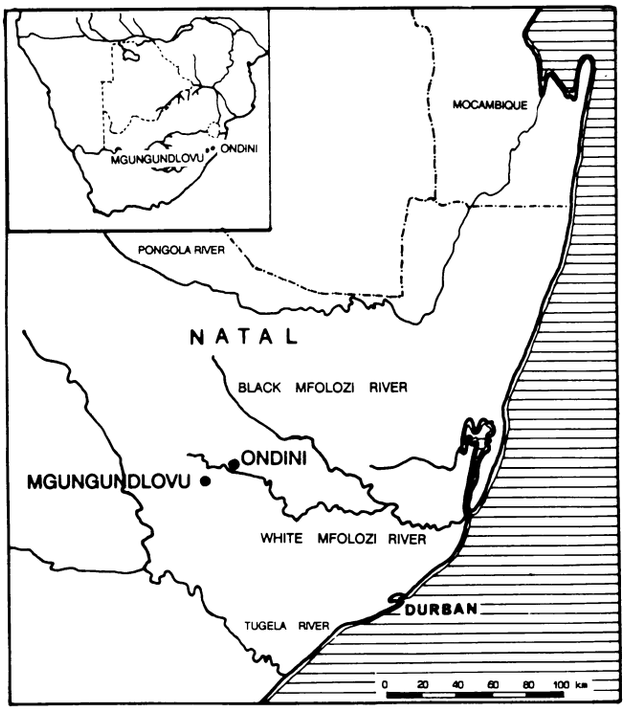

Fig. 1. Map showing location of Mgungundlovu and Ondini.

shortlived sites, against which other nineteenth century collections can be compared.

In addition to two surface collections, some 12 000 beads have been recovered from four different excavation projects in various parts of Mgungundlovu, and more than 9000 beads have been obtained from excavations at Ondini. In the latter case, the majority of the collection (more than 97%) was recovered by Rawlinson's excavation team from one area of the site, the *isigodlo* (i.e. the royal living quarters). Samples from a number of middens outside the *isigodlo* were also excavated. In order to undertake a standardized analysis of the beads from both sites, the various excavated asemblages were consolidated in the Archaeometry Laboratory at the University of Cape Town. A preliminary typological study of the beads raised a number of basic questions about the nature of the collections and the methods by which they were assembled. Accordingly, a preliminary statistical analysis was undertaken of bead frequencies from the two sites, based on methods of manufacture, type and colour (i.e. visual screening alone), in order to address the following questions:

1. To what extent, if at all, did the recovery methods of different archaeologists bias the bead collections at Mgungundlovu?
2. To what extent, if at all, do bead frequencies differ between assemblages from different parts of Mgungundlovu?
3. In what respect does material from the *isigodlo* at Ondini differ from samples obtained outside the royal quarters at this site?
4. In what respect do bead samples from Mgungundlovu differ from those recovered from Ondini?
5. If differences in bead frequencies can be detected, do these correspond to spatial and/or temporal variability in the use of beads?

These questions must be satisfactorily answered before more complex analyses (physical and chemical measurements) and lines of enquiry (bead sources, trade relations, influence of supply and demand on bead frequencies) can be pursued. They are addressed here, following a brief description of Mgungundlovu and an account of excavations undertaken at the site. Ondini is not treated in the same detail, due to the fact that most of the bead collection from this site came from one area, the *isigodlo*.

Mgungundlovu

Historical background

When Dingane kaSenzangakhona succeeded Shaka to the Zulu kingship in 1828, he followed his predecessor's custom of building a number of large military towns in the heart of the kingdom. Finished in 1829, Mgungundlovu was the largest of these towns, serving as the residence of Dingane and his principal advisors. In Zulu the name of the capital is thought to mean the secret meeting place of the elephant.

Internal affairs of the Zulu kingdom were co-ordinated from Mgungundlovu, built on a gently sloping hill side in the wooded savannas of the upper White Umfolozi River catchment (Fig. 1). A large military garrison was maintained there, and trade was conducted with European entrepeneurs who approached the capital from Delagoa Bay in the north and from Port Natal in the south (Guy 1979). Most of the trade was conducted through Delagoa Bay, with the Portuguese as major

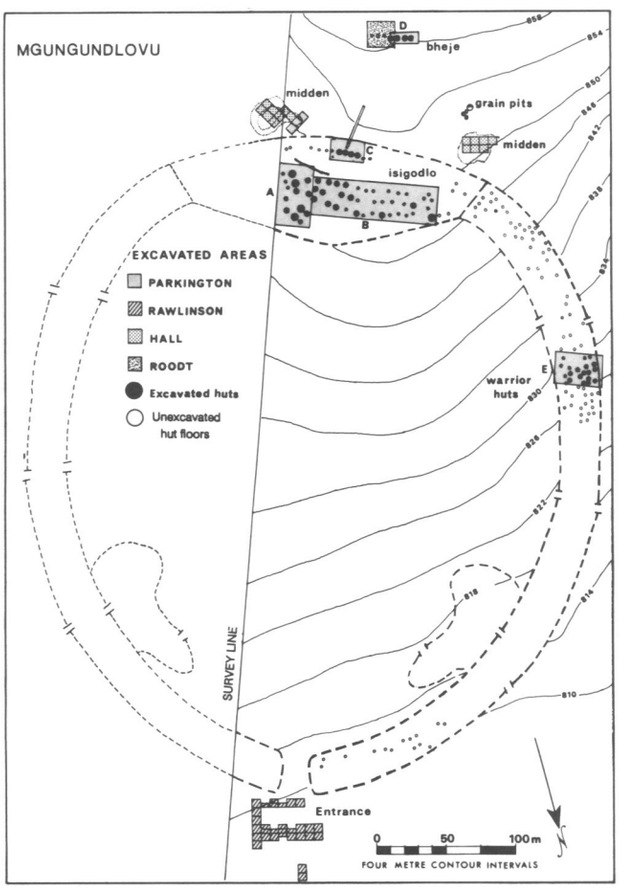

Fig. 2. Schematic drawing of Mgungundlovu showing outline of the palisade and excavations at the site, based on survey by departments of Archaeology and Land Survey, University of Cape Town (Parkington & Cronin 1979).

trading partners. As part of this network, glass beads had gained local value because of rarity and controlled distribution (Hall 1987).

Mgungundlovu was described by a number of European visitors to the site, including Andrew Smith (Lye 1975) and Gardiner (1966). Many years later, James Stuart compiled a map of the town based on oral testimony of Zulu informants who had lived there (Webb & Wright 1977). From these sources, it is clear that Mgungundlovu was elliptical in shape, with two arcs of densely packed warrior houses enclosing a large open space (Fig. 2). The *isigodlo* (a royal area) was situated at the head of the complex on the southern side of the site opposite the main entrance. Dingane's private quarters are believed to have been situated on the east side of the royal area. In a letter written by Piet Retief on 18 November 1837, the king's house is described as a "beautiful habitation, spherical in shape and twenty feet in diameter" (Campbell n.d.:16).

Above the *isigodlo* there were three small enclosures, probably all containing huts but apparently serving different purposes. This area is known collectively as *bheje*, though the three enclosures were referred to individually as *umvazana*, *bheje* and *kwambeceni* (Natal Provincial Museums Service and National Monuments Council n.d.).

When Dingane put Mgungundlovu to the torch in 1839, in the face of an advancing Voortrekker commando, the intense heat of the burning wood and thatch superstructure of huts served to bake the clay floors, ensuring the preservation of many of them to the present day. In addition, extensive midden deposits survive above the *isigodlo*.

Excavation

Within the past 15 years, four controlled excavation projects have been conducted at Mgungundlovu. In January 1974 and July 1975 a group from the Archaeology Department of the University of Cape Town and the Natal Museum undertook fieldwork in various parts of the site (Parkington & Cronin 1979). Their excavations included clay floors in the *isigodlo* area, part of the *isigodlo* midden, hut floors from the *bheje*, and hut floors in the region associated with warrior houses. Excavations in the latter area did not yield bead samples.

Additional areas of the *isigodlo* midden were excavated by Hall (Natal Museum) in 1978. It is probable that material from this part of the site can be attributed to a single time unit, c. 1829-1838. Since 1985, further work has continued at the site under the auspices of the Natal Provincial Museums Service. Roodt is working on hut floors from the *bheje* areas as well as the *isigodlo* and the eastern side of Mgungundlovu. Rawlinson's excavations included hut floors and a refuse dump near the entrance to the site.

Recovery methods

Substantial samples of large objects such as ceramics and fauna were recovered from coarse-meshed sieving, and mineralogical test sieves of various screen sizes were used to recover glass trade beads. Due to time constraints, it was necessary to combine methods of retrieval to collect representative samples of beads and other objects. For example, in the case of Hall's excavation of the *isigodlo* midden, all deposit was dry-sieved, 61% being processed through a 5 x 5 mm mesh sieve, the remaining 39% through a 2,5 x 2,5 mm mesh, and a sample of the latter again through a fine mosquito net. This sampling strategy was designed to retrieve the full range of beads and other small objects present. In the case of Parkington's excavations, material was sieved through 12,7 x 12,7 mm (1/2 inch) as well as 3,2 x 3,2 mm (1/8 inch) mesh sieves.

Analysis of beads

Beads from Mgungundluvo and Ondini have been classified according to procedures described previously (Saitowitz 1988). Several bead types and varieties have been identified in accordance with Kidd & Kidd's (1970) internationally recognized taxonomy, extended by Karklins (1985), based primarily on method of manufacture (drawn, wound, blown etc.) and appearance (colour, type, shape, size, etc.). The following types are present.

If: drawn, simple, tubular, facetted
IIa: drawn, simple, circular monochrome, undecorated, heat rounded or 'tumbled'
IIb: drawn, simple, circular decorated with a single stripe, heat rounded or 'tumbled'
IVa: drawn, compound, circular, undecorated, heat rounded or 'tumbled'
WIb: wound, simple, round or oval (barrel-shaped)
WIIIa: wound, simple, round or oval (barrel-shaped), colour and/or material of surface coating being different from that of the core
WIIIb: wound, simple, round with inlaid decoration
BIa: blown, simple, round, undecorated

Statistical analyses of beads from Mgungundlovu

Table 1 lists percentages of beads classified according to Kidd & Kidd's (1970) taxonomy, extended by Karklins (1985). IIa is consistently the dominant type, irrespective of the area from which samples were obtained. This type, corresponding to Beck's (1928) "short circular barrel I.B.1.b.", accounts for 79,3% of all of the beads from the *isigodlo* midden excavated by Hall, corresponding closely to the proportion of IIa beads (78,4%) from part of the *isigodlo* midden excavated by Parkington. The proportions of IIa beads are also high in samples from huts in the *isigodlo*, the *bheje*, and the entrance to the site. IIb and IVa are the next most frequently occurring types. Most of the others (including If, WIb, and WIIIa) tend to account for less than 1% of the beads in each sample. Blown beads (type BIa) and decorated beads of type WIIIb e.g. 'eye beads' are generally rare, although a cluster of such beads was recovered from the *bheje* (Parkington & Cronin 1979:143).

Table 2 lists bead frequencies of all types found at Mgungundlovu and Ondini, classified by colour and diaphaneity. Where possible, Munsell colour codes have been given together with descriptive terminology. It is clear that white is consistently the most common colour at Mgungundluvo, irrespective of the area from which samples were obtained. Other common colours include green (Munsell number 2.5G 4/8), amber (7.5YR 6/10) and bright navy blue (7.5PB 2/8).

Pearson's correlation co-efficients (r) have been calculated from percentages of all bead types to determine the degree of similarity between bead assemblages from different excavated areas at Mgungundluvo and Ondini. Results given in Table 3 are based on data listed in Table 2, dominant white beads being grouped together. A strong correlation coefficient (r=0,98) has been obtained for the comparison between *isigodlo* midden samples excavated by Hall and Parkington respectively. Comparison between two samples from different excavations in the *bheje*, excavated by Parkington and Roodt respectively,

Table 1. Percentages of beads in collections of beads from Mgungundlovu and Ondini, using Karklins' (1985) typology. If: drawn, simple, tubular, facetted; IIa: drawn, simple, circular, monochrome, undecorated, heat rounded or 'tumbled'; IIb: drawn, simple, circular, decorated with a single stripe, heat rounded or 'tumbled'; IVa: drawn, compound, circular, undecorated, heat rounded or 'tumbled'; WIb: wound, simple, round or oval (barrel-shaped); WIIIa: wound, simple, round or oval (barrel-shaped), colour and/or material of surface coating being different from that of the core; WIIIb: wound, simple, round with inlaid decoration; BIa: blown, simple, undecorated, round.

	Type:	If	IIa	IIb	IVa	WIb	WIIIa	WIIIb	BIa	TOTAL	n
Mgungundlovu Excavation	Excavator										
Isigodlo midden	Hall	0.56	79.34	3.72	14.26	0.90	0.34	0.84	0.04	100	7,735
Isigodlo midden	Parkington	0.26	78.44	7.79	12.21	0.26	0.00	1.04	0.00	100	385
Isigodlo huts	Parkington	0.00	91.51	4.99	3.33	0.00	0.00	0.17	0.00	100	601
Bheje	Parkington	0.00	73.47	4.08	2.04	0.00	0.00	20.41	0.00	100	49
Bheje	Roodt	0.00	77.48	21.11	1.40	0.00	0.00	0.00	0.00	100	2,065
Entrance	Rawlinson	0.19	91.32	4.43	3.81	0.00	0.19	0.06	0.00	100	1,601
Total	All	0.38	81.13	6.89	10.14	0.57	0.23	0.66	0.02	100	12,436
Ondini excavation											
Total	Rawlinson	0.02	90.05	0.25	8.50	0.29	0.85	0.03	0.00	100	9,042
Isigodlo midden	Rawlinson	0.00	84.54	2.06	11.34	1.55	0.52	0.00	0.00	100	8,848
Non-isigodlo	Rawlinson	0.02	89.94	0.29	8.56	0.32	0.84	0.03	0.00	100	194

Table 2. Frequencies of beads of all types from Mgungundlovu and Ondini, classified by colour and diaphaneity, using Kidd & Kidd's (1970) taxonomy, extended by Karklins (1985, pers. comm.). Bead reference numbers from Kidd & Kidd (1970); asterisks indicate beads of type IIa and IIb that were not included in their reference list. Diaphaneity indicated as opaque (Op), translucent (Tsl) or transparent (Tsp). Colour terms as used by Kidd & Kidd (1970) and Karklins (pers. comm.) are listed here, except in cases of beads marked by asterisk.

				MGUNGUNDLUVO							ONDINI		
			Excavator:	Hall	Parkington			Roodt	Rawlinson	All	Rawlinson		
Type and bead reference number	Dia-phan-eity	Colour	Excavation:	Isigodlo midden	Isigodlo midden	Isigodlo huts	Bheje	Bheje	Entrance	Total	Total	Isigodlo midden	Non-isigodlo middens
			Munsell No.										
IIa14	Op	White	N9.5/90.0/R	573	64	265	25	1077	578	2582	358	334	24
IIa12	Tsl	Oyster white	5 GY 9/1	1295	35	23	0	28	65	1446	1	1	0
IIa *	Tsp	Light grey	N 8.25/63.65R	49	0	0	0	1	12	62	17	17	0
IIa7	Op	Black	N 0.5/0.6R	216	5	15	0	2	51	289	1367	1356	11
IIa41	Op	Robin's egg blue	5 B 7/6	100	0	0	0	0	7	107	7	7	0
IIa *	Tsp	Light turquoise	10 BG 8/4	3	0	0	0	0	6	9	3	3	0
IIa *	Op	Green	2.5 G 4/8	1207	64	33	1	32	50	1387	1273	1237	36
IIa *	Tsp	Dark green	2.5 G 3/6	295	14	10	1	3	18	341	78	78	0
IIa *	Tsl	Bright green	2.5 G 5/10	6	0	0	0	0	49	55	409	402	7
IIa *	Tsl/Op	Dark jade green	10 G 4/6	28	0	0	0	0	59	87	44	43	1
IIa *	Op	Orchid mist	10 RP 8/4	1	2	0	2	228	0	233	370	369	1
IIa *	Op	Light orchid mist	5 RP 7/10	2	0	1	0	0	20	23	173	164	9
IIa *	Op	Mauve pink	5 RP 6/8	0	1	0	2	77	90	170	2181	2135	46
IIa *	Op	Cherry rose	5 R 6/6	0	2	0	0	12	11	25	832	827	5
IIa *	Op	Light cherry rose	10 R 8/4	1	0	0	0	1	0	2	31	31	0
IIa19	Op	Amber	7.5 YR 6/10	656	25	25	0	6	2	714	23	23	0
IIa *	Tsl	Dull yellow	5 Y 8/6	348	21	13	2	16	26	426	188	177	11
IIa *	Tsp	Ruby	2.5 R 3/10	30	0	0	0	0	40	70	470	461	9
IIa *	Op	Indian red	7.5 R 3/8	3	0	1	0	0	2	6	63	62	1
IIa56	Tsp	Bright navy	7.5 PB 2/8	265	13	134	1	12	157	582	213	210	3
IIa *	Op	Medium blue	5 PB 4/6	154	8	0	0	3	11	176	1	1	0
IIa *	Op	Pale blue	10 B 7/4 - 7/8	38	0	2	0	24	9	73	0	0	0
IIa *	Op	Cerulean	2.5 PB 4/10	0	0	1	0	0	96	97	1	1	0
IIa *	Tsp	Bright blue	7.5 B 4/8	142	10	8	2	78	30	270	23	23	0
IIa *	Op	Copen blue	7.5 B 4/12	27	0	0	0	0	15	42	0	0	0
IIa *	Op	Shadow blue	2.5 PB 5/4	638	36	17	0	0	10	701	1	1	0
IIa *	Op	Medium Copen blue	5 PB 6/8	49	0	1	0	0	47	97	0	0	0
IIa59	Tsp	Rose wine	10 P 2/6	11	2	1	0	0	1	15	5	5	0
IIb	Op	4 navy blue stripes/white		38	3	9	0	17	68	135	2	2	0
IIb	Op	4 scarlet stripes/white		109	13	17	2	327	3	471	0	0	0
IIb	Op	4 turquoise stripes/white		6	1	0	0	30	0	37	0	0	0
IIb	Op	2 scarlet & 2 navy blue stripes/white		82	12	4	0	57	0	155	4	4	0
IIb	Op	2 scarlet & 2 turqoise stripes/white		18	0	0	0	5	0	23	0	0	0
IIb	Op	24 white stripes/navy blue		35	1	0	0	0	0	36	0	0	0
IIb	Op	2 orange & 2 turquoise stripes/white		0	0	0	0	0	0	0	20	16	4
If	Tsp	Multicoloured		43	1	0	0	0	3	47	2	2	0
IVa	Op	Indian red/green core		1002	38	13	0	2	24	1079	21	21	0
IVa	Tsp	Ruby/white core		101	9	7	1	27	37	182	753	731	22
WIb	Op/Tsp	Multicoloured		70	1	0	0	0	0	71	29	26	3
WIIIa	Tsp	Ruby on white core/yellow core		26	0	0	0	0	3	29	76	75	1
WIIIb	Op/Tsl	Eye beads/floral design		65	4	1	10	0	1	81	3	3	0
BIa	Tsl	Light grey		3	0	0	0	0	0	3	0	0	0
		TOTALS:		7735	385	601	49	2065	1601	12436	9042	8848	194

Table 3. Correlation coefficient matrix obtained from percentages of bead frequencies of all types from Mgungundlovu and Ondini (as listed in Table 2), white beads grouped together. Samples from different parts of Mgungundlovu are more similar to each other than any of them are to the Ondini assemblages. A strong correlation coefficient (r=0,98) has been obtained from comparison of the two *isigodlo* midden assemblages excavated by Hall and Parkington respectively. The coefficient obtained from comparison of the two *bheje* samples excavated by Roodt and Parkington is also high (r=0,89). These strong correlation coefficients are found despite potential sampling bias associated with different methods of recovery. Samples from *isigodlo* huts at Mgungundlovu are similar to those from the entrance to the site (r=0,94).

	MGUNGUNDLOVU							ONDINI		
Excavator:	Hall	Parkington		Roodt	Rawlinson			Rawlinson		
Excavation:	Isigodlo midden	Isigodlo midden	Isigodlo huts	Bheje	Bheje	Entrance	Total Mgungundlovu	Total Ondini	Isigodlo midden	Non-isigodlo middens
Sample size:	7735	385	601	49	2065	1601	12436	9042	8848	194
Sample #:	1	2	3	4	5	6	7	8	9	10
1	1,00									
2	0,98	1,00								
3	0,76	0,77	1,00							
4	0,66	0,69	0,83	1,00						
5	0,66	0,71	0,85	0,89	1,00					
6	0,70	0,72	0,94	0,87	0,88	1,00				
7	0,94	0,95	0,90	0,83	0,87	0,88	1,00			
8	0,16	0,17	0,08	0,08	0,09	0,18	0,15	1,00		
9	0,15	0,16	0,08	0,08	0,08	0,17	0,14	0,99	1,00	
10	0,40	0,44	0,31	0,32	0,31	0,41	0,41	0,87	0,86	1,00

also yielded a high correlation coefficient (r=0,89). These results suggest that bead frequencies generally tend to be similar despite differences associated with different methods of recovery.

More detailed analyses lead to the identification of variability in the spatial distribution of beads of different colours.

Spatial variability at Mgungundlovu

Histograms of bead frequencies shown in Fig. 3 serve to identify spatial variability in the proportions of variously coloured beads represented in different assemblages from Mgungundlovu. Percentages in this case have been calculated from the total of all blue, yellow, green, pink, striped, opaque 'Indian' red or 'Indian' red-on-green beads. The results show that the two samples from the *isigodlo* midden are essentially identical, but the *bheje* has a relatively high proportion of striped beads. Blue and green are relatively abundant in samples from the *isigodlo* huts and in those from Rawlinson's excavations near the entrance to the site.

Temporal variability in a sequence from the isigodlo midden

Hall's excavations in the *isigodlo* midden provide an opportunity to identify temporal variability in the proportions of various colours of beads. Results from a sequence of ten spits from square BCD 6,7,8 indicate that samples near the base of the midden have relatively high proportions of green beads of type IIa with Munsell colour 2.5G 4/8. By contrast, consistently lower proportions of these beads (generally less than 20%) are found in later parts of the sequence. Blue beads with Munsell colour 2.5PB 5/4 account for approximately 5% of the samples in the lower spits, increasing to about 10% in the upper spits. Similar trends are identifiable in a sequence of spits excavated in square GH 1,2,3 in a different part

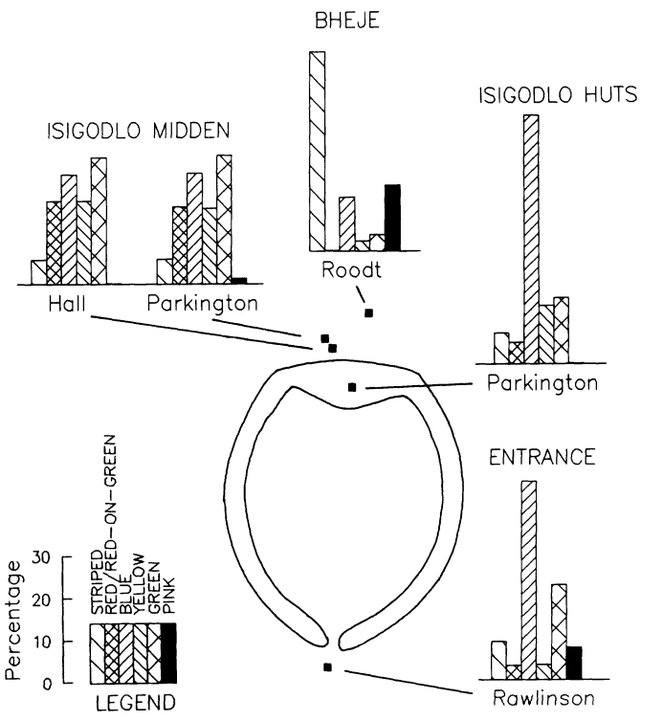

Fig. 3. Histograms illustrating spatial variability in the proportions of beads from different parts of Mgungundlovu. Percentages have been calculated from the total number of striped, red/red-on-green, blue, yellow, green and pink beads (dominant white beads have been excluded). Note the similarity between two samples from the *isigodlo* midden, excavated by Parkington and Hall respectively. Striped beads are relatively common in the *bheje*. Blue and green beads are relatively abundant in *isigodlo* huts and in samples from the entrance to the site.

of the midden. However, proportions of white beads are almost constant.

Spatial variability at Ondini

Although the bead collection from Ondini has been obtained primarily from the *isigodlo* area at this site, comparisons can be made between samples from the royal quarters and those from other areas at the site. Results shown in Table 2 show that mauve pink beads are dominant in the *isigodlo* samples as well as in assemblages obtained from middens outside the royal quarters. A correlation coefficient of r=0,86 has been obtained from comparison of the relative abundances of beads of all types in *isigodlo* and 'non-*isigodlo*' midden areas at Ondini (Table 3).

Comparisons between Mgungundlovu and Ondini

As in the case of Mgungundlovu, the bead collection from Ondini is comprised primarily of type IIa beads (Table 1). However, there are noticeable differences in the proportions of beads classified on the basis of colour. Whereas white beads are dominant at Mgungundlovu, pink is the most common colour at Ondini. Munsell colours for various shades of pink beads are given in Table 2. At Ondini, the most commonly represented colour is 'mauve pink' (Munsell No 5RP 6/8). Other pink beads have Munsell numbers 10RP 8/4 and 5R 6/6. Correlation coefficients based on proportions of all bead types (Table 3) indicate that the Mgungundlovu samples are more similar to each other than any of them are to the Ondini samples. Coefficients obtained from comparison of bead samples from *isigodlo* middens at Mgungundlovo and Ondini are less than 0,16, contrasting with r values generally greater than 0,70 in the case of comparison of samples from different parts of Mgungundlovu. Conversely, the *isigodlo* and 'non-*isigodlo*' midden samples from Ondini are more similar to each other than either is to any of the assemblages from Mgungundlovu (Table 3). However, correlation coefficients indicate that the Mgungundlovu samples are slightly more similar to material from non-*isigodlo* middens at Ondini than they are to *isigodlo* assemblages from that site.

Conclusion

The Mgungundlovu collection is comprised mainly of monochrome, drawn beads of type IIa, the dominant colour being white. Correlation coefficients have been calculated to quantify variability in the proportions of beads from different parts of the site. Results obtained from an initial statistical analysis serve to show that bead samples from different excavations at Mgungundlovu are comparable, despite non-uniform methods of recovery.

Temporal trends have been identified in a sequence of samples from Mgungundlovu, even though the site was occupied for a period of only ten years. Spatial variability at the site has also been observed. The highest proportions of striped beads have been documented in the *bheje* area; blue and green are most abundant in the *isigodlo* huts and in samples from the entrance to the site.

A marked contrast has been found between assemblages from Mgungundlovu and Ondini. The samples from the latter site are characterized by high proportions of pink beads, contrasting with assemblages from Mgungundlovu (not only the *isigodlo* samples from this site), where white is the dominant colour. Comparative studies in progress can be expected to show whether this change also occurred elsewhere in Africa and North America, due to change in supply or whether it is a local phenomenon based on consumer demand. More detailed physical and chemical analyses will show whether the identified bead types are in fact homogeneous or whether a given bead type may have been produced by more than one manufacturer. Detailed analyses of beads could perhaps help to address the question as to whether the major foreign trading partners of Mgungundlovu and Ondini were respectively Portugal and Great Britain, and whether the shift of power from Mapungubwe to Great Zimbabwe coincided with a change in foreign trade partners.

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