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MAQUETTE DE COUVERTURE
Wydawnictwo i Pracownia Archeologiczna PROFIL-ARCHEO Magdalena Dzięgielewska

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Wydawnictwo i Pracownia Archeologiczna PROFIL-ARCHEO Magdalena Dzięgielewska

EN COUVERTURE
Les types de statuettes en terre cuite mycéniennes de région au Bas-Danube (les répliques modernes), et la reconstruction du spécimen découvert sur l'hameau fortifié de l'Âge du Bronze à Maszkowice (Carpates occidentales extérieures) (Réalisation et photo par E. Przybyła et M. Przybyła)

ADRESSE DE LA RÉDACTION
Instytut Archeologii Uniwersytetu Jagiellońskiego, ul. Gołębia 11, PL 31-007 Kraków
www.archeo.uj.edu.pl/wydawnictwa
www.farkha.nazwa.pl/RechACrac/
mniauj@interia.pl
mszprzybyla@gmail.com

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ÉTUDES

RAPPORTS

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Łukasz Mrówka[1]

Development of pottery style on the Bronze and Early Iron Age cemetery at Kietrz, Głubczyce district, in the light of statistical analyses

Abstract: This article attempts to determine the relative chronology of the Kietrz cemetery of the Lusatian culture proceeding from the stylistic development of forms and ornamentation of vessels coming from selected pottery inventories. The co-occurrence matrix of forms and ornaments, developed from the sources described above, was examined using correspondence analysis. Graphic representation of the results forms a quite distinct arc-shaped layout in the plot of two principal axes. Correspondence analysis was also conducted for the identified types of decoration. The results, transposed into a two-dimensional diagram, show a different, not arch-like distribution. Objects and variables form two separate clusters. Detailed analysis of the two diagrams allowed for many valuable conclusions: (1) phases of vessel form development are polythetic assemblages, which means that they are formed by specific combinations of attributes or their frequencies rather than by strictly defined sets of phase-unique attributes; (2) in the development of pottery forms, one can observe a continuous evolution between phases BrC2 and HaC, i. e. in the period spanning nearly 800 years (ca 1380–600 BC). This confirms earlier conclusions, based on planigraphy data, concerning the uninterrupted functioning of the cemetery; (3) development of pottery decoration followed a different pattern – a "revolutionary" change in HaA was followed by a continuous development until the end of early Hallstatt period, when a regression in pottery ornamentation probably took place; (4) there is some discrepancy between the present results and M.Gedl's chronology with respect to the older phases of vessel form and decoration development (among other things, the present results suggest dating the appearance of bossed decoration as early as BrC2).

Keywords: Lusatian culture, cemetery, Kietrz, correspondence analysis, pottery

1. Introduction

The cemetery at Kietrz was first mentioned in the literature by R. Drescher in the second half of the 19th century. In the years 1930–1942, G. Raschke led rescue excavations as the site was being devastated by clay acquisition. Raschke's investigation resulted in the discovery of 463 graves dating to the late Bronze Age and to Hallstatt period. After WWII, the excavations were continued in the years 1956–1983 by M. Gedl from the Department of the Archaeology of Poland (since 1971: the Institute of Archaeology of the Jagiellonian University). In total, the almost completely investigated cemetery at Kietrz yielded more than 4000 burials (Schewe

[1] Institute of Archaeology, Jagiellonian University; Gołębia St. 11, 31-007 Kraków, Poland; lukaszmrowka88@gmail.com

1997, 430–436; Gedl 2002, 75–76). The apparently uninterrupted development of the necropolis had lasted for over thousand years (from BrC to HaC). Such a source basis allows for detailed chronological studies of the Silesian group of the Lusatian culture, and its Głubczyce sub-group in particular (Gedl 1980, 83). This work attempts to determine the relative chronology of the Kietrz cemetery proceeding from the stylistic development of forms and ornamentation of vessels coming from selected pottery inventories.

Chronological studies based on local pottery development may bring interesting results. Previous attempts at determining chronology of the Kietrz cemetery relied heavily on the variability of metal objects representing the forms widespread in the Urnfields or in the Hallstatt culture. However, basing local chronological sequence on metal artefacts, usually of non-local provenance, may lead to errors connected with the possibility of prolonged use of these objects in the peripheries as compared to the area of their origin. Therefore, it seems reasonable to make an attempt to develop an independent sequence of relative chronology that would rely primarily on the local pottery stylistic development. The results may be compared with the chronology proposed by M. Gedl to reveal potential disagreements.

2. Methods

2.1. Selection of source basis

Chronological criteria

Grave assemblages selected for the analysis come from the excavations of site 1 at Kietrz conducted by M. Gedl in the years 1956–1983. Materials from graves uncovered by G. Raschke have not been included. They have been rejected because Raschke's results were only very briefly reported (Gedl 1962a, 212–213) and the majority of artefacts and documentation were lost during the war.

The graves analysed in this paper were associated by M. Gedl with the period spanning the time from BrC2 till HaC (Gedl 1973; 1978b; 1982; 1984; 1987; 1989; 1991; 1992; 1996). The oldest assemblages, dated to BrB–BrC1, have not been included, as these earliest burials were not furnished with pottery (Gedl 1984, 61–63). The youngest graves discovered on the site, originating from HaD3 and La Tène period, have also been rejected. This is due to a distinct gap, clearly noticeable in the cemetery development in the period from HaC/HaD transition to HaD3 (Gedl 1962b, 338; 1978a, 71–72).

Formal criteria

The basic criterion of grave selection was the occurrence of vessels, either fully preserved or such whose form could be reconstructed. Graves were selected separately from particular zones of the cemetery that roughly correspond to individual chronological phases distinguished by M. Gedl. In the analysed time period (BrC2–HaC) a general tendency may be noted on the Kietrz cemetery to increase the number of vessels put to a single grave. Therefore, different threshold values had to be established for the number of vessels that were required to accept the inventory for the analysis. The following threshold values were used (for the chronological phases distinguished by M. Gedl): phase Kietrz IIa–c – 3 vessels, phase Kietrz III – 5 vessels, phase Kietrz IVa–c – 6 vessels, and phase Kietrz V – 6 vessels. As a result, 206 graves were selected for the analysis: 65 graves from phase Kietrz IIa–c, 28 graves from phase Kietrz III, 68 graves from phase Kietrz IVa–c, and 45 graves from phase Kietrz V. The predominance of graves from phases Kietrz IIa–c and Kietrz IVa–c may be explained by the fact that each of these phases lasted for 250 years, and such a long time

resulted in more burials. Analogically, small number of phase III graves (HaA2 according to M. Gedl) would stem from the short time span (less than a hundred years). A relative abundance of graves from phase V (HaC) may reflect both the long time span (some 200 years) and the population growth. In that period rapid growth was recorded in the entire Głubczyce sub-group (Gedl 1972a, 317). Another possible explanation for the large share of phase V graves was proposed by A. Mierzwiński (1994, 117). He suggested that the early Hallstatt style might have continued in the Kietrz material for a longer time, from HaB3 till HaD1.

2.2. Classification of forms – methods and results

The next step of the analysis consisted in defining vessel types and categories. This made it possible to analyse the co-occurrence of particular vessel types in each grave assemblage. The following categories of clay vessels were identified: bowls, vases (including the so-called small goblets), pots, scoops, cups, and jugs. Lids, which often accompanied pots, were also included in the analysis of pottery style development. Miniature vessels, included in the co-occurrence analysis, belong to a separate category. In spite of differences in their shapes, miniature vessels were not divided into types as they were characterised by a completely different methods of manufacture (Gedl 1975, 66–70; Mogielnicka-Urban 1984, 70–103).

Vessel categories were divided into types with no reference to the typological and chronological classifications previously used for the Lusatian culture pottery (Gedl 1962a, 17–59; Gediga 1967, 27–125). The division into types based on the easily perceptible morphological traits, such as slenderness and squatness, placement of the widest part of the body, degree to which the neck was separated, form of the rim, placement of the handles etc. Within the identified types, a variation in vessel size

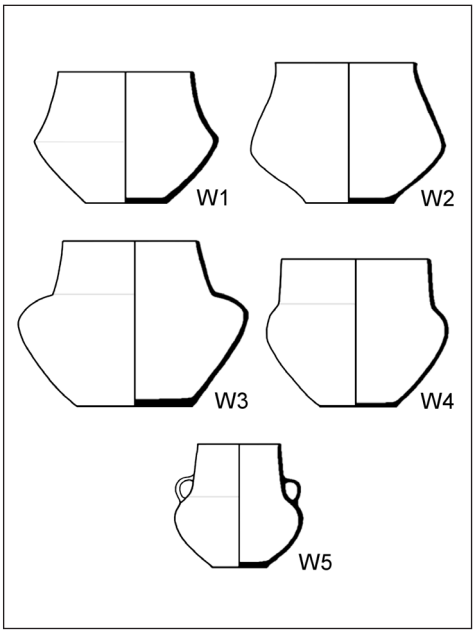

Fig. 1. Kietrz, Głubczyce district, site 1. Model shapes of the defined types of vases (drawing not to scale): type W1 (46 specimens) – biconical vessels with neck not separated from the body, no handles; type W2 (24 specimens) – biconical vessels with slightly everted rim and gentle carination placed low. Most of them have no handles, a few specimens have a pair of handles placed over the shoulder; type W3 (20 specimens) – vessels with bulging body, separated conical or cylindrical neck and straight rim, with no handles. Maximal body diameter is significantly higher than rim diameter; type W4 (16 specimens) – vessels with bulging body, separated conical or cylindrical neck and straight rim, usually with no handles. A few specimens have handles at the base of the neck. Maximal body diameter is slightly higher than rim diameter; type W5 (20 specimens) – vessels with bulging or slightly rounded body and high, separated, cylindrical or conical neck. The rim is usually straight, less often slightly everted. Two handles are placed at the base of the neck

and a slight departure from a model shape is acceptable.

When defining particular types, morphometric attributes of the vessels were not taken into account and the criterion of raw material and admixture used in vessels manufacture was also rejected. The reason was that the study was based only on materials published in the literature. Finally, the typological division was established with no reference to the vessels decoration (Fig.1–6).

The last criterion used when defining a vessel type required that no less than five specimens occurred in the selected inventories. Introducing less numerously represented variables (types) into the analysis that uses statistical methods might make the results less clear. At this stage of the selection of source basis some 40 vessels were rejected, which is an insignificant number compared with the total sample. The only exception from the rule was made for type W16 (4 vessels) that represents a vessel form which is "foreign" to the Lusatian culture pottery. In total, 44 types were defined in the ceramic inventory of the selected graves. The analysed vessels comprised a total of 1256 specimens, including 291 bowls, 382 vases, 155 pots, 41 lids, 306 scoops, 19 cups, 19 jugs and 43 miniature vessels (Table 1).

2.3. Classification of decoration – methods and results

The analysis of ornament style development was conducted on the same group of 206 selected graves. Undecorated vessels were found in the grave inventory only in one case (grave 1707). Eight assemblages (graves: 1025, 1344, 1373, 1713, 1787, 1901, 1925, and 2001) contained vessels decorated with a single motif only, which also resulted in their rejection from the analysis.

Pottery from 197 graves was decorated with incised and relief ornaments. The

Table 1. Number of vessel types in particular phases of pottery style development

	A1	A2	B	N	C	D
W1	33	12	-	-	1	-
W2	-	4	12	2	6	-
W3	5	11	4	-	-	-
W4	13	1	-	-	2	-
W5	2	8	7	1	1	-
W6	-	-	-	-	-	22
W7	-	-	7	-	5	-
W8	14	3	-	-	-	-
W9	-	-	26	-	74	-
W10	-	-	-	-	2	35
W11	-	-	-	-	-	22
W12	-	-	2	-	18	-
W13	-	-	-	-	10	-
W14	-	1	2	3	-	-
W15	-	-	-	-	5	-
W16	-	-	-	4	-	-
M1	32	19	9	-	24	2
M2	-	15	21	3	15	3
M3	-	2	1	-	12	90
M4	-	-	2	-	7	8
M5	4	-	1	-	-	1
M6	9	-	-	-	-	1
M7	-	-	-	-	1	4
G1	-	-	-	-	10	16
G2	-	-	-	-	7	16
G3	1	4	17	1	20	-
G4	-	-	3	-	19	4
G5	16	12	-	-	-	-
P1	-	-	-	-	8	11
P2	-	-	-	-	1	13
P3	-	-	-	-	7	-
C1	-	-	5	-	50	39
C2	-	-	3	-	6	21
C3	-	-	-	-	-	-
C4	6	5	-	-	6	-
C5	3	5	-	-	-	-
C6	1	-	12	-	77	13
C7	-	3	10	2	1	-
C8	1	2	4	1	-	-
C9	12	3	-	-	-	-
K1	-	3	7	-	2	-
K2	-	1	4	-	2	-
D1	1	4	1	-	-	-
D2	10	3	-	-	-	-
NM	3	3	1	-	19	16

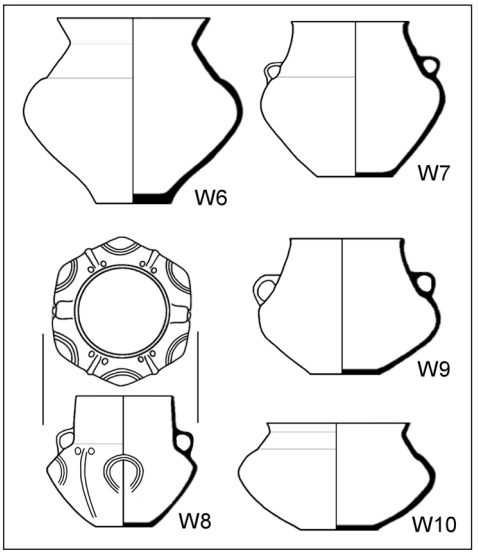

Fig. 2. Kietrz, Głubczyce district, site 1. Model shapes of the defined types of vases (drawing not to scale): type W6 (22 specimens) – large vessels with bulging body, more or less separated neck and the funnel-shaped rim; type W7 (12 specimens) – vessels with bulging body, separated, conical neck and slightly everted rim. Usually with two handles at the base of the neck; type W8 (16 specimens) – vessels with bulging body, distinctly separated conical or cylindrical neck and straight rim. Bosses pushed from inside give the vessel a polygonal shape in plan. Two handles are placed at the base of the neck; type W9 (101 specimens) – vessels with bulging body and poorly separated neck. The rim is usually everted, less often straight. Two handles placed at the base of the neck; type W10 (37 specimens) – low, wide-mouthed vessels with bulging or less often biconical body, short, separated conical neck and everted rim, with no handles

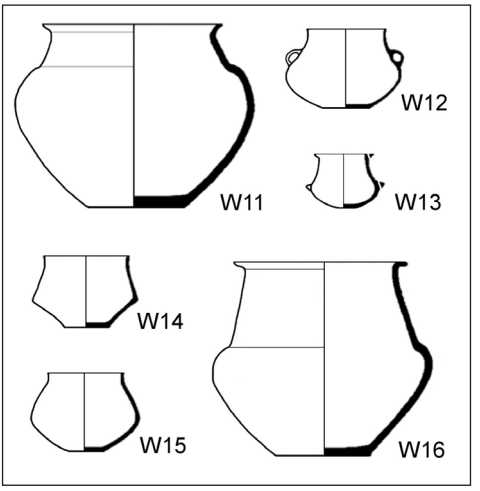

Fig. 3. Kietrz, Głubczyce district, site 1. Model shapes of the defined types of vases (drawing not to scale): type W11 (22 specimens) – vessels with bulging body, short, separated conical neck and everted rim, with no handles; type W12 (20 specimens) – low vessels with almost rounded body, poorly separated neck and everted rim. The majority of them have two handles placed at the base of the neck; type W13 (10 specimens) – small vessels with rounded, or less often flat bottom, S-shaped, with two vertically pierced handles and strongly everted rim. The rim above the handles is pierced; type W14 (6 specimens) – small, biconical vessels with sharp carination placed low, with everted rim; type W15 (6 specimens) – small vessels having maximal body diameter in the lower part of the body, with poorly separated, slightly everted rim; type W16 (4 specimens) – vessels with bulging body, distinctly separated, conical or cylindrical neck and strongly outturned, flaring rim. No handles

classification of ornament did not take into account the category and type of the vessel on which it was applied. The correlation between the vessel form and decoration was not investigated. Neither were taken into account the differences in the frequency of particular motifs on pottery from various burials. The co-occurrence analysis was performed for 48 decorative motifs (Fig. 7–8). Their presence was recorded on all ceramic elements belonging to the selected grave inventories, including those preserved only in fragments. Decorative motifs were defined only if they appeared on vessels from at least three grave inventories. Single motifs were identified in most cases, less often appeared their simple compositions. Ceramic objects from one grave assemblage revealed from 2 to 19 various types of decoration.

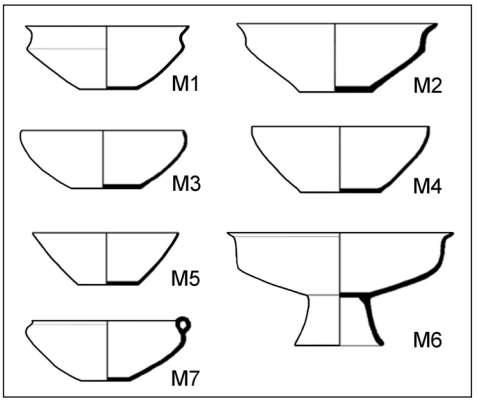

Fig. 4. Kietrz, Głubczyce district, site 1. Model shapes of the defined types of bowls (drawing not to scale): type M1 (86 specimens) – carinated bowls whose rim and carination are of the same diameter. Small difference in the diameters in favour of the rim is acceptable. There are specimens with two, one or no handles; type M2 (58 specimens) – carinated bowls with broad mouth. There are specimens with two, one or no handles; type M3 (107 specimens) – bowls with inverted rim. Usually with no handles. Sporadically occur bowls with one small handle pierced horizontally, placed on the rim, on the carination or below it. Specimens with relief handle are even less common; type M4 (19 specimens) – hemispherical bowls with straight, upright rim. Specimens without handles are predominant. Few bowls have one small handle pierced horizontally, placed on the rim or sporadically below it; type M5 (6 specimens) – conical bowls with no handles. Only one specimen has one, ribbon-like handle; type M6 (10 specimens) – carinated bowls on hollow foot. The degree of carination and the foot's height vary within the type. There are specimens with two, one or no handles; type M7 (5 specimens) – carinated bowls with rim diameter significantly smaller than the diameter at carination

3. Results

3.1. Development of vessel forms

The co-occurrence matrix of forms and ornaments, developed from the sources described above, was examined using correspondence analysis (Zimmermann 1997, 9–15; StatSoft 2010)[2]. The graphical representation of the results forms a quite distinct arc-shaped layout in the plot of two principal axes (Plate 1). According to T. Madsen (2007, 20–21), the so-called arc effect is characteristic of data with a pattern of continuity between objects and variables. This means that a gradual and systematic replacement of variables is observed in successive objects (particular vessel types occur in a limited number of graves and every grave is equipped with a limited number of vessel types). In other words, there is a chronological continuity of development. Similar interpretation was proposed for the results of correspondence analysis of Early Bronze Age inventories from southern Scandinavia and northern Germany (Vandkilde 1996, 147–152)[3].

The uneven, arc-shaped distribution of points in the correspondence analysis map for the vessel types identified on the Kietrz cemetery may be explained in two ways: either as a result of uneven temporal occurrence of graves or as an effect of uneven temporal development of particular vessel types (Madsen 2007, 29). For the Kietrz cemetery, both explanations are true. The results of correspondence analysis suggest an undisturbed development of the necropolis over the investigated period of time, lasting nearly 800 years. Four phases

[2] Statistical analyses have been done using "Statistica" software.

[3] The plot of a correspondence analysis is two-dimensional, but in reality it is a multidimensional space. The layout of objects and variables on the plot is a result of a projection into two-dimension. In this way, some informations about the connections between the objects and variables could be lost. Plate 3 was prepared to minimize this risk. Plot on the two-dimensional space shows a line along which the objects and variables are evenly and maximally spread (Madsen 2007, 21). Only projection into two-dimension allows the interpretation of multidimensional layout. This makes it possible to test the development of forms and ornamentation of vessels and their relative chronology.

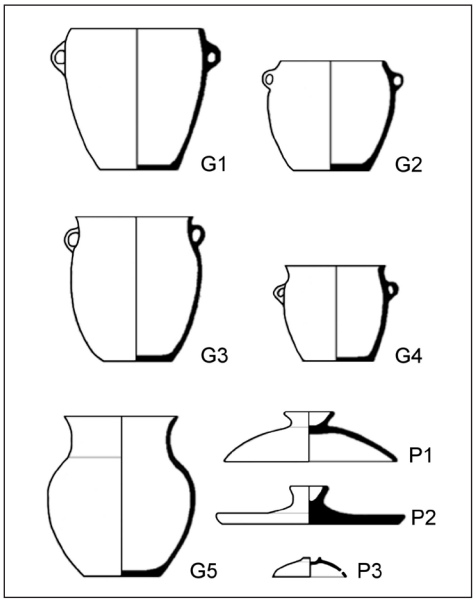

Fig. 5. Kietrz, Głubczyce district, site 1. Model shapes of the defined types of pots and lids (drawing not to scale):
type G1 (29 specimens) – high, egg-shaped pots with inverted rim. Maximal body diameter is placed approximately in 2/3 of the vessel's height. Most specimens have two handles below the rim; pots with no handles are less common; type G2 (24 specimens) – low, barrel-shaped pots with inverted rim. Maximal body diameter is placed approximately in 1/2 of the vessel's height. Most specimens have two handles below the rim; pots with no handles are rare, and specimens with one handle occur sporadically; type G3 (44 specimens) – slender egg-shaped pots with everted rim. Maximal body diameter is placed approximately in 2/3 of the vessel's height. The vast majority of specimens have two handles below the rim; pots with no handles are extremely rare; type G4 (30 specimens) – low, barrel-shaped pots with everted rim. Except for few specimens without handles, most pots have two handles below the rim; type G5 (28 specimens) – pots having nearly S-shaped profile, with emphasised transition between the body and the neck, and a relatively high placed maximal body diameter (they are called "shouldered pots"). They usually have no handles, although some specimens have two handles that join the base of the neck with the rim; type P1 (20 specimens) – large, convex lids of various heights. They have hollow, funnel-shape handle; type P2 (14 specimens) – flat lids with hollow, funnel-shaped handle. Only two specimens have solid handles; type P3 (7 specimens) – small, slightly convex lids. Most of them have two small apertures near the perimeter. Usually they have no handles, sometimes there is a small hollow at the top of the lid, surrounded by a low bordering

(A–D) of vessel stylistics development were separated within the arc, and a small group of outliers (marked with letter N) is found outside the arc.

The earliest burials are situated on the right side of the arc-shaped layout (Plate 2). This cluster comprises burials containing vessels attributed to stylistic phase A. It contains 71 grave assemblages and it is the most numerous group. The first phase of stylistic development was divided into two sub-phases (A1 and A2). This was due to the abundance of burials and the observed gradual and systematic replacement of certain vessel types in grave inventories (while other, long-lasting types still continued).

Description of vessel forms typical of particular stylistic phase often includes the discussion of their frequency in other phases. Such approach aims at presenting stylistic phases as polythetic assemblages formed by combinations of attributes and their frequency rather than as strictly defined sets of phase-unique attributes (compare Fig.9–11).

Sub-phase A1

The cluster corresponding to sub-phase A1 holds 40 burials (596, 699, 719, 720, 740, 753, 818, 875, 1010, 1022, 1025, 1125, 1348, 1371, 1373, 1429, 1489, 1495, 1509, 1510, 1529, 1534, 1538, 1601, 1616, 1625, 1639, 1670, 1715, 1719, 1730, 1733, 1754, 1771, 1787, 1833, 1976, 2000, 2001 and 2014). Due

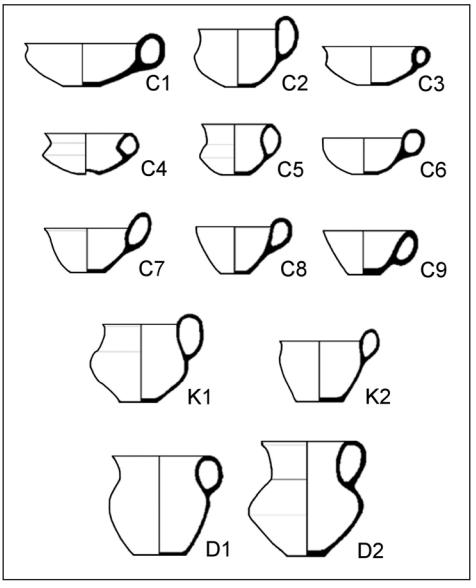

Fig. 6. Kietrz, Głubczyce district, site 1. Model shapes of the defined types of scoops, cups and jugs (drawing not to scale):
type C1 (101 specimens) – low, slightly carinated scoops, handle protruding over the rim; type C2 (32 specimens) – high, slightly carinated scoops, handle protruding over the rim; type C3 (7 specimens) – carinated scoops with handle that joins the rim with the carination. Handle does not protrude over the rim; type C4 (12 specimens) – low, strongly carinated scoops, with handle that joins the rim with the carination. Handle does not protrude over the rim; type C5 (8 specimens) – high, strongly carinated scoops, with handle that joins the rim with the carination. Handle usually does not protrude over the rim, two scoops have handles protruding slightly over the rim; type C6 (107 specimens) – hemispherical scoops with handle protruding over the rim. The rim is usually straight, less frequently slightly inverted; type C7 (16 specimens) – conical scoops with separated, everted rim. Handle protruding over the rim; type C8 (8 specimens) – conical scoops with handle protruding over the rim; type C9 (15 specimens) – conical scoops with handle not protruding over the rim; type K1 (12 specimens) – cups with bulging body and separated neck, with everted rim; type K2 (7 specimens) – slightly carinated, egg-shaped cups with everted rim. Handle protruding over the rim; type D1 (6 specimens) – S-shaped jugs with everted rim. The neck is usually not separated, sometimes slightly marked; type D2 (13 specimens) – jugs with bulging body, high neck and everted rim. Ribbon-like handle joins the rim with the base of the neck or with the body. Handle usually does not protrude over the rim. Nearly half of jugs representing this type has a body polygonal in plan, which is due to the bossed ornament

to considerable similarities between grave inventories the cluster is rather compact.

Vases: Typical of sub-phase A1 are bossed vessels polygonal in plan. Such decoration occurs on vessels of W8 (all) and D2 types (nearly half of the specimens). The occurrence of bossed vessels is almost entirely limited to sub-phase A1, with very few cases of their continuation into the next sub-phase. Very common in phase A1 are biconical vessels of W1 type, which at that time played the role of urns. They are much less common in sub-phase A2, and a single W1 vessel from phase C (grave 1007) is a completely unique find. In the inventories dated to phase B this vessel type was not recorded. However, W1 vases occur in the inventories potentially dated to phase B which were excluded from the analysis (due to poor equipment in ceramics), although they are still less numerous than in sub-phase A2. This points to the long duration of this vessel form and the decrease of its frequency with time. Vases of W4 type are characteristic mainly of sub-phase A1. One specimen was found in A2 grave (1098), while other two, distinguished by pairs of handles, occurred in graves from phase C (1087, 1074/1075). This may speak for a longer duration of this form (Plate 3:1).

Bowls: The situation is similar in the case of conical bowls of M5 type which occur mainly in sub-phase A1, while single

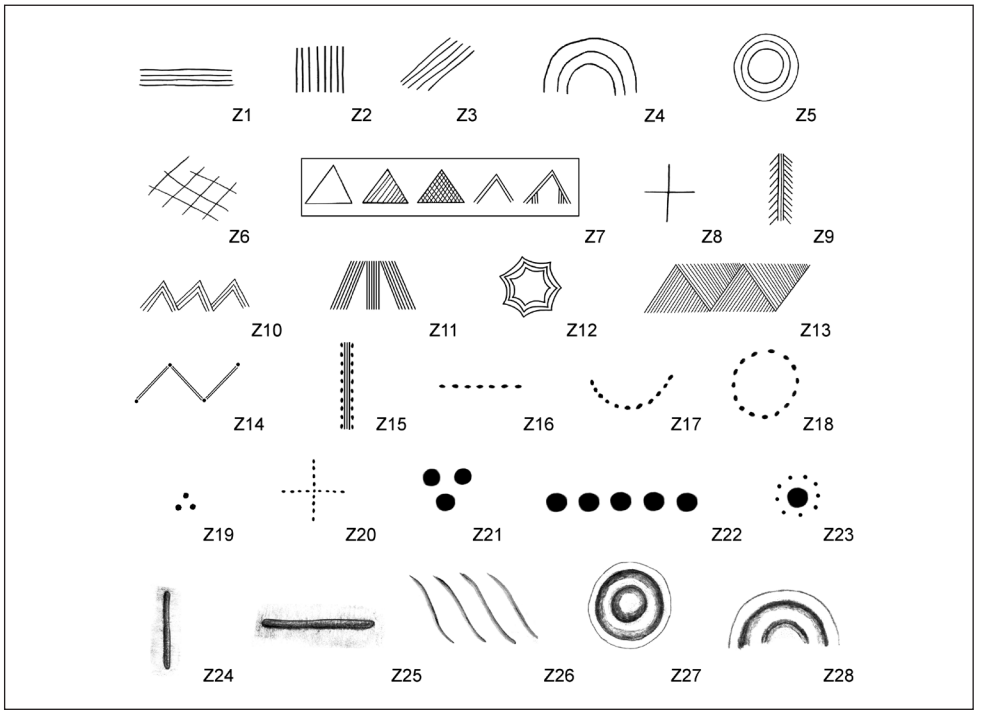

Fig. 7. Defined decorative motifs on pottery (drawing not to scale):
type Z1 – single or multiplied horizontal incised line (112); type Z2 – single or multiplied vertical incised line (108); type Z3 – single or multiplied incised line (120); type Z4 – semicircular or horseshoe-shaped single or multiplied incised line (36); type Z5 – single or multiplied concentric circles, incised (27); type Z6 – chequered pattern, incised (3); type Z7 – incised triangles, hatched or plain (53); type Z8 – incised cross motif (8); type Z9 – incised herring-bone motif (5); type Z10 – incised chevron pattern (10); type Z11 – group of vertical incised lines flanked with two groups of oblique incised lines (12); type Z12 – single or multiplied concentric multi-arm stars, incised (11); type Z13 – tangled bands of hatched triangles (17); type Z14 – bands of alternate oblique lines joined with hollows (4); type Z15 – multiplied incised lines flanked with bands of small hollows (3); type Z16 – band of small hollows (82); type Z17 – semicircular band of small hollows (6); type Z18 – circular band of small hollows (8); type Z19 – small hollows forming a triangle (6); type Z20 – small hollows forming a cross motif (3); type Z21 – hollows forming a triangle (7); type Z22 – band of hollows (64); type Z23 – hollow surrounded by a circle of small hollows (6); type Z24 – single or multiplied vertical groove (64); type Z25 – single or multiplied horizontal groove (74); type Z26 – single or multiplied oblique groove (54); type Z27 – single or concentrically multiplied circular grooves (30); type Z28 – single or multiplied grooves, semicircular or horseshoe-shaped (49)

specimens are recorded in phases B (grave 1999) and D (grave 83). Bowls on a hollow foot of M6 type occur almost exclusively in sub-phase A1, the only exception being the specimen from phase D grave 80, distinguished by a more gentle profile. Carinated bowls of M1 type are present in all the distinguished chronological phases, although their distribution is far from even. They are most numerously represented in sub-phase A1 and are slightly less common in sub-phase A2. In the course of phase B

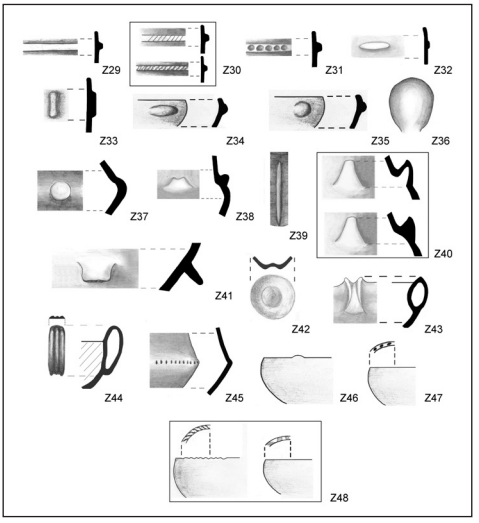

Fig. 8. Defined decorative motifs on pottery (drawing not to scale):
type Z29 – relief rib, not decorated (9); type Z30 – relief rib decorated with cuts or notches (14); type Z31 – relief rib decorated with hollows (15); type Z32 – short horizontal relief rib (34); type Z33 – short vertical relief rib (6); type Z34 – oval knob, pasted (44); type Z35 – circular knob, pasted (46); type Z36 – large boss pushed from inside of the vessel (25); type Z37 – circular knob pushed from inside of the vessel (3); type Z38 – knob with split ends (13); type Z39 – vertical rib, pasted (14); type Z40 – horn-shaped boss, pushed from inside or solid (12); type Z41 – relief handle in the lower part of the body (23); type Z42 – concave bottom of the vessel (110); type Z43 – protrusions on the top of the handle (6); type Z44 – elongated grooves decorating the handle (51); type Z45 – notches on the carination (47); type Z46 – protrusion on the rim (61); type Z47 – hollows on the vessel's rim (6); type Z48 – rim of the vessel decorated with notches or incised lines (24)

they distinctly lose their importance, while in phase C they again come into prominence, becoming the most common bowl type. Type M1 is least frequent in phase D. Only two specimens were found (grave 76 and 416) (Plate 3:2).

Pots: Very common in sub-phase A1 are also pots of G5 type. They are almost equally well represented in sub-phase A2 (Plate 3:3).

Scoops and jugs: Among the earliest scoops are those of C3 and C9 types. The former is characteristic of sub-phase A1 only, while the latter continues into sub-phase A2. The earliest scoops are conical (type C9) or carinated (type C3). Both types have handles which do not protrude above the rim. Scoops of C4 type are also quite widespread in sub-phase A1. The already mentioned jugs of D2 type occur mainly in sub-phase A1. In A2 inventories they are less common (Plate 3:4).

Sub-phase A2

Sub-phase A2 is represented by 31 grave assemblages (481, 533, 634, 658, 765, 1003, 1026, 1092, 1098, 1245, 1339, 1344, 1380, 1402, 1448, 1545, 1631, 1651, 1707, 1710, 1713, 1832, 1876, 1877, 1901, 1924, 1925, 1928, 1936, 1965 and 2010). The A2 cluster is less compact than the previous one (A1). This may suggest a transitory character of sub-phase A2 and a continuous transition into phase B (Plate 2).

Vases: The most common vase type in this sub-phase is W1 (although the number of W1 specimens was three times as high in sub-phase A1). Another popular type is W3, which reaches its peak during this phase. Vases of W3 type were quite widespread during sub-phase A1, too. They are most likely direct descendants of very similar W4 forms. They were used for longer time and occurred sporadically still in phase B. Vases of W5 type, characterised by long, cylindrical neck, seem to resemble W8 type in profile. However, contrary to the latter, vases of W5 type are not polygonal in plan. First W5 specimens appear sporadically during sub-phase A1. On the correspondence analysis map, W5 type is situated

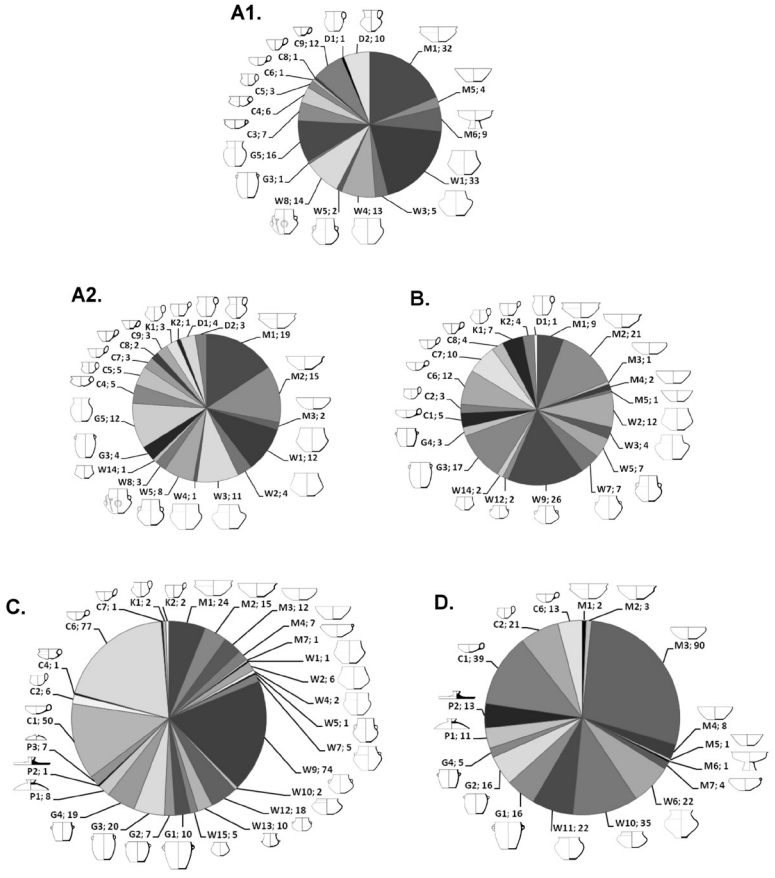

Fig. 9. Percentage of vessel types in particular phases of pottery style development. Number given after semicolon stands for the number of specimens representing the type

almost exactly at the transition between phases A2 and B. Its transitory character is further confirmed by nearly even representation in grave inventories from these two phases (Plate 3:1).

Bowls: Two main bowl types occur in sub-phase A2. Along with M1 type known already from sub-phase A1, a new type – M2 – appears. Both types are represented by a similar number of specimens (Plate 3:2). In sub-phase A2, pots of G5 type are still predominant, together with less numerous pots of G3 type (Plate 3:3).

Scoops, cups, jugs: Low, strongly carinated scoops of C5 type occurred at the border with sub-phase A1. Such vessels are represented in similar numbers in phases directly preceding and following sub-phase A2. On the other hand, high, strongly carinated scoops of C5 type are typical of sub-phase A2 and less common in sub-phase A1. In the development of scoops mentioned so far (in order of appearance: type C3, C4 and C5) one can notice an interesting tendency. In sub-phase A1, the earliest type (C3) comprises scoops of rather low and

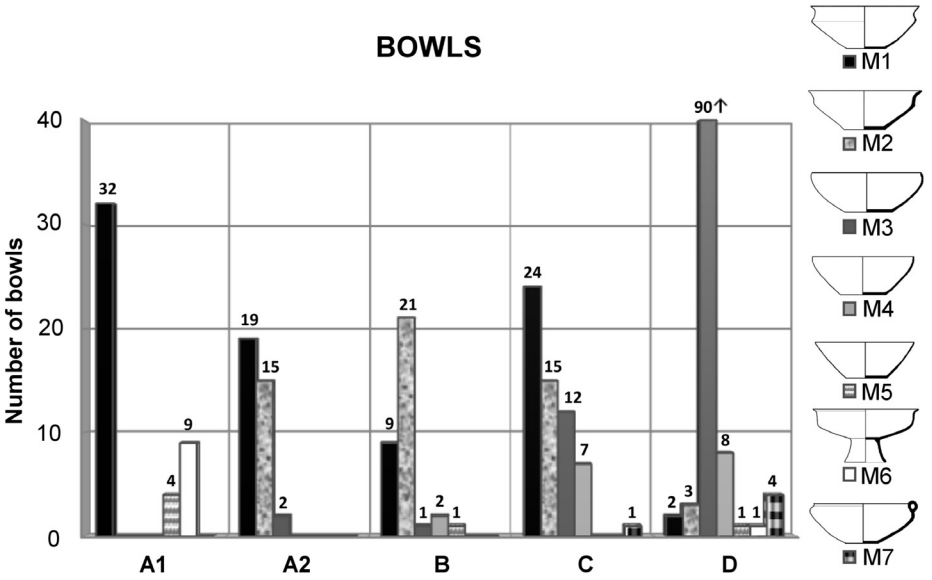

Fig. 10. Number of bowl types in particular phases of pottery style development

gently profiled forms. Vessels of C4 type are still low but with stronger carination. In sub-phase A2, scoops of C5 type preserve a strong carination, but are much higher then before. All the above scoop types have handles which usually do not protrude above the vessel's rim. Carinated scoops are no longer present in phase B. In the course of sub-phase A2, scoops of C7 and C8 types occur rarely. At that time single cups of K1 (graves: 1245, 1339 and 1832) and K2 (grave 1245) types start to appear. Cups are much more common in phase B inventories. Jugs of D1 type are recorded almost exclusively in sub-phase A2. In the neighbouring grave clusters such vessels are represented by single specimens only (Plate 3:4).

Phase B

Grave cluster representing phase B contains 26 burials (179, 384, 386, 467, 468, 477, 490, 523, 544, 550, 553, 794, 914, 994, 1039, 1043, 1054, 1073, 1078, 1150, 1151, 1261, 1263, 1504, 1999 and 2006).

Vases: In phase B, the most numerously represented vases are those of W9 type. The second most frequent type is W2, whose form most likely derives from biconical W1 vases. Unlike their predecessors, vessels of W2 type are more gently profiled and have a slightly flaring rim. This type is characteristic of phase B, even if it sporadically appears in phases A2 and C. Type W7 situates on the correspondence map just next to the border with phase C, where it is almost equally well represented (Plate 2). This suggests a transitional character of type W7. Its origins may be sought in earlier vases of W5 type (although still present in phase B), characterised by long, cylindrical necks and rather straight rims. Vases W7 have shorter necks and distinctly everted rims.

Bowls: In phase B, the predominant forms are carinated bowls of M2 type. This is a long-lasting type, present in nearly all the distinguished chronological phases. They are most numerous in phase B, quite common in phases C and A2, very rare in phase D and totally lacking in sub-phase A1. In

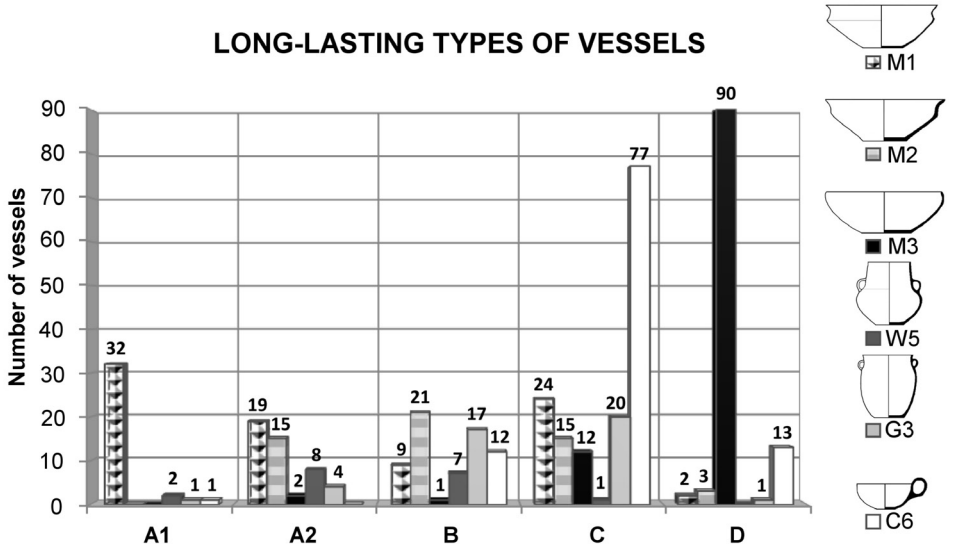

Fig. 11. Number of long-lasting types of vessels in particular phases of pottery style development

phase B, a preferred bowl form was a carinated vessel with rather flaring rim (M2). In that period, such vessels were three times as numerous as bowls of M1 type (Plate 3:2).

Pots: The most common pots in phase B are egg-shaped forms with everted rims, representing G3 type. One such specimen comes already from sub-phase A1 (grave 1976). Such pots occur sporadically in sub-phase A2, while in phase C they become equally popular as in phase B. Only one such pot is known from phase D (grave 497). Apart from predominant G3 type, single specimens of new G4 type also occur in phase B (graves 794, 1078, 1263) (Plate 3:3).

Scoops and cups: From phase B come mainly conical scoops representing C7 and C8 types. Both types are provided with handles protruding significantly above the rims. Scoops C8 sporadically occur already in sub-phases A1 (grave 2014) and A2 (graves 533 and 1344). They are characterised by straight rims, while rims of C7 type are everted. The earliest C7 scoops appear in sub-phase A2 (graves: 533, 1924, 2010) and have handles protruding slightly over the rims. The above scoop types, most widespread in phase B, developed directly from conical scoops of C9 type. One can notice a tendency to place the handle higher and higher in younger types of conical scoops. Conical scoops are almost unknown from phase C, except for one C7 specimen from grave 556.

During phase B, certain new scoop forms appear as well, namely slightly carinated C1 and C2 and semi-spherical C6 types. In the discussed period, scoops of C6 type become almost equally numerous as conical forms (C7 and C8), while the share of C1 and C2 is considerably lower (Plate 3:4).

Phase B inventories are distinguished by the presence of cups. Both identified types (K1 and K2) have handles protruding over the rim, which is a characteristic trait of phase B. Type K1 refers in form to high, strongly carinated scoops of C5 type. This similarity may reflect a tendency, detected already in materials from sub-phase A2, to increase the height of scoops (C3, C4 and C5). The discussed type (K1) is also

represented (though in very limited numbers) in phases A2 (graves: 1245, 1339, 1832) and C (graves: 556, 858). Type K2 is known almost exclusively from phase B, the only exceptions being one specimen from sub-phase A2 (grave 1245) and two more from phase C (graves: 266, 1087) (Plate 3:4).

Phase C

To phase C were included 58 grave inventories (30, 182, 184, 197, 201, 202, 205, 214, 215, 223, 239, 240, 241, 261, 266, 271, 283, 295, 305, 311, 317, 336, 351, 358, 362, 371, 374, 380, 387, 514, 556, 746, 842, 858, 924, 940a, 963, 981, 1007, 1059, 1074/1075, 1086, 1087, 1100, 1105, 1147, 1171, 1190, 1194, 1195, 1196, 1205, 1208, 1222, 1227, 1228, 1230, 1238). They form a rather compact cluster on the arc-shaped layout.

Vases: Type W9 occurred near the border with the cluster belonging to phase B. Vases of this type occur already in the previous phase, and reach the highest number in phase C. Their form resembles the vases of W7 type, although their neck is less distinctly separated. Vessels of W9 type are much squatter. Very often individual phase C inventories contain two, or sometimes even three or four W9 vessels. Despite being so common during phase C, W9 type does not occur in the following phase D. Vases characteristic of phase B are distinguished by considerably smaller size as compared to previous phases. This applies to vessels W12, W13 and W15. The tendency to reduce the size can be noticed already on vessels representing W9 type, which were used both in phase B and phase C. Some vase types typical of phase B (W2 and W7) survive into phase C as well (Plate 3:1). Vases of W13 type are very often accompanied by P3 lids. These lids have small apertures below the rim, most likely for a string or leather strap connecting the vessel with the lid. This enabled suspending the vessel.

Bowls: Several bowl types occur in phase C. There are carinated bowls (M1 and M2), as well as semi-spherical bowls with upright rim (M4) or inverted rim (M3). Most numerous are bowls of M1 type. Bowls M2 are less common then in the previous phase, although they regain their position during phase C, becoming the second most numerous bowl type at that time. Bowls of M3 type are slightly less popular, and M4 bowls appear only sporadically (Plate 3:2).

Pots and lids: Like in the previous phase, also in phase C pot of G3 type remain the predominant form. Low, barrel-shaped pots of G4 type are known almost exclusively from phase C. Their shape refers to the earlier G3 type. Both types continue into phase D, although only as isolated specimens. New pot types G1 and G2, distinguished by inverted rims, are less common in phase C. Phase C pots are sporadically accompanied by P1 lids (Plate 3:3).

Scoops: Semi-spherical scoops of C6 type, the most common form during phase C, occur in as many as 51 grave inventories from that phase. Very often burials are equipped with two or even three such vessels. In phase D, scoops in question become much less popular, and their frequency is comparable with that of phase B. One C6 scoop is known from grave 875 dated to sub-phase A1. The second most common scoop form in phase C is type C1, known from more than half of the inventories attributed to this phase. Scoops of C1 type quite often occur in twos or threes in particular grave inventories. The discussed type is slightly less common in phase D. Gently profiled C2 scoops are rare finds in phase C inventories, although one should notice a rising tendency as compared to phase B (Plate 3:4).

Between phases C and D are placed 4 graves (25, 114, 982, and 1008) and three

vessel types of transitional character (M4, C1 and miniature vessels – MN). The frequency of the above vessels is similar in phase C and phase D.

Phase D

To phase D are attributed 42 grave assemblages (5, 17, 20, 22, 27, 31, 39, 61, 65, 67, 73, 76, 77, 78, 79, 80, 83, 101, 102, 103, 105, 107, 122, 126, 129, 130, 136, 143, 171, 211, 411, 416, 425, 445, 462, 497, 499, 500, 504, 505, 506, 507). This is the most compact of all clusters.

Vases: Vase types from this cluster (W6, W10, W11) occur almost solely during the discussed phase. From the preceding phase are known only two vessels resembling vases of W10 type (graves 30 and 1007). Multisegment vases of W6, W10 and W11 types lack older parallels. They are much bigger as compared to phase C, and they seem to represent a different style. In phase D, vase types widespread in the previous phases do not occur (Plate 3:1).

Bowls: A vast majority of phase D bowls belong to M3 type and have inverted rims. Single specimens of this type are known already from phases A2 (graves 533 and 634) and B (grave 468). They become more popular in phase C and are present in virtually every inventory during phase D. At that time, a single grave inventory most often contained two such bowls. One, three or four bowls were also quite often recorded, with exceptional cases when five or even six such vessels occurred. Bowls of M4 type also occur in phase D, but they are much less popular than M3. From phase B are known only single M4 specimens (graves 544 and 1043), while during phase C they become equally popular as in phase D. Among stylistically youngest vessels one can also find carinated bowls of M7 type, characterised by a diameter significantly smaller at the rim than at the shoulder. This type is present mainly in phase D. One specimen is known from phase C (grave 963). Carinated bowls of M1 and M2 types appear only marginally during phase D (Plate 3:2).

Pots and lids: In phase D, the leading pot forms are types G1 and G2. The former comprises more slender, egg-shape vessels, while the latter groups barrel-shaped specimens. Both types are characterised by inverted rims. In grave inventories representing phase D, pots are very often accompanied by lids of P1 and P2 types. P2 lids are characteristic of phase D, although one such specimen was recorded in phase C as well (grave 842) (Plate 3:3).

Scoops: Most common in phase D are low, gently profiled scoops of C1 type. They occur in more than half of the phase D inventories, and are twice as numerous as C2 scoops. This latter type is recorded in phase D more frequently than in any other phase. In the last phase of pottery style development, the least frequent are scoops of C6 type (Plate 3:4). One should also mention trace occurrence of other categories of ceramic artefacts, such as discs (graves 78, 107, 317and 506), semi-lunar holders (graves 20, 78, 107 and 129) and rattles (graves 27, 39, 73, 80 and 425). In phase C inventories was found only one round clay disc (grave 17) and one rattle (grave 924).

Cluster N

Cluster marked with letter N on the correspondence map is an outlier from the parabolic layout. It is situated at some distance from the line marking the main current of stylistic development. The cluster contains graves 479, 811, 1152, 1260 and 1521, and vessel types W14 and W16. Position of these objects and variables outside the main layout may suggest that vessels from these burials are characterised by a different style. Some

connections between cluster N and phase B can be noticed on the diagram (Plate 3:1), which means that some vessel types are common for phase B and cluster N (e.g. M2, W2, W5, G3, C5, C7, C8). This leads to the conclusion that burials belonging to cluster N were deposited roughly at the same time as those belonging to phase B.

3.2. Development of vessel ornaments

Correspondence analysis was also conducted for the identified types of decoration. The results, transposed into a two-dimensional diagram, show a different, not arch-like distribution. Objects and variables form two separate clusters. To the right one can see a loose cluster of burials, while to the left can be seen a compact cluster distinguished by a vertical layout of objects. This gave grounds for the identification of two phases of ornament development (FI and FII), which correspond with the clusters of objects and variables marked on the diagram (Plate 5).

Results of correspondence analysis for ornaments reveal some similarity to a model case presented by T.Madsen (2007, p. 19–20). The two identified clusters (FI and FII) are placed at the opposite sides of the diagram (Plate 5). However, the distance between them is closer than in the idealised model. Between the two clusters, some variables of transitional character (Z2, Z22, Z32) can be identified. However, due to their limited number, the connections between clusters are not very numerous. To compare the pace of development of ornaments with that of forms, the results of two correspondence analyses were collated. On the diagram presenting the results of correspondence analysis for ornaments, objects were marked with colours indicating particular phases of vessel forms development. This allowed for the identification of various sets of decoration motifs typical of particular stages of vessel forms development (Plate 6). More detailed comments on the issue will be given in the following chapter.

Phase FI

The cluster denominated as FI comprises 50 graves attributed to phase A of vessel forms development. This number includes 35 burials from phase A1 (i.e. all A1 burials included into the analysis of ornaments) and 16 burials from phase A2 (533, 1026, 1092, 1098, 1380, 1402, 1448, 1545, 1631, 1832, 1877, 1924, 1928, 1936, 1965, 2010). Phase FI is distinguished by a limited range of decorative motifs and the decoration confined to only small part of the vessel's surface (except for bossed vessels). Burial inventories attributed to phase FI contain many unornamented vessels. The remaining vessels usually bear from 1 to 3, less frequently 4 (bossed vessels of W8 type) different decoration motifs. Therefore, the total number of decorative motifs occurring on vessels from one specific burial inventory varies in phase FI from only 2 to 10, most frequently between 3 and 6. Compared to phase FII, the little diversity and narrow spectrum of decorative motifs applied during phase FI are striking.

Vessels from phase FI are ornamented with bosses (Z 36) pushed from inside of the vessel. Such decoration co-occurs most often with semi-circular or horseshoe-shaped incised lines (Z4) or grooves (Z28). Sometimes, bosses are separated with vertical rib (Z39). Vases (W1) very often have notches on the shoulder. The decoration of handle tops with small protrusions is typical of phase FI only. Such decoration is most common on bowls. The decoration covering lower part of the vessel body is not very popular. It usually consists of vertical (Z2) or oblique (Z3)

incised lines. Vases are sometimes decorated with fingertip impressions (Z22) and short ribs (Z32) on the shoulder. Ribs are known from phase FII vessels as well, but they tend to appear on upper parts of pots in that period.

Small number of connections between the two phases indicate a change in pottery ornamentation. Lack of significant relations can be explained by departure from ornament patterns typical of phase FI in favour of a new set of decoration motifs. The change must have been relatively rapid, as burials representing phase A2 of vessel form development occur in both stages of development of ornaments (Plate 6).

Phase FII (a–b)

Phase FII is distinguished by a much broader range of decorative motifs. Their number in particular inventories is considerably higher than in phase FI. To phase FII are attributed 147 burial assemblages. On the diagram, the phase is represented by a very compact, vertically arranged cluster. The alternate occurrence of objects and variables within the cluster points to a continuous development during that phase. This means that decorative motifs on pottery were systematically and consistently replaced with the new ones. The division proposed here into two sub-phases (FIIa and FIIb) is not very clearly manifested. A number of variables have a transitory character or is long-lasting, which precludes many objects from being precisely assigned to a specific sub-phase. The accepted dividing line runs through the zone where in the vertical layout objects and variables are more sparsely distributed (Plate 5).

Phase FIIa groups the majority of objects (108), including almost all graves from phases B and C, as well as some A2 burials (481, 634, 658, 765, 1245, 1339, 1651, 1876). Burials from phase D (17, 22, 27, 73, 80, 103, 129, 171, 425, 462, 506) occurred in sub-phase FIIa too, although they

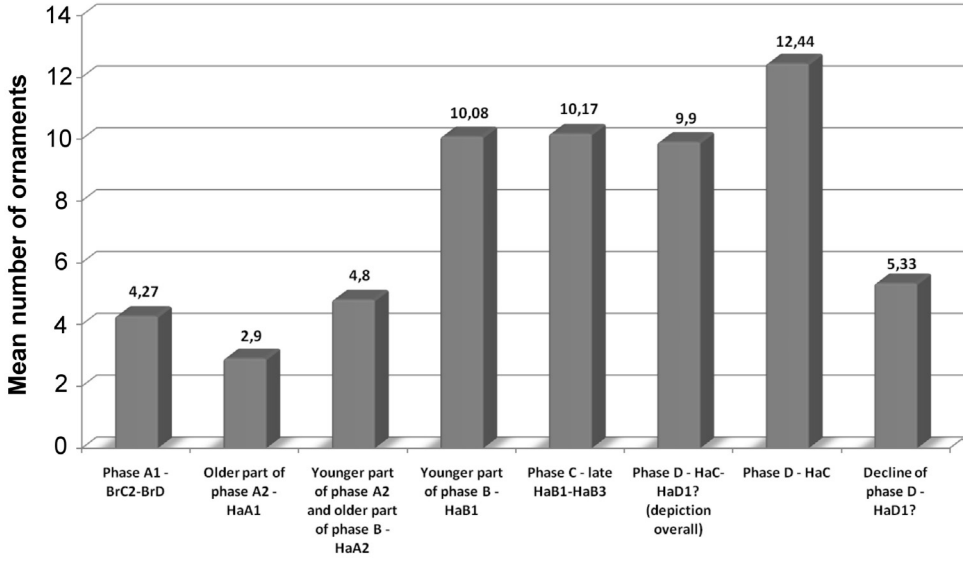

Fig. 12. Mean number of decorative motifs in particular phases of pottery style development

were less numerous. They were clustered on the margin of sub-phase FIIa, close to the border with sub-phase FIIb. The latter holds assemblages attributed almost exclusively to phase D. Such layout of objects confirms a smooth transition between the two sub-phases (FIIa and FIIb).

31 out of 39 graves assigned to phase FIIb are burials connected with phase D of vessel form development (5, 20, 31, 39, 61, 65, 67, 76, 77, 78, 79, 83, 101, 102, 105, 107, 122, 126, 130, 136, 143, 211, 411, 416, 445, 497, 499, 500, 504, 505, 507). Other phases were represented by few burials (grave 1003 from phase A2; 467 from phase B; 30 from phase C; graves 479, 1260 and 1521 from cluster N and graves 25 and 114 from transitional cluster between phases C and D).

The number of decorative motifs increases in subsequent phases of ornament development (Fig. 12). A considerable enrichment of the applied set of ornament patterns can be noticed already at the transition between phases FI and FIIa. Pottery assemblages representing the final segment of phase FI, which comprise burials attributed rather to the first half of phase A2 of vessel form development, reveal between 2 and 7 decorative motifs, most commonly 3 or 4. In graves from the very beginnings of phase FIIa, dated to the younger segment of phase A2, this number varies from 3 to 8, with most frequent value between 4 and 6.

The number of decorative motifs becomes higher and higher in the next phases of vessel form development: it is between 2 and 13 in phase B (most often 4–10), and between 2 and 18 in phase C (most often 5–13). The variety of decoration patterns reaches its maximum in phase D. The vast majority of phase D inventories reveal between 6 and 14 motifs, sporadically even 15–19. Lower number of patterns (3–5) occurs only exceptionally. In the course of phase FII, decoration started to cover more and more of the vessel surface. In terms of the area covered with decoration, the most lavishly ornamented pottery inventories are those from phase D. Among the best examples one can mention scoops of C1 and C2 types, common in this period, with both outer and inner surfaces lavishly decorated.

The change that took place at the transition from FI to FII is manifested by the introduction of new decoration patterns and phasing out of those applied previously (Z36, Z39, Z43, Z45). New motifs which appear in sub-phase FIIa comprise various kinds of grooves arranged on vessel body in bands (especially oblique Z26, vertical Z24 and horizontal Z25 grooves). During this phase, typical bossed ornament (Z36) gave way to small circular bosses pushed from inside of the vessel (Z37) and to more numerous oval (Z34) and circular (Z35) knobs pasted on the vessel's surface. Rims in sub-phase FIIa are often decorated with protrusions. Another trait characteristic of sub-phase FIIa is the decoration of vessel base with concentric circles (Z25) or multi-arm stars (Z12). Ornament in the form of group of vertical incised lines flanked with two groups of oblique incised lines (Z11) is typical exclusively of sub-phase FIIa, and in phase FIIb appears only sporadically. This is also the case with bands of hatched triangles (Z13) and bands of small hollows (Z16 and Z17).

Variables from the area where sub-phases FIIa and FIIb meet are either transitional or long-lasting. This applies to the whole range of incised triangles (Z7), knobs with split ends (Z38), circular (Z27) and oblique (Z26) grooves, which are all evenly distributed in the two identified sub-phases.

In sub-phase FIIb, a number of decorative motifs appear which are characteristic almost exclusively of this period of ornament development. These comprise: decoration

of bowls' rims with hollows (Z47) or notches (Z48), cross motif either incised (Z8) or composed of hollows (Z20), incised herring-bone (Z9) and chevron (Z10) patterns, incised chequered ornament (Z6) and bands of alternate oblique lines joined with hollows (Z14). Various relief ornaments are also characteristic of phase FIIb: cordons (Z29) or cordons decorated with notches (Z30) or hollows (Z31), short vertical ribs (Z33), handles placed in the lower part of the body (Z41), and horn-shaped knobs (Z40), either pasted or impressed from inside of the vessel. All the above ornament patterns are only sporadically recorded in pottery inventories from the previous sub-phase (FIIa).

The most long-lasting patterns, which continue throughout all the identified phases and sub-phases of ornament development, are horizontal (Z1), vertical (Z2) and oblique (Z3) incised lines. They are most common in sub-phase FIIa, slightly less popular in FIIb and least widespread in phase FI.

It should be emphasized that the development of ornaments followed a different rhythm than the development of vessel forms. The identified phases and sub-phases of ornament development are more long-lasting, and a set of decorative motifs characteristic of one phase of ornament development may, in some cases (like for FIIa), occur on vessels from four consecutive phases of vessel form development.

4. Discussion: results of correspondence analysis versus traditional periodization of the Kietrz cemetery

A rather clearly noticeable division into phases of pottery style development visible on the diagram (Plate 2) enables comparing the obtained sequence with the traditional chronology proposed by M. Gedl. The first conclusion from this comparison is that the two schemes developed for the Kietrz materials show distinct similarity. However, the analysis performed in this paper brings a number of new, more detailed data about local development of pottery style. This stems most likely from the differences in applied research methods and from the fact that the present study is based entirely on pottery, not taking into account the variability of metal artefacts.

A considerable similarity can be noticed between phase A of vessel form development and M. Gedl's phase Kietrz IIa. However, it should be emphasised that this similarity does not encompass the internal divisions within these phases, which are not parallel. Vessel types characteristic of phases Kietrz IIa and Kietrz IIb occurred mainly in sub-phase A1. Correspondence analysis proved it very difficult to identify phase Kietrz IIa among the selected burials using the criteria proposed by M. Gedl (1979, 27–29; 1980, 85–88). In his opinion, particularly characteristic of phase Kietrz IIa were, among other vessels, bowls on hollow foot (M6) and vases with rounded body and conical or cylindrical neck (W3). The latter were often decorated with short ribs on the body (type Z32), and sometimes with small bosses or knobs (type Z37), although undecorated specimens also occur. In burial inventories selected for the analysis (graves: 875, 1348, 1601, 1719, 1730), bowls M6 are frequently accompanied by bossed vessels, which according to M. Gedl are indicators of the subsequent phase (Kietrz IIb) (Gedl 1979, 29–30; 1980, 88–90). Vases W3 decorated with ribs are a more long-lasting type and occur throughout the entire phase A (graves from sub-phase A1: 1601, 1730, 2000; graves from sub-phase A2: 1448, 1545, 1924, 1925, 1928). In sub-phase A1, such vases sometimes occur together with bossed vessels (Gedl 1996, plate I:5,7,15; II:5,8,15; XXXVIII:9; XCIII:9). Short ribs

are recorded in sub-phase A1 on biconical vases of W1 type, too (graves: 1125, 1670, 1715, 2000).

Other vessels that M. Gedl considered typical of phase Kietrz IIa were vases with barely marked bosses pushed from inside, and/or with pasted ribs-knobs which delicately emphasised the vessel's polygonal outline (Gedl 1980, 85–86). Among the selected inventories such decoration appears on several vessels (Gedl 1992, plate 33:12; 1996, plate 1:11, 38:11, 93:13) coming from graves ascribed to sub-phase A1 (graves: 1495, 1601, 1730, 2000). Vases from graves 1601 (specimen preserved in fragments), 1730, and 2000 belong to type W3, while vase from grave 1495 refers to type W8. The discussed ornament also appears on two small jugs/cups from grave 1495. In all the above mentioned inventories, vases bearing the ornament in question are accompanied by bossed vessels or their fragments (Gedl 1992, plate 32:7; 1996, plate 1:5,7,15, 2:5,8,15, 38:9, 93:9), i.e. by the indicators of M. Gedl's phase Kietrz IIb (1979, 29; 1980, 88–90). The co-occurrence of the two types of decoration makes it difficult to establish chronological divisions within the grave cluster corresponding to sub-phase A1. Ornament in the form of barely marked bosses delicately emphasising a polygonal body was recorded in sub-phase A2 only on one vase (grave 1339 – Gedl 1989, plate 82:7), whose younger chronological position was indicated by decorative motifs typical of phase FIIa of ornament development, namely bands of oblique and vertical grooves.

Bossed vessels of W8 type show interesting distribution on the correspondence analysis map (Plate 3:1). They are clustered almost exclusively in sub-phase A1. This is also the case with another type of bossed vessels – type D2. Such position of bossed vessels differs from that proposed by M. Gedl, who connected them with phase Kietrz IIb. Distribution of these variables (W8 and D2) on the correspondence analysis map (Plate 5) and their co-occurrence with vessel types and decorative motifs typical of M. Gedl's phase Kietrz IIa may speak for the appearance of bossed style as early as in BrC2 (Kwapiński 1985, 31–37). In conclusion, it should be stated that in the light of the results of statistical analysis it is impossible to distinguish between sub-phases Kietrz IIa and Kietrz IIb. The results suggest that the cluster of graves connected with sub-phase A1 should be dated to BrC2 and BrD.

Describing sub-phase A2 of pottery style development one should emphasize its transitional character. More than half of the A2 objects (graves: 1026, 1092, 1098, 1344, 1380, 1402, 1448, 1545, 1631, 1707, 1710, 1713, 1832, 1901, 1924, 1925, 1928, 1936, 1965, and 2010) are still connected with the preceding sub-phase A1, as is manifested by a short distance between them, which means that there are considerable similarities in pottery inventories. In this group of burials still appear vessel types characteristic of sub-phase A1, such as biconical vases W1, carinated bowls M1, pots with shoulder G5 and strongly carinated scoops of C4 type. Similar is also the set of decorative motifs, representing ornaments typical of phase FI: bowls and vases of W1 type are commonly decorated with notches on the carination (Z45), sometimes supplemented with oblique incised lines on the lower part of the body. Bossed decoration still survives, although vessels decorated with bosses pushed from inside and surrounded by grooves or incised lines are known from only four inventories. In graves 1448 and 1631 these vessels are vases W8, polygonal in plan (Gedl 1992, plate 25:6; 1996, plate 10), from grave 1454 comes a small jug of D2 type (Gedl 1992, plate 46:7), and a cup of K1 type is known from grave 1832 (Gedl

1996, plate 56:7). Disappearance of the developed bossed ornament results in the lower number of decorative motifs used in the older segment of phase A2 as compared to phase A1 (Fig. 12). The above arguments speak for connecting the discussed group of graves from sub-phase A2 with phase Kietrz IIc, dated roughly to HaA1 (Gediga 1967, 184; Gedl 1979, 31–33; 1980, 92–93).

Because new vessel types appear in sub-phase A2 (W2, G3, K1, and K2) it is very difficult to correlate it fully with phase Kietrz IIc. Graves discovered on the peripheries of the cluster linked with sub-phase A2 (graves: 481, 533, 634, 658, 765, 1245, 1651, 1876, 1877) seem to lean towards phase B. This may be observed in the set of decorative motifs which undergoes a sudden change at the end of sub-phase A2. Motifs characteristic of phase FI of ornament development give way to a new set of ornaments, typical of phase FIIa. Inventories dated to the younger segment of sub-phase A2 no longer contain bossed vessels. The decoration with cuts on carination disappears as well. New types of decoration appear: bands of oblique or vertical grooves on the upper parts of vases, hatched triangles (Z7), herring bone pattern (Z9) and small, oval (Z34) or circular (Z35) knobs pasted on the vessel's body in its widest part. This last ornament appears to be a reminiscence of the early Lusatian bossed style, typical of the previous phase of decoration development (FI). Pattern of hatched triangles, often accompanied by horizontal lines and herring bone motif, occurs most commonly on low biconical vessels with gentle (type W2) or sharp (type W3) profile. Such vessels are known from the majority of grave inventories in question.

To the group of burials from sub-phase A2 one should also include two graves situated closer to sub-phase A1, namely graves 1003 and 1339. For grave 1003, the reason lies in the presence of vessels which were not included into the analysis due to their poor preservation or insufficient number (Gedl 1989, plate 61:6,7). Grave 1339 was included because it contained vessel types (W5 and K1) connected rather with the younger segment of sub-phase A2 and phase B. Form and decoration (bands of vertical and oblique grooves, small, circular knobs and hatched triangles) of vessels from the two graves suggest that they should be linked with the discussed group of burials.

Recapitulating the above discussion on the internal division within sub-phase A2, it should be emphasised that regardless of the differences, both grave clusters share common, more long-lasting vessel types (described in previous chapter). The appearance of new vessel types and a different style of ornamentation in pottery from graves attributed to the younger segment of sub-phase A2 suggest dating these burials no later than to HaA2, which corresponds to phase Kietrz III (Gedl 1979, 33–39, 1980, 94–99). Small number of sub-phase A2 assemblages may be explained with short duration of periods HaA1 and HaA2, each of which probably lasted for no longer than 50 years (1150–1100 and 1100–1050 BC).

More than half of the burials attributed to phase B of vessel style development should be still connected with phase Kietrz III (graves: 467, 468, 477, 490, 523, 544, 550, 794, 994, 1073, 1078, 1504, 1999, and 2006). No significant changes are recorded in pottery decoration and the set of vessel types remains similar. Towards the end of phase B slight changes occur, although they are less distinct than during sub-phase A2. The differences observed within phase B allow distinguishing a rather compact cluster of younger graves, situated close to phase C. This cluster comprises the following burials: 179, 384, 386, 553, 914, 1039, 1043, 1054, 1150, 1151, 1261 and 1263.

Phase Kietrz III burials from late subphase A2 and phase B are characterised by the presence of vases W5 (with separated, conical neck) and W2, carinated bowls M2, conical scoops C7 and C8, and cups K1. Inventories of graves from late phase B contain more numerous examples of other vases, such as W7 and W9, which only sporadically occurred earlier. Type W5 is replaced by vases of W7 type, with shorter, conical neck and slightly flaring rim. Stylistic changes in vases are best reflected by vessels of W9 type, which are most numerously represented in the late part of phase B. Vases become lower, more squat, with shorter and less distinctly separated neck. Such proportions dominate in phase C, too. By the end of phase B, conical scoops (C7 and C8) and cups of K1 type lose their importance, while previously uncommon, slightly carinated (C1 and C2) or hemispherical (C6) scoops and cups K2 become more popular.

Graves from the younger segment of phase B are distinguished by the higher number of vessels accompanying the urn. Burial inventories most often contain as many as three scoops (graves: 179, 384, 386, 1054, 1151, 1263), less frequently a scoop and cup (graves: 914, 1039, 1043, 1261) and exceptionally two scoops (graves: 553, 1150). In the older segment of phase B scoops are much less numerous, while cups are more common. Four graves contain neither scoops nor cups (graves: 467, 468, 490, and 1999). There are five inventories with a scoop and cup (graves: 523, 544, 994, 1504, 2006), three with a scoop only (graves: 477, 550, 1073) and two with a set of two scoops and a cup (graves: 794, 1078).

Regardless of the described differences in inventories and the continuous stylistic evolution of pottery, one should emphasise strong connection between burial clusters distinguished within phase B. This link is manifested by the identical share of some vessel types: carinated bowls M1 and M2, biconical vases W2 and egg-shaped pots G3. Vessel decoration also reveals close similarities. By the end of phase B, the set of applied decorative motifs becomes richer. Apart from previously known hatched triangles and oblique or vertical grooves, a new motif appears, in the form of tangled bands of hatched triangles (Z13). Such decoration appears on five small vessels: vases of W2 and W9 type from grave 179, carinated scoop C2 from grave 386, poorly preserved biconical vessel from grave 1039 and a vase of W2 type from grave 1263 (Gedl 1982, plate 1:2,5, 60:19; 1987, plate 33:6, 90:13). This decoration is much more widespread in phase C. In the final phase B, vessels are often decorated with degenerated early-Lusatian bossed ornament. Oval or circular knobs pasted on vessel's body are often emphasised by semi-circular grooves, or less frequently topped by incised multiplied (Z7). Knobs are usually separated by bands of vertical grooves and single or multiplied hollows (Z22). Vases are very often decorated at the base of the neck by horizontal grooves running beneath bands of hollows (Z22) or punctures (Z16). In the previous phase (phase Kietrz III), pasted knobs occur alone or are emphasised by oblique or vertical bands of grooves or incised lines arranged above the knobs or beside them. Knobs surrounded by semi-circular grooves are much less common. In the younger segment of phase B the share of decorated vessels in burial inventories rises, and a richer set of decorative motifs covers more of the vessel surface. A custom to decorate the inside of bowls and scoops C1 and C2 becomes popular. Most scoops, especially of new types C1, C2 and C6, have now concave bottoms. Unlike richly decorated scoops of C1 and C2 types, the majority of hemispherical scoops of C6 type are not ornamented. Such situation continues in the

next phases of pottery style development. The above arguments speak for connecting the grave cluster from the final phase B with phase Kietrz IVa which, according to M. Gedl, corresponds roughly with period HaB1 (Gedl 1979, 39–48; 1980, 104–110).

M. Gedl's observation concerning a different – 'foreign' – style of some vessel types during phase Kietrz III finds confirmation on the diagram, where it is reflected as a cluster of graves (479, 811, 1152, 1260, 1521) and vessel types marked with letter N (Plate 1, 2). A foreign character of type W16 (large vases with bulging body, separated conical or cylindrical neck and flat, out-turned rim that sometimes is facetted) is suggested by its position far from the arc-like layout. Such vases are known from four grave inventories (479, 811, 1152, and 1260), all of them belonging to cluster N. Type W16 is not typical of Silesian group of the Lusatian culture. Single specimens are known from graves from Wisznia Mała, Trzebnica district, and Dobrzeń Wielki, Opole district (Przybyła 2009, 335–336). Vases W16 are slightly more numerous in the Głubczyce subgroup on the Kietrz cemetery. Their appearance at Kietrz should be linked with southern influences, radiating through the Moravian Gate from the Middle Danubian Urnfields. Such vases are one of the leading pottery forms in the younger phase of the Velatice culture in HaA2 (Gedl 1984, 17–18; Przybyła 2009, 336). Analogical dating should be ascribed to the vases from Kietrz. In two inventories (graves 479 and 1260) vases W16 are accompanied by small, biconical vases of W14 type, decorated above sharp carination with horizontal lines, band of hatched triangles and herringbone pattern. The presence of small vases confirms the attribution of W16 vessels to phase Kietrz III (Gedl 1980, 96; Przybyła 2009, 336). A custom of forming flat, outturned rims facetted from inside continue into period HaB1, when it is recorded on a more typically Lusatian vase (type W9) discovered in grave 179 (Gedl 1980, 97).

In the inventories from cluster N there also appear other vessel types (M2, W2, W5, G3, C5 and C7), common in the younger part of sub-phase A2 and the older segment of phase B (phase Kietrz III). The set of decorative motifs typical of cluster N is identical with that of phase Kietrz III. In the light of the above remarks, graves from cluster N should be approximately linked with period HaA2.

Selected burial inventories contain other vessel types revealing southern influences, too. However, these types were not included into statistical analysis due to their small representation. One of such vessel types are 'multi-section' vessels, represented in the selected inventories by two specimens (graves 533 and 1003). Origins of such pottery should be sought in the Carpathian Basin in the Knoviz culture milieu and in the younger phase of the Velatice culture from southern Moravia (Bouzek 1958a, fig. 149, 154; 1958b, fig. 220). The two vessels from Kietrz come from inventories dating to HaA2 (younger segment of sub-phase A2). Such dating is confirmed by the decoration of 'multi-section' vessels – a band of densely arranged incised oblique grooves on the vessel from grave 1003 and groups of oblique grooves separated by single hollows on the vessel from grave 533. It is further confirmed by the presence of accompanying vessels (W2, C7, C8 and a quadrilateral bowl from grave 1003) belonging to types characteristic of phase Kietrz III, and in particular a small, biconical, sharply carinated vase from grave 1003, decorated with hatched triangles (Gedl 1980, 97, 99; 1989, 25; Przybyła 2009, 334). To the 'multi-section' forms refer other vessels, with lower, slightly bulging necks. Such specimens are slightly more frequent on the Kietrz

cemetery (graves: 490, 1073 and 1100). This type should probably be connected with the Velatice culture milieu (Gedl 1980, 97), although its local origin is also possible as the vessels are decorated with typical Lusatian motifs. One should also take into account the inspirations from the eastern zone of the South Germany Urnfields and from the Knoviz culture at the end of HaA (Przybyła 2009, 334–335). In conclusion, vessels with bulging necks discovered at Kietrz should be dated to HaA2 (graves 490 and 1073 from the older segment of phase B) and to HaB1 (grave 1100 from the early phase C). On the Kietrz cemetery, 24 graves yielded nearly 40 vessels whose style may be linked with southern influences (Przybyła 2009, 342). Small number of the vessels and their episodic appearance throughout HaA2–HaB1 (from the younger segment of sub-phase A2 till the beginning of phase C) suggest weak influences from the Middle Danubian Urnfields.

There is a striking similarity between phase C of pottery style development and phase Kietrz IV (Gedl 1979, 39–50). The set of characteristic vessel types is almost identical in both phases. Both phases are also characterised by a significant variability in the size of vases. Along with large vessels, such as surviving types W2 or W7, medium-size (W9) and miniature vases (W12, W13, W15) occur. In both phases there also appear carinated (M1 and M2) and hemispherical (M14) bowls, pots G4 with everted rim, hemispherical (C6) and carinated (C1) scoops. Decoration is also very similar. In spite of a large number of burials there seems to be no reason for dividing phase C of pottery style development into sub-phases. Phase C may be linked with the period from the end of HaB1 (when vessel types characteristic of phase B disappear) till HaB3.

Phase D is characterised by a rich variety of vessel types. Some of them, like multi-section vases W6, W10 and W11, bowls M7, pots G1 and G2, and lids P2, occur only during that phase. Richly decorated scoops of C2 type are also numerous. The above vessel types correspond with pottery forms widespread in HaC. Phase D of pottery style development should be directly correlated with phase Kietrz V (Gedl 1979, 50–62). Such conclusion is supported by the same set of FIIb decorative motifs recorded in the two phases. However, despite the richest repertoire of ornaments and the highest complexity of vessel decorations, in phase D the average number of decorative motifs on vessels coming from single grave inventory is slightly lower than in phase C (Fig. 12). This may result from surviving of the early-Hallstatt style into period HaD1. To that style one can attribute a group of burials (graves: 17, 22, 31, 39, 61, 65, 73, 103, 130, 136, 211, 425, 462, 497 and 505) containing vessels typical of HaC although much more modestly decorated (Mierzwiński 1994, 116–117).

The presented analysis may be supplemented by comparison of the correspondence analysis results with radiocarbon dates, obtained from bone remains found in selected graves on the Kietrz cemetery (Chochorowski 2007). The comparison is presented on the diagram showing the results of correspondence analysis for vessel types (Plate 7). Chronological distribution of dates, from the oldest to the youngest, coincides with the variability of vessel types in time, although broad chronological ranges of radiocarbon dates, spanning even several hundred years, render the establishment of absolute chronology virtually impossible. Based on the radiocarbon results, sub-phase A1 can be broadly dated to the period from 1402 to 803 BC, while the dates for sub-phase A2 fall within the range from 1255 to 595 BC. Phase B falls into the period from 1220 to 750 BC, which

corresponds to the range of the dates for cluster N (between 1127 and 801 BC). The dates for phase C cover the period from 1008 and 405 BC.

5. Summary

1. Phases of vessel form development are polythetic assemblages, which means that they are formed by specific combinations of attributes or their frequencies rather than by strictly defined sets of phase-unique attributes.

2. In the development of pottery forms, one can observe a continuous evolution between phases BrC2 and HaC, i.e. in the period spanning nearly 800 years (ca 1380–600 BC). This confirms earlier conclusions, based on planigraphy data, concerning the uninterrupted functioning of the cemetery.

3. Development of pottery decoration followed a different pattern – a "revolutionary" change in HaA was followed by a continuous development until the end of early Hallstatt period, when a regression in pottery ornamentation probably took place.

4. A number of independent tendencies were identified in the evolution of material culture, for example a tendency to gradually enrich the repertoire of decorative motifs and increase the sophistication of pottery ornamentation, which reached its apogee during phase HaC.

5. There is some discrepancy between the present results and M.Gedl's chronology with respect to the older phases of vessel form and decoration development (among other things, the present results suggest dating the appearance of bossed decoration as early as BrC2).

6. The following facts were confirmed: individual character of HaA2 assemblages with "foreign" pottery and an episodic character of this phenomenon (new forms were not incorporated into the standards of phases C and D).

7. Independent – though inaccurate – radiocarbon dates revealed general conformity with the results of correspondence analysis.

List of vessel types used in the analysis, originating from the inventories of selected grave assemblages discovered at the Kietrz cemetery. Roman numerals stand for the number of specimens of a given vessel type in a particular grave assemblage.

M1 (86): 76, 197, 201, 202, 205, 214, 215, 241, 317, 351, 374, 380II, 384, 387, 416, 468, 481, 490II, 514, 523, 556, 596, 719, 720II, 753II, 765, 818, 1003II, 1010, 1022, 1025II, 1026, 1039, 1054, 1059, 1086II, 1098, 1100, 1150, 1190, 1195, 1205, 1208, 1230, 1245, 1261, 1339, 1373II, 1380, 1402, 1489, 1509, 1510, 1534II, 1625, 1631, 1639, 1651, 1670, 1715, 1733, 1754II, 1771, 1787, 1832, 1901II, 1925, 1936, 1965, 1976, 2000III, 2001, 2010.

M2 (58): 102, 130, 179, 182, 184, 202, 239, 240, 261II, 295II, 336, 358, 362, 445, 467, 477, 479, 490, 544, 550II, 553II, 634, 794II, 811II, 914, 924, 994, 1039, 1073, 1074/1075, 1092, 1151II, 1194, 1260, 1261, 1263, 1380, 1402, 1448, 1504, 1631, 1651, 1707, 1710, 1713, 1876, 1928II, 1936, 1965, 2006.

M3 (107):5II, 17II, 20IV, 22II, 25, 27III, 31II, 39II, 61, 65II, 73II, 76II, 77IV, 78, 79IV, 80III, 83IV, 101, 102, 103II, 105III, 107III, 126II, 130II, 136, 143III, 171III, 211, 215, 351, 374, 416, 425II, 445V, 462II, 468, 497II, 499, 500III, 504VI, 505, 506II, 507III, 533, 556II, 634, 858, 940a, 982, 1105, 1171, 1190, 1194, 1195.

M4 (19): 31, 67, 83, 105, 107, 114, 182, 201, 205, 223, 497, 500, 504II, 544, 940a, 1043, 1228, 1238.

M5 (6): 83, 699, 1601, 1670, 1833, 1999.

M6 (10): 80, 875, 1022, 1348, 1509, 1538, 1601, 1719, 1730, 2000.

M7 (5): 22, 101, 102, 136, 963.

W1 (46): 533, 658, 720, 753III, 818, 875, 1007, 1025, 1026, 1092, 1125II, 1344, 1371II, 1373II, 1429, 1489, 1529, 1534, 1538, 1545, 1616, 1625, 1639, 1670, 1710, 1713, 1715II, 1719, 1771, 1787II, 1901, 1936, 1965, 1976, 2000III, 2001, 2010.

W2 (24): 179, 184, 467III, 479, 533, 544, 550, 553, 765III, 994, 1007, 1039, 1147, 1150, 1151, 1190, 1195, 1196, 1263, 1521.

W3 (20): 523, 1043, 1078, 1245II, 1261, 1373, 1448, 1495, 1545, 1601, 1710, 1730, 1877, 1924III, 1925, 1928, 2000.

W4 (16): 596, 719, 720II, 1025, 1074/1075, 1087, 1098, 1348, 1373, 1429, 1509, 1529, 1616, 1976II.

W5 (19): 467, 468, 481III, 490, 544, 634, 658, 794, 811, 1059, 1078, 1263, 1339, 1529, 1651II, 1719.

W6 (22): 39, 67III, 76II, 77, 79, 83, 102, 126, 136, 211, 445, 497, 499, 500, 504, 505, 506II, 507.

W7 (12): 182, 201II, 362, 386, 556, 914, 1073II, 1151, 1263II.

W8 (17): 596, 699, 740II, 875, 1339, 1348, 1448, 1510, 1601, 1616, 1631, 1639, 1715, 1719, 1733, 2014.

W9 (101): 179IV, 182III, 184II, 197, 202, 205, 215II, 223II, 239III, 240, 241II, 261II, 295, 305II, 311IV, 317, 351II, 358, 371, 374, 380II, 384II, 386, 387, 477, 490, 550, 553, 746, 794, 842II, 858II, 914, 924II, 940aII, 963II, 981II, 1007, 1008, 1039, 1043II, 1054II, 1073, 1074/1075II, 1086, 1087II, 1100II, 1105, 1150III, 1171II, 1194II, 1195, 1196, 1205II, 1208, 1222III, 1228II, 1230II, 1261II, 1504, 1999.

W10 (37): 20III, 30, 31, 39, 65II, 73, 77II, 78, 79II, 80II, 101, 102III, 107II, 126, 130, 136, 143, 425, 445III, 504, 506II, 507III, 1007.

W11 (22): 5, 17, 22, 61, 73III, 76, 80II, 103, 105, 122, 129, 171, 411, 425, 445, 462, 499, 504, 507.

W12 (20): 30, 197, 202, 205, 240, 336, 351, 477, 514II, 924, 940a, 963, 994, 1105, 1190II, 1205, 1208II.

W13 (10): 215, 223, 271, 317, 371, 842, 1171, 1227, 1228, 1230.

W14 (6): 468, 479, 634, 1260, 1521, 2006.

W15 (6): 283, 380, 981, 982, 1086, 1147.

W16 (4): 479, 811, 1152, 1260.

G1 (29): 5, 78, 83, 103, 105, 122, 143, 201, 211, 215, 336, 351 362, 374, 411, 416, 425, 445, 499, 505, 506, 507, 746, 981, 982II, 1008, 1190, 1208.

G2 (24): 17II, 20, 61, 65, 67, 78, 79II, 101, 105, 126, 201, 261, 266, 295, 380, 411, 462, 500, 504, 842, 982, 1230.

G3 (44): 179, 182, 271, 358, 380, 384, 386, 467, 468, 477, 490, 497, 523, 544, 553, 658, 858, 914, 994, 1007, 1039, 1043, 1054, 1074/1075, 1086, 1087II, 1100, 1105, 1147, 1150, 1194, 1195, 1196, 1208, 1222, 1228, 1238, 1260, 1651, 1876, 1877, 1976, 1999.

G4 (30): 25, 30, 39III, 80, 197, 202, 214, 223, 239, 241, 283, 305, 362, 371II, 387, 445, 746, 794, 982, 1008, 1059, 1078, 1171, 1227II, 1238, 1263.

G5 (28): 533, 634III, 699, 765, 1003, 1010, 1022, 1026, 1125, 1339, 1348, 1371, 1402II, 1495, 1509, 1510, 1670, 1707, 1754, 1771, 1787III, 1832, 2014.

P1 (20): 17, 25, 73, 77, 78, 103, 129, 143, 223, 266, 271, 411, 416, 445, 462, 746, 981, 1227, 1228, 1238.

P2 (14): 5, 20, 65, 101, 122, 130, 171, 497, 499, 500, 504, 505, 506, 842.

P3 (7): 215, 223, 266, 371, 924, 1171, 1227.

C1 (101): 20III, 31II, 61, 67III, 76, 79, 80II, 83IV, 101, 102, 103, 114IV, 122, 126, 136III, 143, 171, 182II, 184III, 205, 211, 214III, 215II, 223, 239II, 261II, 271, 305, 311, 317, 336II, 351, 358, 362, 374III, 380, 387III, 411, 416, 497, 499, 500II, 504II, 506III, 523, 914, 924, 940a, 982, 1008II, 1054, 1059III, 1074/1075II, 1087II, 1100II, 1105II, 1151, 1196, 1205, 1208II, 1228, 1261.

C2 (32): 5, 25, 73, 76III, 77II, 80, 107IV, 129III, 171, 179, 202, 211II, 336, 386, 411,

416, 504, 963, 1008, 1086, 1147, 1222, 1263.

C3 (7): 719, 720II, 818, 1534, 1771, 2001.

C4 (12): 182, 719, 753II, 765, 875, 1380III, 1489, 1713, 2000.

C5 (8): 753, 811, 1092, 1344, 1429, 1651, 1925, 2010.

C6 (107): 17, 20, 25II, 30II, 61, 65, 77, 103, 129, 130, 136, 179II, 182, 197, 201III, 202III, 205II, 214III, 215, 223II, 239, 240II, 241, 271II, 283III, 295, 305, 311, 317, 351II, 358II, 362, 371, 374, 380, 384II, 386, 387II, 445, 462, 504, 505, 514, 553, 746II, 842II, 858, 875, 924, 940a, 963, 981, 982II, 1007II, 1039, 1074/1075, 1086, 1100II, 1105, 1147, 1150, 1151II, 1171III, 1190, 1194, 1195, 1196II, 1205III, 1208, 1222, 1227, 1228, 1230, 1238II, 1263, 2006.

C7 (16): 386, 479, 533, 544, 550, 553, 556, 794, 994, 1043, 1054, 1078, 1260, 1504, 1924, 2010.

C8 (8): 384, 477, 533, 1073, 1078, 1152, 1344, 2014.

C9 (15): 1010, 1429, 1529, 1534, 1538, 1670, 1707, 1710, 1754, 1928, 1976III, 2000II.

K1 (12): 523, 544, 556, 794, 858, 1078, 1245, 1261, 1339, 1504, 1832, 2006.

K2 (7): 266, 914, 994, 1039, 1043, 1087, 1245.

D1 (6): 544, 634, 699, 765, 1545, 1631.

D2 (13): 740, 1010, 1495II, 1545, 1601II, 1625, 1651, 1833II, 1876, 2000.

NM (43): 17, 22II, 27, 30, 39II, 73II, 80II, 105, 114, 122II, 126, 197, 240, 241, 266II, 283II, 305, 317, 358, 362, 425, 507, 514, 553, 720, 746, 842, 858, 1026, 1087, 1098, 1125, 1190, 1238, 1545, 2000.

Rozwój stylistyki wytwórczości ceramicznej na cmentarzysku z epoki brązu i wczesnej epoki żelaza w Kietrzu, pow. Głubczyce, w świetle analiz statystycznych

Niniejszy artykuł jest próbą określenia chronologii względnej cmentarzyska ludności kultury łużyckiej w Kietrzu na podstawie analizy rozwoju stylistyki form oraz ornamentacji naczyń pochodzących z wyselekcjonowanych inwentarzy ceramicznych. Badanie to zostało przeprowadzone z wykorzystaniem metod statystycznych, zwłaszcza analizy korespondencji.

Stworzona w oparciu o wymienioną wyżej bazę źródłową matryca współwystępowania typów kształtów i motywów zdobniczych została następnie poddana badaniu analizy korespondencji. Graficzne przedstawienie wyników analizy korespondencji wyróżnionych typów naczyń przyjmuje formę dość wyraźnego łuku na dwóch głównych osiach wykresu. Analizę korespondencji przeprowadzono również dla wyróżnionych typów wątków zdobniczych. Otrzymany wynik przeniesiony na dwuwymiarowy wykres przyniósł odmiennie ukształtowany układ. Przypadki i zmienne utworzyły na wykresie dwa wyodrębniające się skupiska. Szczegółowa analiza obu powyższych wykresów doprowadziła do wielu cennych wniosków, z których ważniejsze to: (1) fazy zmienności stylistyki form mają charakter zbiorów politetycznych, to znaczy nie są przypisane do nich ścisłe zestawy cech, niewystępujące poza nimi, lecz raczej pewne specyficzne kombinacje cech, czy też wręcz ich frekwencji; (2) w zakresie rozwoju stylistyki kształtowania naczyń wskazać można na płynną ewolucję form od BrC2 do HaC, czyli przez blisko 800 lat (ok. 1380–600 BC). Potwierdza to oparty na planigrafii wniosek o kontynuacji użytkowania cmentarzyska; (3) zaobserwować można odmienny charakter zmienności ornamentyki – dość „rewolucyjna" zmiana w HaA, następnie kontynuacyjny rozwój aż po

schyłek okresu wczesnohalsztackiego, kiedy prawdopodobnie mamy do czynienia z regresem w zakresie zdobienia ceramiki; (4) brak pełnej zgodności wyników badań ze schematem chronologicznym M. Gedla w odniesieniu do starszych faz rozwoju stylistyki naczyń (m.in. sugestia o wcześniejszym pojawieniu się stylu guzowego już w BrC2).

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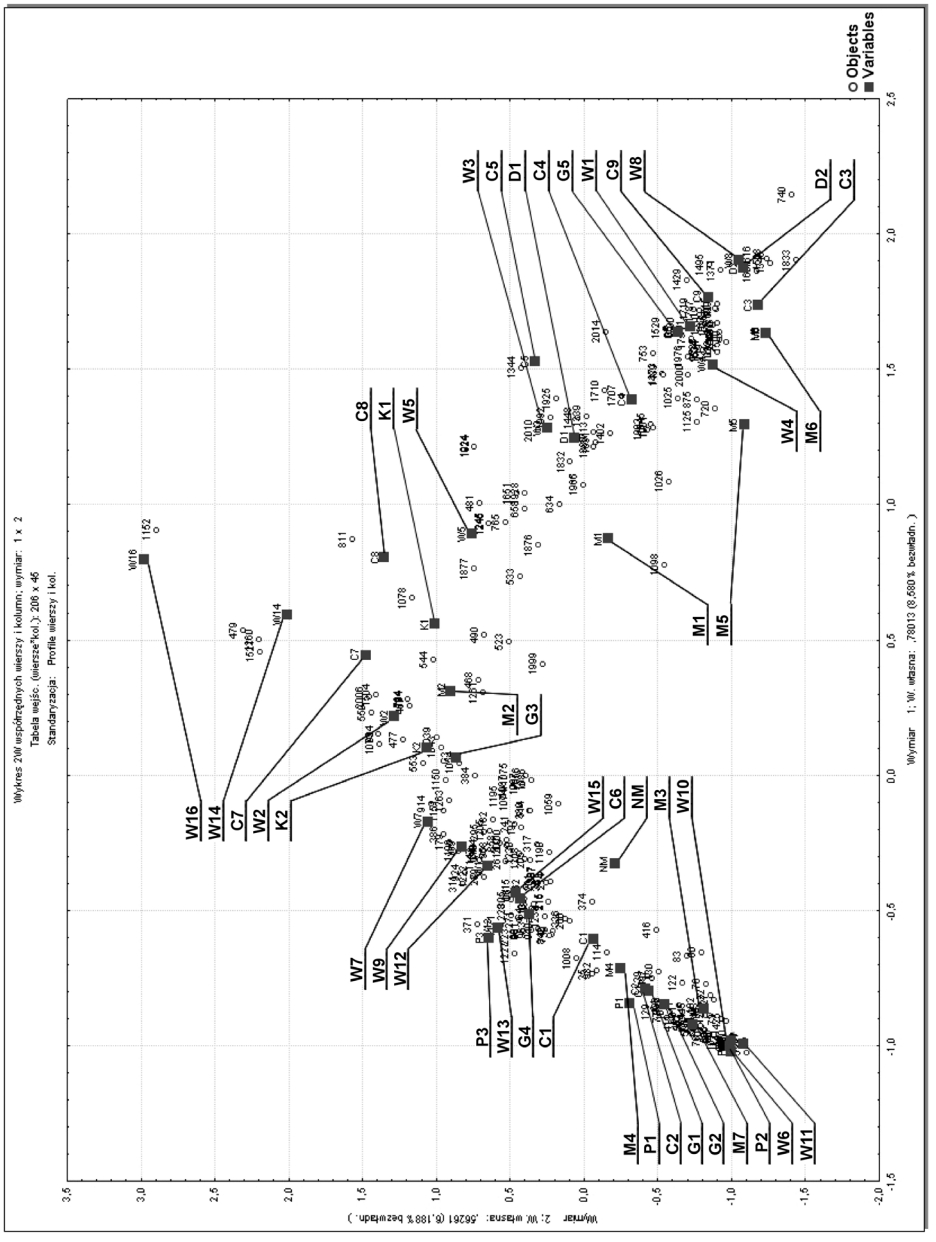

Plate 1. Kietrz, Głubczyce district, site1. Correspondence analysis of the defined vessel types. Distribution of vessel types in grave assemblages

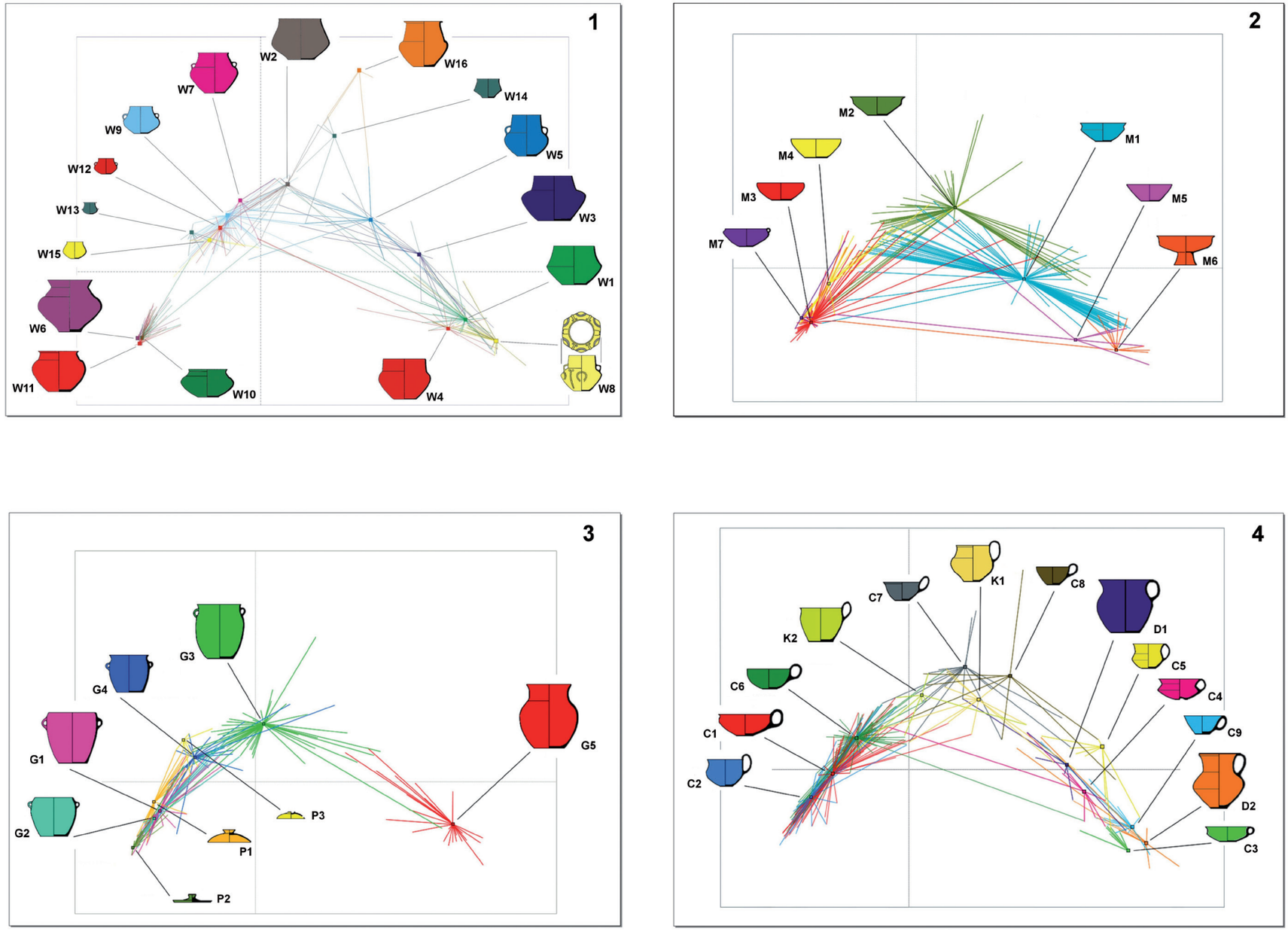

Plate 3. Kietrz, Głubczyce district, site1. Distribution of particular types of vases (1), bowls (2), pots and lids (3), jugs, cups and scoops (4) in grave assemblages

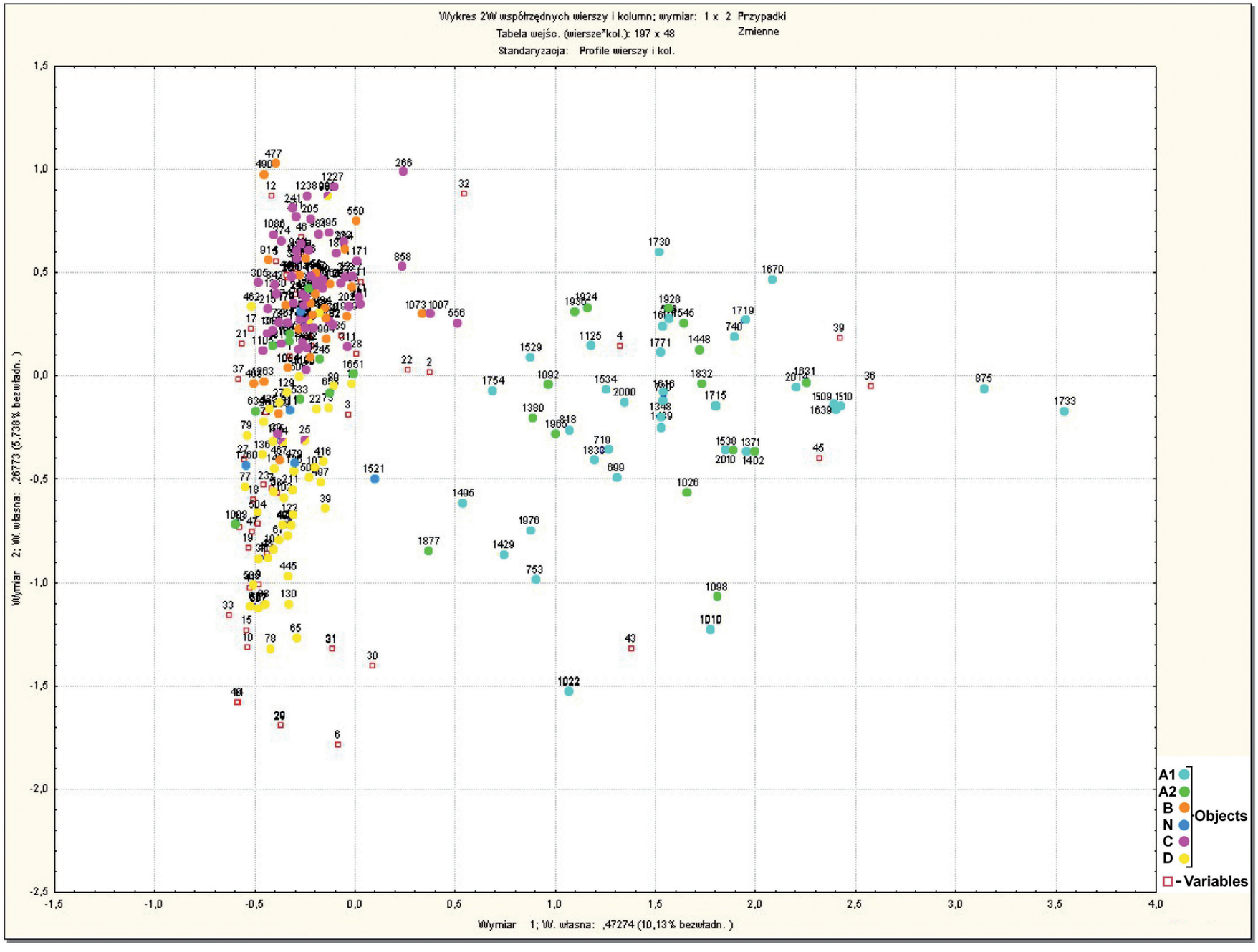

Plate 6. Kietrz, Głubczyce district, site1. Correspondence analysis of the defined types of ornament. Objects attributed to particular phases of vessel form development are marked with colour

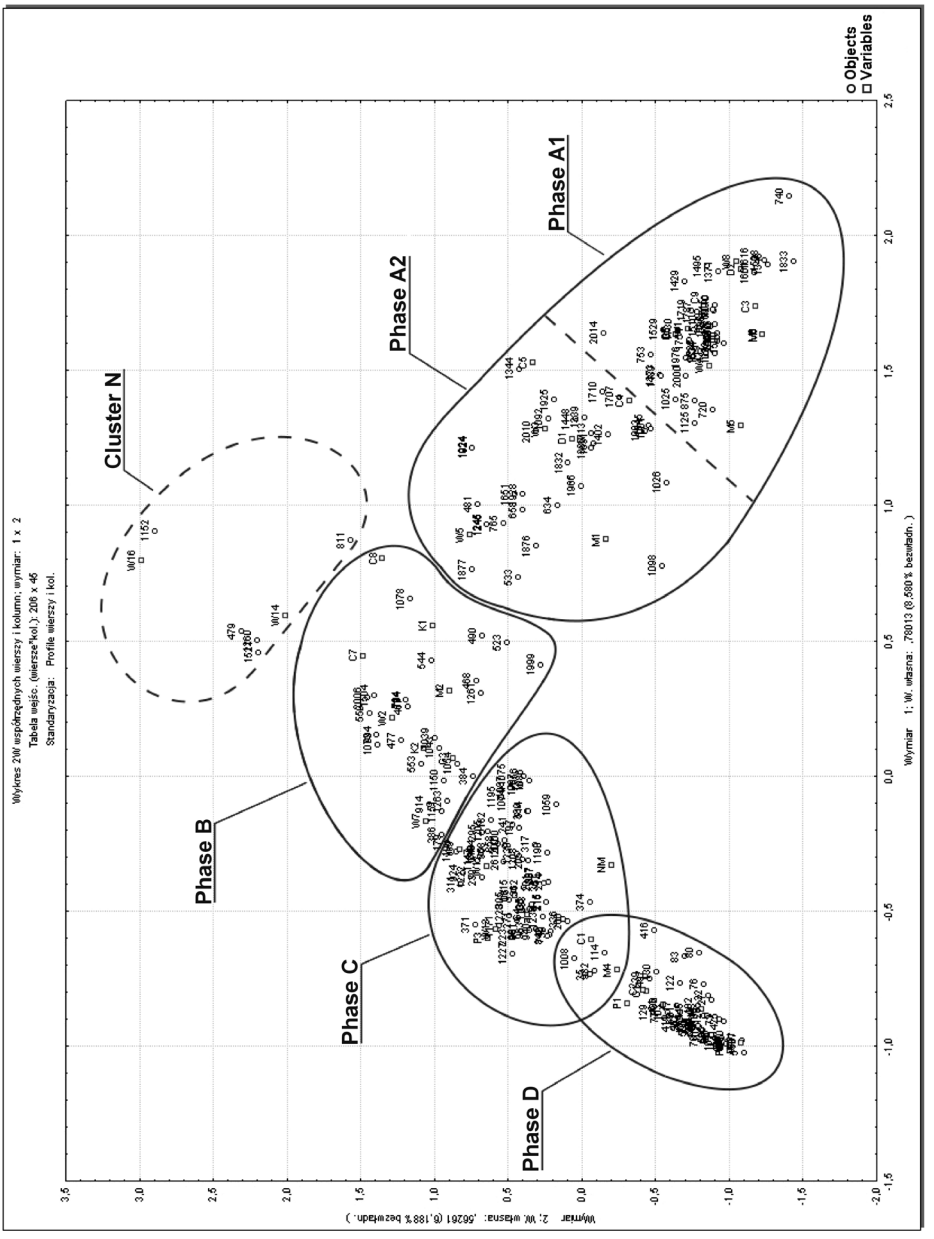

Plate 2. Kietrz, Głubczyce district, site1. Correspondence analysis of the defined vessel types; phases of pottery style development are marked

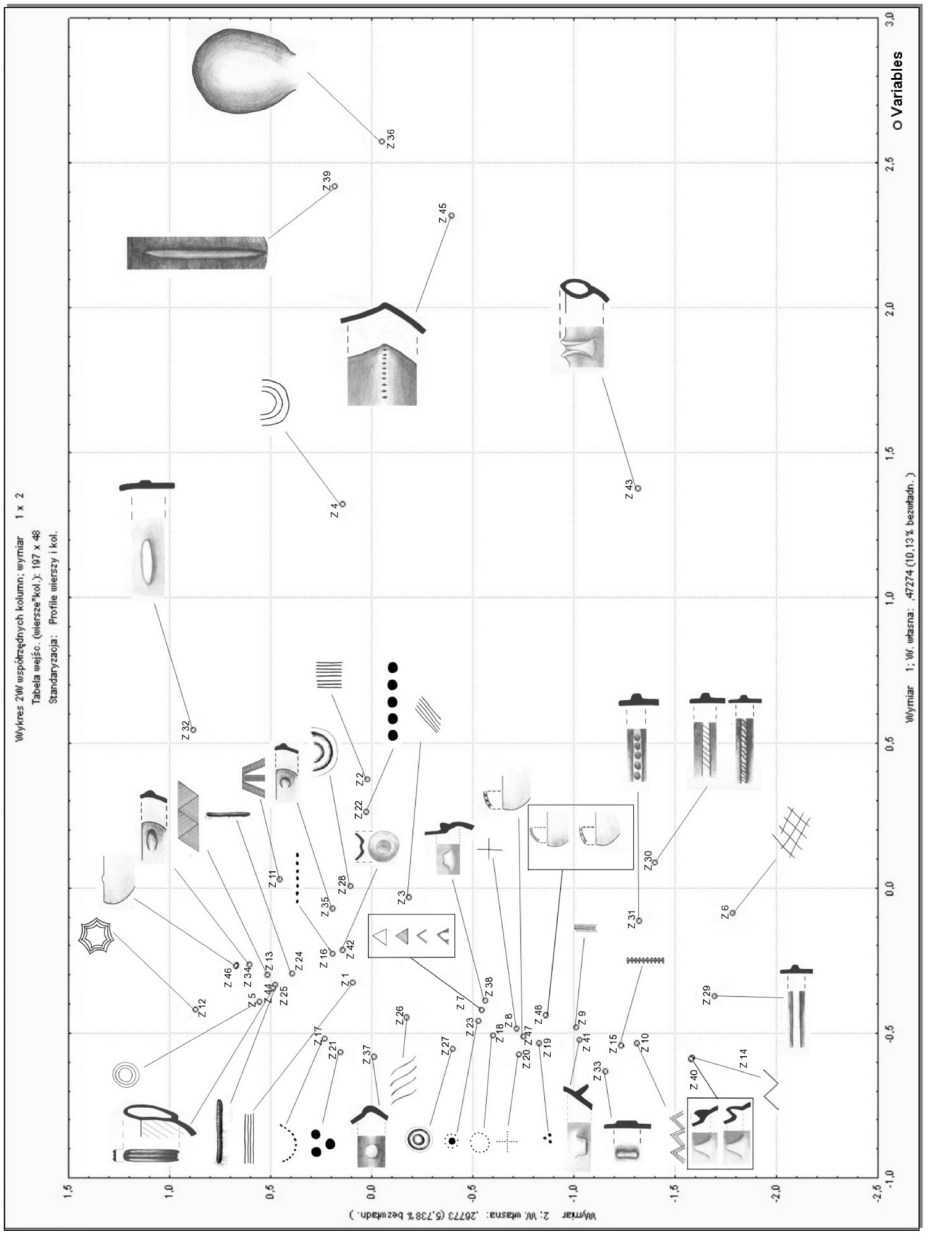

Plate 4. Kietrz, Głubczyce district, site1. Models of the defined decorative motifs

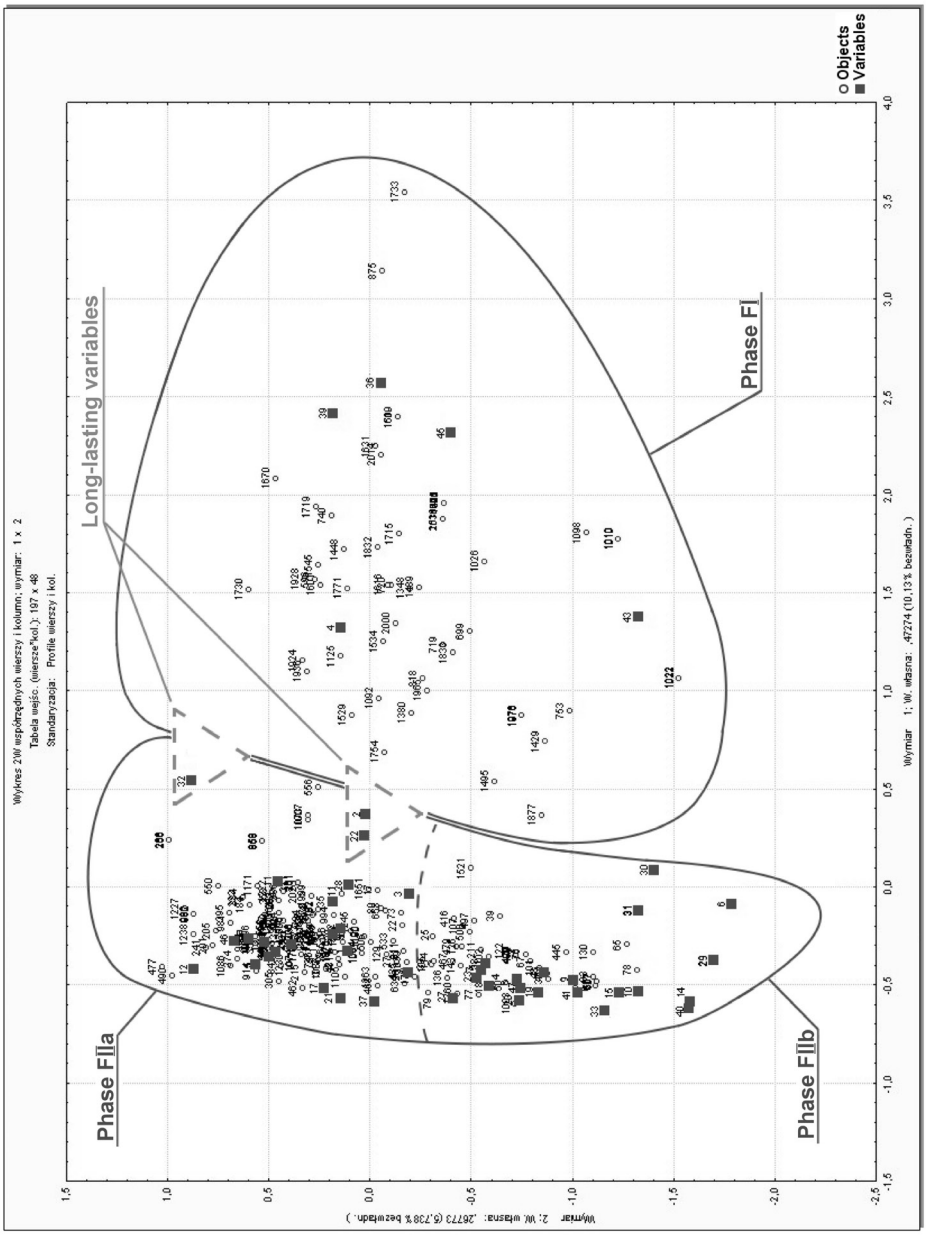

Plate 5. Kietrz, Głubczyce district, site1. Correspondence analysis of the defined decorative motifs; phases of vessel decoration development are marked

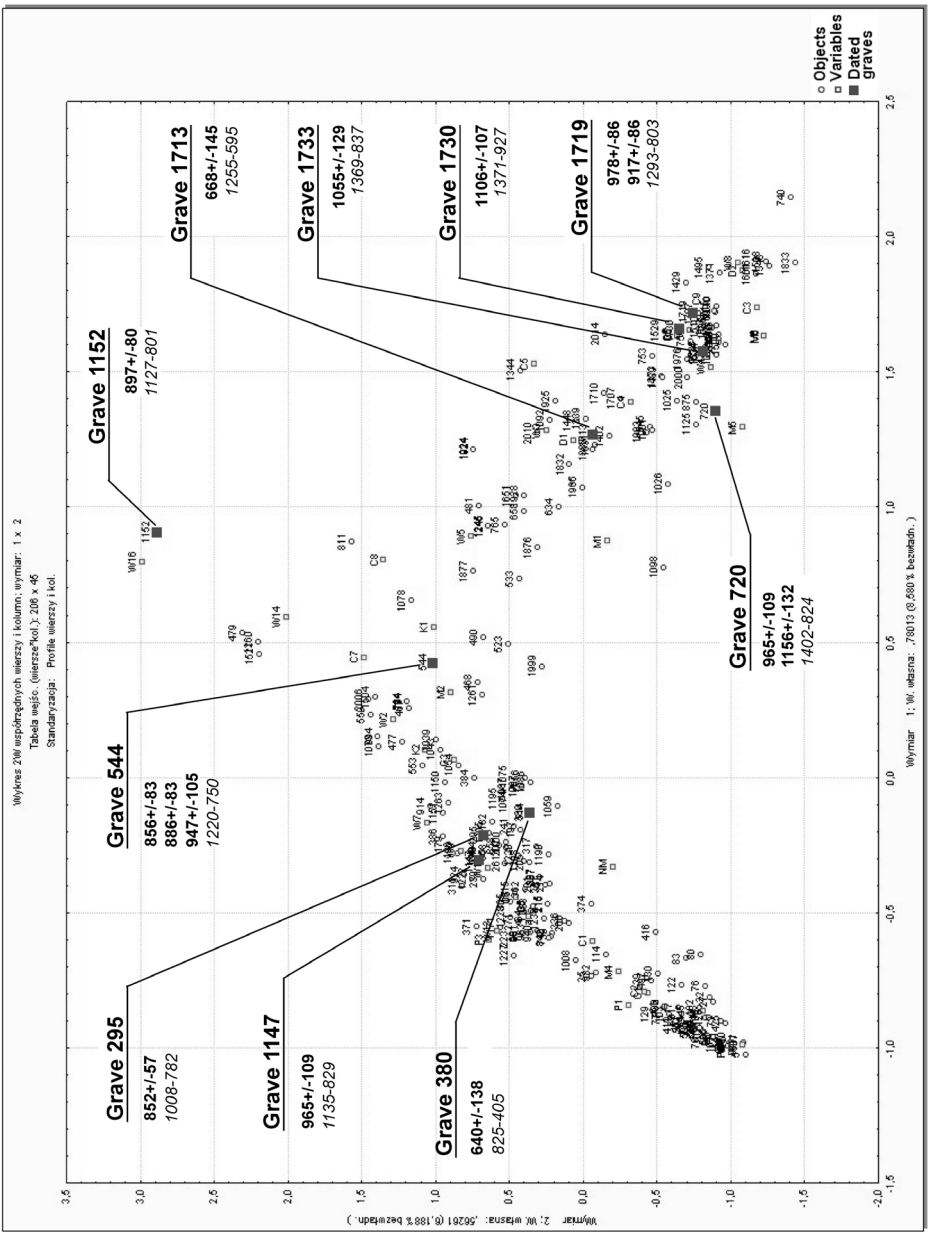

Plate 7. Kietrz, Głubczyce district, site1. Correspondence analysis of the defined vessel types. Distribution of radiocarbon dated graves