CHARLES UNIVERSITY IN PRAGUE

Faculty of Arts

Institute of Classical Archaeology

MASTER THESIS

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THE DEVELOPMENT OF CERAMICS IN THE SHEROBOD OASIS, SOUTH UZBEKISTAN

Prague 2016

Supervisor: PhDr. Ladislav Stančo, Ph.D.

PODĚKOVÁNÍ

Ráda bych na tomto místě vyjádřila upřímné poděkování svému školiteli, PhDr. Ladislavu Stančovi, Ph.D, za jeho důvěru, se kterou mi tento náročný úkol svěřil, a především za jeho profesionální a podnětný přístup po celou dobu mé práce. Jeho vedení bylo příkladně inspirativní a zapříčinilo samotný vznik této práce.

Mé poděkování patří rovněž mým kolegům, jmenovitě Věře Doležálkové, Tereze Macháčikové, Martinu Odlerovi a Petře Tušlové, kteří se podíleli na první fázi dokumentace studovaného souboru a poskytli cenné informace týkající se jeho primárního zpracování.

Děkuji rovněž celé mé rodině a blízkým přátelům, bez nichž by tato práce nemohla vzniknout, za jejich morální podporu a pochopení po celou dobu mého snažení.

Prohlašuji, že jsem tuto bakalářskou práci vypracovala samostatně a výhradně s použitím citovaných pramenů, literatury a dalších odborných zdrojů.

V Havířově dne 30. července 2016

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podpis

ABSTRAKT A KLÍČOVÁ SLOVA

Název: The development of ceramics in the Sherobod oasis, South Uzbekistan

Autor: Bc. et bc. Markéta Kobierská

Vedoucí práce: PhDr. Ladislav Stančo, Ph.D.

ABSTRAKT:

Předkládaná diplomová práce představuje výsledek druhotného zpracování keramického souboru vzešlého z českého archeologického působení v uzbeckém okrese Šerabád v letech 2008 až 2010. Hlavním úkolem bylo zpracovat doposud nepublikovaný soubor primárních dat vzešlých z povrchových sběrů do podoby publikovatelného katalogu. V teoretické části práce se zabývám možnostmi v současnosti aplikovaných typologií ve vztahu ke specifickým vlastnostem zkoumaného keramického soboru, tedy k jeho statigrafickému, místnímu a časovému neukotvení.

KLÍČOVÁ SLOVA:

keramika – Uzbekistán – Šerabádská oblast – Surchandaria – povrchový sběr – fuzzy typologie – archeologie Střední Asie

ABSTRACT AND KEY WORDS

Title: The development of ceramics in the Sherobod oasis, South Uzbekistan

Author: Bc. et bc. Markéta Kobierská

Supervisor: PhDr. Ladislav Stančo, Ph.D.

ABSTRACT:

The submitted thesis presents a resultant of the secondary processing of the field survey pottery assemblage acquired by the Czech archaeological mission between 2008 and 2010 in the Sherabad District, Uzbekistan. The principal task was to provide an appropriate format for publishing previously unpublished data, commissioned in the form of an extensive catalogue. In the theoretical part of the work, I examine potentialities of the contemporary typologies in relation to the specifics of the field survey assemblage: to its unrestrictiveness and heterogeneousness.

KEY WORDS:

pottery – Uzbekistan – Sherobod Oasis - Surkhandarya – field survey ceramic assemblage – fuzzy typology – archaeology of Central Asia

CONTENTS

LIST OF ABBREVIATIONS

BAI	Bulletin of the Asia Institute
BAR	British Archaeological Report
BAOM	Bulletin of the Ancient Orient Museum
ISIMU	ISIMU. Revista sobre Oriente Proximo y Egipto en la Antiguedad (Madrid)
JAMT	Journal of Archaeological Method and Theory
JZUS	Journal of Zhejiang University SCIENCE
RA	Rossiyskaya Arkheologiya
SH	Studia Hercynia
SR	The Silk Road

1. INTRODUCTION

Since 2001, the Institute of Classical Archaeology in Prague represented by Ladislav Stančo has been extending its scientific activities within the Central Asian region of Surkhandarya, South Uzbekistan. In 2002, the first archaeological mission was realized on Jandavlattepa, a significant ancient mound in the vicinity of the town of Sherobod. In the consecutive years, the team successfully continued to expand the area of interest as well as methods of its research. In 2008, a remote ground control of potential archaeological features in the Sherobod district became pivotal field of activity. The acquired data were verified in the subsequent seasons, resulting in identification of newly recognised sites and scatters. During the physical prospections from 2008 to 2010, an assemblage of archaeological material had been repeatedly revealed on the surface of the surveyed areas. The resulting mixed-up assemblage consisting mostly of the ceramic material had been waiting for its publication in the consecutive years.

I am very grateful to PhDr. Ladislav Stančo, Ph.D. for he expressed his confidence in me by entrusting the task of assemblage's publication to me. I gladly accepted the offer, keeping in mind the responsibility connected to the commitment.

Shortly after acknowledgment of the assemblage's character, the questions concerning the methodology arose. I came to a conclusion that an open approach towards material's processing will be required. The endeavours resulted in an assessment that there's a need of more profound theoretical discussion about general character of a typology as a classification method. The presented work reflects the long-lasting deliberations.

After a short chapter devoted to geographical and historical background of the studied area, I proceed to the chapter dedicated to the theoretical basis of a crucial part of the work: a catalogue of the Sherobod field survey assemblage. The following chapter examines the very basics of our way of thinking about classifications and typologies. Progressively more and more investigated concept of a fuzzy logic is introduced in relation to archaeological context. In the succeeding chapter, the theoretical aspects of the latter chapter were melted into a practical typological scheme seemingly convenient to the examined assemblage. For the purpose of the typological scheme, the rim typology was chosen as it represents the most numerous group of items available. The final chapter examines incidence of convincing outcomes generated on the basis of typological concept presented earlier.

A great deal of the proposed thesis is consecrated to an extensive illustrative part of the catalogue. My wishful thinking is aimed chiefly towards the hope that the thesis will provide a suitable navigational tool for a quick and lucid searching within the catalogue as well as the typological section. I directed my whole efforts including the choice of a typology to this aim.

2. GEOGRAPHICAL AND HISTORICAL BACKGROUND

2.1 Geography of the Surkhandarya Region and the Sherobod District

The Surkhandarya region (Сурхондарё вилояти in Uzbek) represents one of Uzbekistan's twelve administrative provinces. It stretches across the country's south-easternmost protuberance and covers an area of approximately 20,000 square kilometres. Both state as well as regional boundaries are clearly defined by natural phenomena. Its southern frontier is formed by the Amu Darya River (see Map 1 in *Supplementum* I). Except for the southern border, the region is surrounded by hardly penetrable mountain ranges of Gissar and Baysun to the north, Babatag to the east and Kugitang to the west (RTVELADZE 1990, 1).

A whole range of broad rivers irrigates the plains of Surkhandarya before they flow into the Amu Dary River. The eponymic Surkhandarya River flows from the Hissar Mountains in the eastern part of the region. Another significant water supply for the area is formed by the Sheroboddarya River, which flows from the slopes of the Baysun Mountains and forms a north-south axis of the district. At its upper reaches, the fresh river confluents with a salty river of Shurob Say (ABDULLAEV 2011, 13). Salty water thus serves as irrigation resource and the river supplies numerous irrigation channels artificially trenched into the fertile plains of the Sherobod Oasis. Within the town of Sherobod, the river changes its name to Kara Su ('*The Black Water*') and its salty waters virtually disappear into the town's broad net of the artificial irrigation channels, so-called *arik* and *zeber* (RTVELADZE 1990, 1-2; TUŠLOVÁ 2012, 12).

Within the Sherobod district, two diametrically opposed types of landscapes can be found (STANČO – TUŠLOVÁ *[in print]*):

a) arid piedmont steppes to the north and north-west (*circa* 79% of the overall area)

b) intensively cultivated fertile lowlands to the south and south-east

Fertile plains in the Sherobod region have been intensively agriculturally exploited since the second half of the twentieth century (TUŠLOVÁ 2011, 174-175). Cotton can be found as a typical crop-plant on regularly dimensioned flat fields. Unfortunately, the use of heavy machinery in agriculture resulted in destruction of a major number of inopportunately positioned archaeological sites in the recent history (TUŠLOVÁ 2011, 175).

Distinctive features of the Sherobod district – if preserved - are so-called *tepas*. A term '*tepa*' stands for an artificial mound of various dimensions connected with human activities in the area, similar to the Near Eastern *tells/tels (*STANČO 2011, 18). *Tepas* thus represent the pivotal phenomena for archaeology as this is where the evidence of historical occupation has been imposed on a long-term basis.

2.2 Brief History of the Region until the Arabic conquest

Human habitation in the Sherobod region has been proved long-lasting and continual: human presence in the area is archaeologically attested already since the upper Palaeolithic period (PUGACHENKOVA - RTVELADZE - KATO 1991, 39). More distinctive archaeological recognition of Surkhandaryan plains is available for the final Bronze Age phase, the period, since when the area has been continuously inhabited and sedentary way of life was first introduced (ABDULLAEV 2011, 15). The existence of nomadic tribes, on the other hand, is archaeologically manifested at the same time. Moreover, the mutual contacts between sedentary and nomadic elements resulted in progressive social changes within both populaces during the Iron Age period (see ASKAROV 1996, 441-442).

The 'big' history of the examined Central Asian region is initiated by Cyrus' eastern expansion of the Achaemenid Empire. The land was declared a Persian satrapy under a name 'Bactria'. After Persians' defeat, Bactria became a part of Alexander the Great's extensive dominion. The Macedonian conquest represents the beginning of substantial influence of Greeks in the Central Asian region. After Alexander's death, Bactria fell to the Seleucids and the Greek cultural influence culminated. Already in the first half of the third century BC, Diodotus, a Bactrian satrap, took advantage of Seleucid kings, weakened by continuous conflicts with a Ptolemaic Empire. Bactria declared independence and came into existence as so-called Greco-Bactrian Kingdom. However, Seleucids still aspired for the lost territory. Polybius (XI) in *Histories* describes unsuccessful attempt of invasion to the Greco-Bactrian Kingdom, after which Antiochus' final retreat for good (DANI – MASSON (eds.) 1996).

A period after Seleucid's retreat is characterized by territorial expansion and intensive attacks of nomadic peoples. Invasion of nomadic tribes known as Yuezhi brought an end to the Greek kingdom in the second half of 2nd century BC. One of five Yuezhi tribes, the Kushans, subsequently formed one of the most influential empires in ancient Central Asia territory. The empire was formed under a rule of the king Kujula Kadphises in the late 1st century AD, and it lasted until the Sassanian conquest in the 3rd century AD (HARMATTA 1994, 166).

Bactria under the Kushan domination continued developing the Greek tradition in many aspects of everyday life. The Greek was used as a language of administration in both written and oral form. The apex of the Kushan Empire falls within the 2nd century AD, the period characterized by general peace and stability (STANČO 2012, 10).

A decline of the Kushan Empire came as a consequence of the Sassanian expansion after the first quarter of the 3rd century AD (HARMATTA 1994, 472). At that time, the Kushans in Bactria ruled over a limited northern territory and the western kingdom was controled by Sassanidian vassals, who were known as Indo-Sassanian dynasty (HARMATTA 1994, 483; STANČO 2012, 10).

At the beginning of the 5th century AD, nomadic Hephtalites took over extensive territories of Central Asia. The conquest also demarks an end of the Antiquity and a beginning of the Middle Age in the region (LITVINSKY - GUANG-DA 1996, 24). From the Early Middle Age on, significant part of former Bactria is referred to as 'Tokharistan' in written resources available (TUŠLOVÁ 2012, 12).

The Hephtalites controlled their territory until the 6th century AD and later were suppressed by Turkic tribes. The islamisation of the Turkic Torkhistan was initiated by the Arabic conquest at the turn of the 7th and 8th centuries AD (PUGACHENKOVA – RTVELADZE - KATO 1991, 44-45; STANČO 2012, 10-11). In the following centuries, the whole Bactria culturally evolved under the Islamic influence (PUGACHENKOVA - RTVELADZE 1990, 182).

3. SHEROBOD FIELD SURVEY POTTERY SET

3.1 Acquisition of the examined pottery assemblage

The Sherobod field survey ceramic assemblage (see DANIELISOVÁ - STANČO -SHAYDULLAEV 2010) represents a heterogeneous set of finds collected within the joined project of the Institute of Classical Archaeology, Charles University, Prague, and the State University of Termez. Both institutes have a long-term experience with the archaeological research in the aforementioned area, so the initiative of the supplementary project emerged through the vision of increased awareness of the historical environment of the region. The project took part between 2008 and 2010, during which relevant material was withdrawn from the surfaces of prospected sites without a primary sorting.

A comprehensive report dealing with the prospective field survey of the Sherobod district is currently being prepared (see STANČO – TUŠLOVÁ *[in print]*).

3.2 Tasks

A systematic approach to the Sherobod field survey assemblage is executed on following theoretical levels:

i) publishing previously unprocessed material both textually and visually

ii) creation of suitable typology with respect to the assemblage's peculiarity

iii) physical comparison of identified types to previously recognised individuals

iv) detection of temporal pertinence on the basis of comparison

v) dating of the respective sites according to the types presented

The article *i* represents the crucial part of the work. The descriptive, practical treatment of the task extends mainly to the multi-page *supplementa* section, nevertheless, a compendious introduction is provided in the consecutive paragraphs (see chapters 3.3 and 3.4).

Pitfalls of typology establishment (article *ii*) are outlined in chapter 4. The chapter's finale will provide an objective evaluation of potential typologies available in relation to the character of the ceramic assemblage under examination. Chapter 4.3 presents principles, pros and cons of the proposed morphological approach. Practical realizations of the theoretical thesis proposed in chapter 4 can be found in chapter 5.

Comparative articles *iii* and *iv* will be treated in relevant entries of the chapter 5. Further analysis of the data obtained will result in creation of a scheme for dating of the individual sites (article *v*). The analysis' outcome is presented in the chapter 6 together with relevant statistical data and results.

3.3 Characteristics and Quantification

The Sherobod oasis field survey assemblage consists of 1,025 pieces of diagnostic pottery fragments in total. By the term 'diagnostic' following items are understood:

- ceramic vessels' fragments containing rim and/or base section
- surface-treated body potsherds
- vessels' handles or their fragments
- potsherds featuring an extraordinary component (*e.g.* a knob, an appliqué, *etc.*)
- terracotta lamps and their fragments
- 'tokens' and their fragments
- terracotta statuettes and their fragments
- terracotta beads and their fragments

3.3.1 Primary Data Resource

A primary field survey documentation available serving as a basic data resource can be specified as follows:

- primary hand-drawn illustrations (with optional verbal description)
- photographical documentation

3.3.1.1 Illustrations and verbal description

Documentation the whole pottery assemblage was performed on 171 sheets of an A4-format default paper. The illustrations were achieved by a team of five documenters[1] during the seasons 2008, 2009 and 2010. There is a certain level of inconsistency between records performed by different authors concerning illustrational as well as verbal exposure, *e.g.* interchangeable section orientation on drawings or verbal description utterly missing in 220 cases, which makes approx. 21.5% of all the records.

Individual items were grouped into notional clusters with regard to their provenience denoted by an original site number provided by a survey supervisor. Approximately a half of all the records (48.7%) contain a sequential number within its own cluster, although void and confusing in some cases.

[1] Petra Belaňová, Věra Doležálková, Tereza Macháčiková, Martin Odler and Alisher Shaydullaev.

If item description is available, it typically records vessel's estimated diameter and description of characteristic features involving colour and ware quality information. Estimated vessel equivalent (eve) was not recorded at all. The colour concept is highly subjective as no colour reference manual was used for a comparison and only vague terms such as 'red' and 'orange' were applied. Evaluation of the ware quality was cited in 256 cases, which makes it only one quarter of the whole unit. Such proportion is highly ineligible as it makes any credible classification in relation to vessels' quality hardly possible. Complete re-evaluation of the material in question was planned and proposed, however rejected by the authorities (see chapter 4.1, footnote 6).

3.3.1.2 Photographical documentation

Photographical documentation for the field survey assemblage was accomplished during the seasons 2009 and 2010. Even though concordance rate between the drawn and photographical record is not absolute,[2] the correlation was rather satisfactory and does not cause any major discrepancies.

Photographic conditions, however, were not identical in every stage of the photographical process. In most cases, the photographed items were placed on a white opaque board with checkerboard reference scale or folding meter stick, alternatively a simple graph paper serves as a background. What is more disturbing, the lighting conditions were relatively variable, which – together with absence of a colour reference chart – creates a potential for lapses in relation to proper colour perception.

Items belonging to one particular cluster are usually pictured together if possible. There are a few detailed frames featuring individual items of a special significance. No details of paste or fractures are available at the time being.

Although almost half of the items are denoted by a sequential number (see above, 3.3.1.1), it rarely reflects the order in which the photographs were taken. Due to irregular form of an overwhelming majority of potsherds, the vessels are sometimes inadvertently arranged in feigned position, which also complicates item's identification.

[2] The disconcordance is mutual as, on one hand, there are illustrations lacking their photographical counterpart, on the other hand, some of the photographed items could not be found in other data record.

3.3.2 Provenience

All individual items are assigned to one of 99 sites (see table 3.1 and map 3 in *Supplementum* I) identified in the area of approximately 300 sq. km in the Sherobod and Kizirik districts. The site sequencing was established by primary researchers as a purely functional coding tool. Needless thought to say, site order does not by any means reflect topographical reality and numerical succession proximity does not necessarily mean physical vicinity of sites.

Comprehensive study of topography of the Sherobod district with relation to the Czech archaeological mission will be subject of a prepared publication currently in print (Stančo - Tušlová *[in print]*).

Site #	Name of site	Type of site
1	Jandavlattepa	settlement
2	Boshtepa	settlement
3	Koshtepa I	settlement
4	Kulug-Shakhtepa	settlement
5	Aktepa	settlement
6	*no name*	settlement
7	Koshtepa II	settlement
8	Batyrabadtepa	settlement
9	Khoja Qaptol Bobo?	settlement
10	Kattatepa, the main Tepa	settlement
11	*no name*	settlement
12	*no name*	settlement
16	Shortepa (?)	settlement
17	Shishtepa (?)	settlement
18	Gilyambobtepa	settlement
19	Gorintepa	settlement
22	Taushkantepa	settlement
23	Tashlaktepa	settlement
24	Mozoroti baba tepa	settlement
25	Talagantepa	settlement
26	Yalangoyoq ota tepa	settlement
27	Babatepa (the main tepa)	settlement
32	Talashkantepa II (SE mound)	settlement
33	*no name*	settlement
35	Chopan Ata	settlement
36	Anjirtepa	settlement
37	Ayritepa	settlement
38	*no name*	settlement
40	Shortepa (?)	settlement
41	*no name*	settlement
42	Aysaritepa	settlement
43	*no name*	settlement
45	*no name*	settlement
48	Kattatepa - SE mound	settlement
49	Olleiortepa	settlement
50	*no name*	tepa (ploughed)
52	Khosyattepa	settlement
53	Tigrmantepa	architecture
54	Anjirtepa	settlement
55	Khalinchaktepa	settlement
56	Maydankurgan	settlement / fortress
57	Khushvakttepa	settlement
58	Anjirtepa	settlement
61	*no name*	settlement
62	*no name*	camp site
63	Chalakurgan	settlement
71	*no name*	settlement
72	Talashkantepa II (NW mound)	settlement
75	*no name*	settlement
77	Egiztepa I	settlement
78	Egiztepa II	settlement
79	*no name*	settlement?
80	*no name*	settlement
88	*no name*	tepa or kurgan
90	Khontepa	settlement on the hilltop
94	Kurgan	fortress
95	*no name*	fortress
96	*no name*	settlement
98	(Hurjok cemetery)	settlement
99	Talashkantepa III	settlement
100	*no name*	settlement?
101	*no name*	settlement?
103	*no name*	settlement?
105	(within the cemetery of old Akkurqon vill	settlement?
107	Zindontepa	settlement?
108	Kulaltepa - burial ground (north)	burial ground
109	Kulaltepa	settlement
110	Abdul Majam Said cemetery	burial ground
112	Sobir Archa	settlement/fortress/cemetery
113	Amirkondi	settlement
116	Kurgantepa	settlement
117	Hotamtoy	fortress
119	*no name*	settlement?
120	*no name*	settlement?
124	*no name*	settlement
125	Khojai Gambir-ota tepa	settlement
127	*no name*	fortress
128	Kishlok Bazar kabristoni	settlement?
129	Chuyanchi ota kabristoni	settlement?
131	*no name*	settlement?
133	Irjahangir-ota kabristoni	settlement
134	Aktosh-bobo kabristoni	settlement
135	Khojakiyamiddin-ota kabristoni	settlement?
136	*no name*	settlement?
137	*no name*	settlement?
138	*no name*	settlement?
139	Toshtepa	settlement
141	*no name*	settlement?
142	*no name*	settlement?
143	*no name*	settlement?
144	*no name*	settlement?
145	*no name*	settlement?
146	*no name*	settlement?
149	*no name*	settlement?
157	Ota-Kul´ mulla ishan baba	architecture
161	*no name*	settlement
163	*no name*	kurgan?
165	*no name*	kurgan?
166	*no name*	kurgan?

Table 3.1: List of sites and their characteristics (Stančo [personal correspondence]).

3.3.3 Compendious Physical Characteristics

As mentioned previously, by 2010 the Sherobod field survey project provided in total 1,025 pieces of diagnostic pottery fragments. Let us now briefly examine their formal characteristics and consequences in relation to their provenience.

The most characteristic feature of the pottery set in question is its fragmentariness: only 8 items (less than 1%) can be assessed as vessels whereof the whole profile is known. The rest of the set consists of more or less fragmentary vessels' segments, which were - for sake of further evaluation and statistics – divided into groups, see table 3.2 and 3.3/4 for details. By far the greatest of them composes of rim fragments (64% of all items). Vessels' reconstruction was possible in 695 cases (*i.e.* 68% of all items), when the vessels' base or rim diameter was conjecturable.

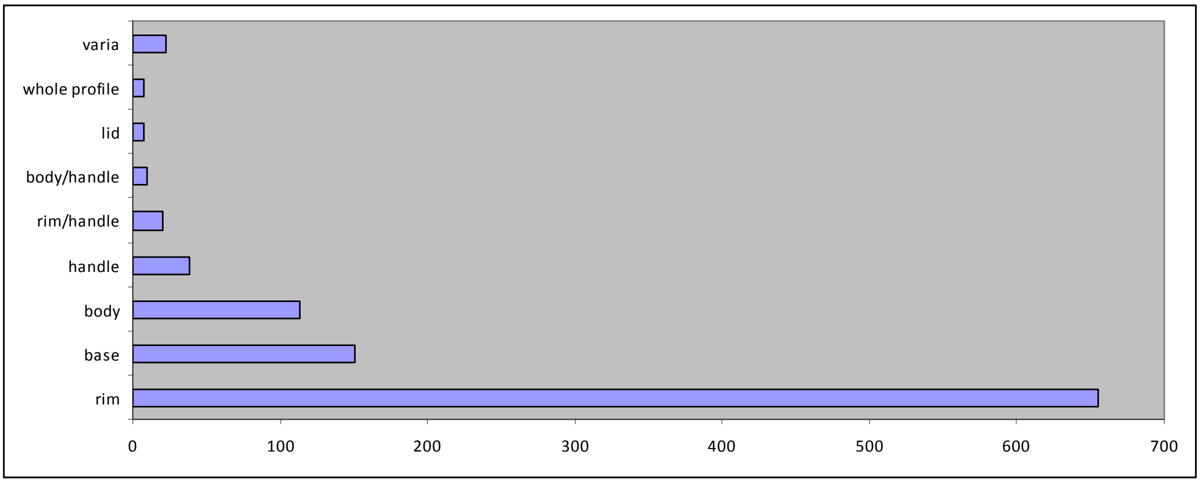

Table 3.2: Diagram of body parts of the diagnostic pottery

The amount of items pertaining to a respective site varies considerably. A site with the highest amount of documented potsherds (*i.e.* site 5) produced 60 diagnostic pieces. Eleven sites, on the other hand, are represented by only a single item. Needless to say, the factor of frequency substantially affects the potency to plausibly estimate a site's dating. However, the average rate of 10 items per site represents a rather convenient sample for re-examining.

Site #	diagn. pcs.	vessel parts statistics R	Ba	Bo	H	R/H	B/H	L	WP	V
1	**4**	0	1	3	0	0	0	0	0	0
2	**34**	9	1	18	4	1	1	0	0	0
3	**6**	6	0	0	0	0	0	0	0	0
4	**23**	21	1	0	0	0	0	0	0	1
5	**60**	46	7	4	0	1	0	0	0	2
6	**9**	0	4	3	1	0	0	1	0	0
7	**5**	5	0	0	0	0	0	0	0	0
8	**18**	12	3	1	2	0	0	0	0	0
9	**1**	1	0	0	0	0	0	0	0	0
10	**28**	22	2	2	0	0	1	0	1	0
11	**8**	7	0	0	0	0	0	0	0	1
12	**16**	14	1	0	0	0	0	1	0	0
16	**49**	29	10	3	5	1	1	0	0	0
17	**11**	9	0	1	0	1	0	0	0	0
18	**24**	18	2	2	2	0	0	0	0	0
19	**8**	6	0	0	1	0	1	0	0	0
22	**10**	8	0	1	1	0	0	0	0	0
23	**18**	7	4	5	2	0	0	0	0	0
24	**30**	19	4	1	6	0	0	0	0	0
25	**27**	22	0	5	0	0	0	0	0	0
26	**50**	39	7	1	1	0	1	0	0	1
27	**10**	8	1	1	0	0	0	0	0	0
32	**36**	28	4	2	0	0	0	0	0	2
33	**26**	12	6	2	0	1	1	1	2	1
35	**6**	6	0	0	0	0	0	0	0	0
36	**4**	0	0	4	0	0	0	0	0	0
37	**16**	16	0	0	0	0	0	0	0	0
38	**1**	1	0	0	0	0	0	0	0	0
40	**27**	21	2	1	2	0	0	0	0	1
41	**5**	5	0	0	0	0	0	0	0	0
42	**11**	8	2	0	0	1	0	0	0	0
43	**15**	12	3	0	0	0	0	0	0	0
45	**13**	9	0	2	2	0	0	0	0	0
48	**9**	5	1	0	0	0	0	0	1	2
49	**1**	1	0	0	0	0	0	0	0	0
50	**4**	1	1	2	0	0	0	0	0	0
52	**4**	3	0	1	0	0	0	0	0	0
53	**2**	1	1	0	0	0	0	0	0	0
54	**3**	0	2	1	0	0	0	0	0	0
55	**9**	4	1	2	1	1	0	0	0	0
56	**13**	4	3	2	2	1	0	0	1	0
57	**7**	2	3	1	0	0	1	0	0	0
58	**7**	5	0	1	1	0	0	0	0	0
60	**1**	0	0	0	0	0	0	0	0	1
61	**5**	3	0	1	0	0	0	0	0	1
62	**2**	0	1	1	0	0	0	0	0	0
63	**10**	7	0	3	0	0	0	0	0	0
71	**1**	1	0	0	0	0	0	0	0	0

INTERPRETATIVE NOTES:
diagn. pcs. ... amount of diagnostic potsherds from a respective site
R ... amount of rim potsherds
Ba ... amount of base potsherds
Bo ... amount of surface-treated body fragments
H ... amount of handle fragments
R/H... amount of rim potsherds containing a handle fragment
B/H ... amount of surface-treated body and handle fragments
L ... amount of lid fragments
WP ... amount of potsherds representing a whole profile of a vessel
V ... *varia*, amount of miscellaneous and unidentified diagnostic fragments

Table 3.3: List of diagnostic pottery, part one

Site #	diagn. pcs.	vessel parts statistics								
		R	Ba	Bo	H	R/H	B/H	L	WP	V
72	**9**	5	0	1	0	1	0	1	0	1
75	**7**	4	1	1	0	0	1	0	0	0
77	**4**	3	1	0	0	0	0	0	0	0
78	**6**	5	1	0	0	0	0	0	0	0
79	**6**	1	2	1	0	0	1	0	1	0
80	**24**	16	3	2	0	1	0	1	0	1
88	**10**	7	1	0	1	1	0	0	0	0
90	**6**	3	2	0	0	1	0	0	0	0
94	**21**	15	4	0	0	1	0	0	0	1
95	**24**	21	2	0	0	0	0	0	1	0
96	**3**	1	0	0	1	0	0	0	0	1
98	**17**	6	7	2	0	1	0	0	0	1
99	**20**	12	3	3	0	1	0	0	0	1
100	**15**	7	3	1	0	3	0	1	0	0
101	**8**	5	2	0	0	1	0	0	0	0
103	**7**	1	4	0	0	0	0	1	0	1
105	**4**	3	1	0	0	0	0	0	0	0
107	**6**	2	4	0	0	0	0	0	0	0
108	**1**	0	1	0	0	0	0	0	0	0
109	**13**	10	3	0	0	0	0	0	0	0
110	**4**	4	0	0	0	0	0	0	0	0
112	**6**	2	3	0	0	1	0	0	0	0
113	**3**	2	1	0	0	0	0	0	0	0
116	**2**	0	1	0	0	0	0	0	0	1
117	**2**	0	0	2	0	0	0	0	0	0
119	**4**	4	0	0	0	0	0	0	0	0
120	**7**	5	2	0	0	0	0	0	0	0
124	**2**	2	0	0	0	0	0	0	0	0
125	**10**	7	3	0	0	0	0	0	0	0
127	**2**	2	0	0	0	0	0	0	0	0
128	**5**	2	3	0	0	0	0	0	0	0
129	**4**	3	0	0	0	0	0	0	1	0
131	**5**	4	1	0	0	0	0	0	0	0
133	**8**	6	2	0	0	0	0	0	0	0
134	**6**	2	1	3	0	0	0	0	0	0
135	**2**	0	1	1	0	0	0	0	0	0
136	**1**	0	1	0	0	0	0	0	0	0
136/7	**1**	1	0	0	0	0	0	0	0	0
138	**1**	1	0	0	0	0	0	0	0	0
139	**1**	1	0	0	0	0	0	0	0	0
141	**2**	1	0	1	0	0	0	0	0	0
142	**4**	2	2	0	0	0	0	0	0	0
143	**8**	5	1	1	0	0	0	0	0	1
144	**1**	1	0	0	0	0	0	0	0	0
145	**12**	1	1	10	0	0	0	0	0	0
146	**5**	2	2	1	0	0	0	0	0	0
149	**2**	2	0	0	0	0	0	0	0	0
157	**2**	0	1	0	0	0	1	0	0	0
161	**11**	3	2	4	2	0	0	0	0	0
163	**3**	1	0	1	1	0	0	0	0	0
165	**1**	0	0	1	0	0	0	0	0	0
Total:	**1025**	**656**	**151**	**113**	**38**	**20**	**10**	**7**	**8**	**22**

Table 3.4: List of diagnostic pottery, part two

3.4 Catalogue: Notes and Methods

Following chapter deals with a theoretical basis of the task *i* proposed in chapter 3.2: the task, which is effectively realized in *Supplementa* III, IV and V of this work: to publish the previously unprocessed material both textually and visually in a form of an extensive catalogue.

For complete understanding of the published data, it is advisable to treat every individual practical *Supplementa* (III, IV and V) as well as the presumptive *Supplementum* II separately, as they all embody very specific characteristics. However, there are features common to all the sections.

First and foremost, the general aim in relation to the catalogue outputs was to remain strictly descriptive in character, in other words, to avoid any interpretative references in the catalogue section.[3] Such approach proves itself useful as long as a further research may bring fundamental changes in the contemporary interpretative concepts. The proposed catalogue seeks to remain atemporal and ready-to-reinterpret, if necessary.

Another characteristic feature of the proposed catalogue is author's full credence to the primary data set. As long as the option of a direct re-examining was excluded by authorities (see chapter 4.1, footnote 6 for more detailed report), all the presented data maintain its original content, even though doubts and ambiguities may sometimes occur. After all, even the repeated re-examining and double-checks do not prevent archaeologists from random errors and misinterpretations and certain level of precaution is always required when dealing with archaeological data.

The whole work follows a consistent scheme of reference to individual items: every individual item was assign by a unique number (in Arabic figure) starting from 1. Item's order respects its pertinence to a site: sites were processed in a way that they form an ascending sequence (from 1 to 161).[4] Also within the individual sites, firm rules of succession were set: the respect of fraction characteristics is taken into account. Fractions' rate is sequenced as follows: whole profile – rim fragment – body fragment – handle – base fragment. In case an

[3] Interpretative questions will be treated in chapters 4, 5 and 6 of this work.
[4] With an exception of the *miscellanea*, which are treated separately regardless of the site order.

item is a combination of several fractions (e.g. rim fragment with a handle), it is assigned under the fraction of the higher rank. The sequence within the fractions' clusters was randomly chosen and usually reflects an order given in the primary documentation, if available.

3.4.1 List of Tables: commentary

List of tables presented in the *Supplementum* II provides a tool for an easy navigation in the catalogue. The first column prescribed as '*Item #*' contains a unique number denoting a reference to an individual item. Starred items (*) refer to individuals documented also photographically, *i.e.* the ones that can be found in *Supplementum* V. The column '*Site #*' assigns individual to its respective site. The column '*Table #*' refers to item's location in the *Supplementum* IV.

3.4.2 Catalogue: commentary

Verbal description as provided by the primary documentation forms contents of the *Supplementum* III. No post-examination data was added to the catalogue: data integrity presented in the catalogue reflects the objective condition of the primary documentation. The physique form of the data, however, was slightly modified so that it follows a given pattern.

Due to its voluminosity and repeatability, abbreviations are amply exerted in the discussed *supplementum*. The complete list of abbreviations can be found at the outset of the *Supplementum* III. For better comprehensibility, abbreviations are marked in italics in the text.

All dimensions are stated in meters.

3.4.3 Catalogue Tables: commentary

Supplementum IV presents a crucial part of the work: catalogue plates. Existence of the drawn documentation was the main criterion for 'creating' a catalogue entry, so the *Supplementum* IV constitutes the most compact set of data available in the catalogue.

All the items are displayed in identical scale 1:2. The measure's intension was to preserve actual proportions for further comparison. Consequently though, there's altered page orientation depending on a represented item's size. Default portrait orientation is omitted on the behalf of landscape orientation if at least one item's size exceeds utility sheet's dimension.

Item's succession reflects the sequence described in the introduction to chapter 3.4. The inherent sequence is (rarely) slightly modified by spatial reasons.

Regarding universal graphic design, several influential publications were used for a reference. The most important, the Journal of the American School of Classical Studies at Athens – *Hesperia*, was taken as a standard. However, the level of consistency applied in the aforementioned influential journal fell behind expectations. There's extensive variability in graphic design concerning almost all conceivable aspects of a technical drawing. The scheme presented in this volume thus represents a favourable combination of features based on catalogue's requirements.

A wall section as the fundamental feature of archaeological drawing is marked by solid black fill. Items' tagging and sequencing respect traditional left-to-right *usus* in reading. The tag denoting the items stands outside the item and thus predestinates the employment of left section as the vessel reconstruction is not always possible and placing of denoting tag would be otherwise troublesome. Whenever the vessel form reconstruction is possible, wall's section is depicted to the left, while the reconstruction to the right from the vertical axis. Such layout is rather common practise in archaeological publications (see *e.g.* ROTROFF 1982, VIONIS *et al.* 2010, KRAMER-HAJOS – O'NEILL 2008 or JOHNSTON 2000 for comparison).[5]

Fragment's breaks are marked simply by plain and abrupt cuts without proposed continuation strokes (see e.g. LYNCH-PAPADOPOULOS 2006, JOYNER 2007, HAGGIS *et al.* 2007 and TOMLINSON *et al.* 2010 for parallels).

Handles in horizontal section as well as additional horizontal sections, are marked by hatched fill. Handles in vertical section, *e.g.* when they appear as a part of another body part, are marked by a simple boundary line as seen in *e. g.* ROTROFF 1991, FLOYD – BETANCOURT 2010, THOMAS 2011; DAY *et al.* 2011 or TOMLINSON *et al.* 2010, signifying they are not integral part of the vessel proper, but attached secondary.

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[5] The ratio of *Hesperia* publications using the left section scheme is approximately comparable in size to the ones using the right section scheme. Some authors (e.g. LYNCH-PAPADOPOULOS 2006 or JOYNER 2007) even apply both schemes within a single work. Personally, I find the controversy unsubstantial and secondary as long as the forwarded information is comprehensible to the reader.

Vessel's reconstruction was applied every time the diameter estimate was available. Graphic strokes on the reconstruction surface indicate either profile's curvatures or original surface treatment peculiar to a respective vessel.

Surface-treated body fragments are, if possible, displayed in front view, positioned by its sections' inner borderline. Surface treatment illustration was performed by means the most convenient for particular decoration type.

3.4.4 Plates: commentary

Supplementum V represents a selection of photographical documentation available for the Sherobod field survey ceramic assemblage. Selected items were chosen with respect to following aspects:

- predicative potential of a photograph
- technical quality of a photograph
- inherent character of a photographed item

The catalogue of plates consists of 206 photographed items (20% of the whole set). Complete list of published items can be found either in *Supplementum* II (starred * items, see chapter 3.4.1) or at the end of the *Supplementum* II ('*List of Plates*').

Graphic arrangement in context of publishing consisted of heterogeneous background displacement and addition of a uniform scale. Colours within items themselves were not *ex-post* manipulated; neither the images' saturation nor its hue or lightness was altered. The colour spectrum thus reflects conditions during the primary documentation described in chapter 3.3.1.2. No deformative interference was carried even towards the items photographed in factitious positions or misleading perspectives.

Whenever possible, items are clustered on the basis of the site pertinence and subjected to a single scale. That proposition, again, does not apply to *miscellanea*, which are treated separately according to an object type.

4. POTTERY ANALYSIS

4.1 Methodology: Problems and Limitations

The fundamental principle of every archaeologist's work is to settle explicit regulations and work standards of his or her research. Ideally, such mandatory decisions should be made at the very beginning of the respective archaeological process, so that the consistent data record - a result of such choices – would subsequently allow an unambiguous interpretation - if possible - and provide an adequate comprehension not only for the benefit of the archaeologist in question, but for any researcher browsing the data in the future. Practically though, archaeologists are often forced to face situations that are far from the ideal scenario: entering projects in-process and reassuming the work previously achieved by one or more other scientists or occurrence of unavoidable changes in research practise evoked by circumstances beyond one's control to name a few.

Reassuming other researchers' work implies evaluation and eventual adoption of formerly applied research designs. Avoiding any major posterior conceptual change is highly desirable as even a simple modification in the research practise produces considerable degree of incertitude and challenge. Data, after all, isn't but the result of researcher's choice in research design: the result of a decision about which material is to be collected and which attributive details are deemed significant (ARCHER 2006, 2).

Also while dealing with the Sherobod field survey pottery set, I was positioned in the middle of such archaeological process. I reassumed the task after assemblage's primary documentation had been accomplished and its basic methodology had been well established. Due to external circumstances[6] I was confronted purely with the primary data record, which included mostly drawn and photographical documentation. Data set incorporated in the primary record provided a starting point for setting a methodological background of my work. Evaluation of the available data set concluded in a decision to implicitly adopt existing

[6] In 2013, the collective grant project by Ladislav Stančo, Markéta Kobierská and Tereza Machačiková-Včelicová „Keramika z výzkumů česko-uzbecké expedice v jižním Uzbekistánu" was rejected by the Grant Agency. Project's main task was supposed to be a complex re-evaluation of previously proceeded material deposited in Termez, Uzbekistan, in order to deliver a profound quantitative and qualitative analysis. However, the collection subsequently became generally inaccessible due to reconstruction work at the museum building.

physical description of the individual items with its pros and cons and to revisit the former classifications used in a similar context in order to retrieve a suitable classification method that would increase comprehension and interpretation of the archaeological record featuring following characteristics:

i) fragmentariness of the material in question

ii) multitudinousness of the material in question (see chapter 3.3.3)

iii) quantity of the material in question

iv) relative chronological and local incoherence with the site of withdrawal

v) unrestrictiveness of the set in question

vi) material encompassing an extensive time span

vii) current inaccessibility of the physical material for further analysis

viii) heterogeneity of the primary archaeological record

Within the scope of the aforementioned characteristics, projection of methodology as a critical evaluation of potential methods applicable (ARCHER 2006, 3) unveiled a necessity to design a variant, more general classification method as the existing typologies used in context of the Sherobod region did not prove effective for a such particular collection though they've proved themselves very applicable in their respective contexts (see *e.g.* PUSCHNIGG 2006, MAXWELL-JONES 2015, ZAVYALOV 2008 *etc.*). Factual evaluation of individual classification methods will be the topic of the following chapter 4.2.4, but before that, let us examine elementary logical pre-requisitions essential for setting a suitable typology and method of classification.

4.2 Classification and Typology in Archaeology

Classification[7] can be - speaking in a roughly simplified matter - described as the basis of data analysis in archaeology. It is essential for establishing a systematic approach to a data organisation and provides a tool to trace iterative patterns in various assemblages. Applying classification and creating a typology to an indistinct assemblage would permit its desirable

[7] For debates and profound definitions see WHITTAKER – CAULKINS – KAMP 1998, ADAMS – ADAMS 1991, HILL – EVANS 1972, DANIELS 1972, MARRADI 1990, READ 1974, ROUSE 1960, DUNNELL 2001.

comparative and statistical treatment and would facilitate an elementary communication among archaeologists. However, even the greatest tool can turn into a bad master if it is grasped too rigidly.

There are several essential premises concerning typology and classification, which can be generally presupposed and shall be thus kept in mind:

i) classification is an act of archaeologist, not a discovery *in natura* (DUNNELL 2001, xxvi)

ii) all classifications are meant to be functional and all typologies serves a purpose defined by a researcher (ADAMS – ADAMS 1991, 157), which implies:

iii) there's not a single one 'proper' universally valid typology (WHITTAKER – CAULKINS – KAMP 1998, 134)

iv) issues of typological consistency are theoretically and methodologically important (WHITTAKER – CAULKINS – KAMP 1998, 129)

Occasional unconscious neglecting of the aforementioned premises produces a source of possible misunderstandings and discrepancies between researchers reusing existing typological schemes. Let us now further examine difficulties we face while defying a typology.

Every typology as a human construct is grievously non-resistant to biases and errors as every researcher – being a human entity - is a fallible observer. We tacitly presuppose an occurrence of random errors producing minor noise in the data record. More critical with a respect to a future impact to a data set are biases, which are cumulative in character and may have a considerable effect on a final result (WHITTAKER – CAULKINS – KAMP 1998, 134-135).

Besides inadvertent human error, there's another important factor affecting the result right within the classification process itself. The phenomena could be defined as an inevitable difference in perception and interpretation of the individuals. In other words, if an inexplicit number of researchers apply the identical analytical technique on the identical set of material, every single one of them would presumably reach at least a slightly different conclusion (WHITTAKER – CAULKINS – KAMP 1998, 134).

Following the similar logic, it is necessary to make sure that we equally comprehend researcher's given definitions and attitudes in order to hold a sensible discussion about one's typological scheme. (WHITTAKER – CAULKINS – KAMP 1998, 131). Archaeologists recruit both from those who believe that all the typologies are more or less arbitrary and searchless constructs, and those who are convinced that a typology embodies a potential to thoroughly reflect a real word's substantiality. In addition, fairly big part of researchers tacks about somewhere in the spectrum between the two extreme viewpoints.

The importance of clearly formulated purpose of a selected typology is vital: it has a potential to turn a typology into a mechanism that allows its author to interpret a culture, to simplify huge data sets and answer chosen interpretative questions. A fail to define an actual purpose, on the other hand, together with assumptive attitude towards *a priori* typologies, may lead to devaluation of one's work and boosts reluctance to put the so-called standardized typologies to a trial. As familiarity breeds trust, the standardized typologies are slowly reaching a status of universally valid schemes unworthy of any re-evaluation, even though the statement may not be always correct.

A question of typological consistency is a crucial but at the same time a rather neglected topic (see WHITTAKER – CAULKINS – KAMP 1998 for a profound study). A level of consistency reflects the level of typology's informativeness and ingenuity. Correction of discrepancies originating from a typology itself demands a great deal of self-reflection and without clearly pre-defined goals it is extremely hard to disclose an optimal degree of a detail in a type description, as over-detailed description may easily prove as counterproductive as the poorly defined types (WHITTAKER – CAULKINS – KAMP 1998, 142). A proposition of the following chapters is to pursue the elementary mode of human comprehension of categories and typologies as the cause of a great deal of definition-related and structural problems is inherent to a trivial presumption of applying a rigorous Boolean logic to describe a real word in its unquantitable diversity.

4.2.1 CATEGORIZING THE WORLD: ARISTOTELIAN PROPOSITIONS AND BOOLEAN LOGIC

The most of applied typologies are categorical *per se*, obeying the unambiguous *either-or* logic: every single element is individually assessed as belonging to a given classificatory type or not, *tertium non datur* (SATTLER 1996, 578). The classificatory typology works as a convenient tool for formal analysis as it formalizes otherwise vague individual features and – first and foremost – it reduces a set's complexity in order to make sense out of the 'big data' (RAGIN 1987, 160).

The *either-or* concept follows strategies of the bivalent Boolean logic: it reflects sharp boundaries of the Boolean truth functions (fig. 4.1). Following the same logic, arbitrary defined typological rank (*e.g.* morphological) can thus be graphically demonstrated as a function of crisp sets (fig. 4.2), where the values 0 and 1 stand for an element's absolute impertinence and absolute pertinence to a classificatory type respectively. Furthermore, elements T1, T2 and T3 indicate so-called typical representatives, which denote a type.

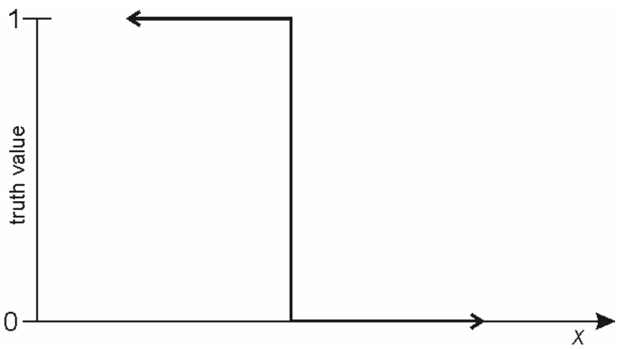


Fig. 4.1: Boolean logic: the truth function of a crisp set.

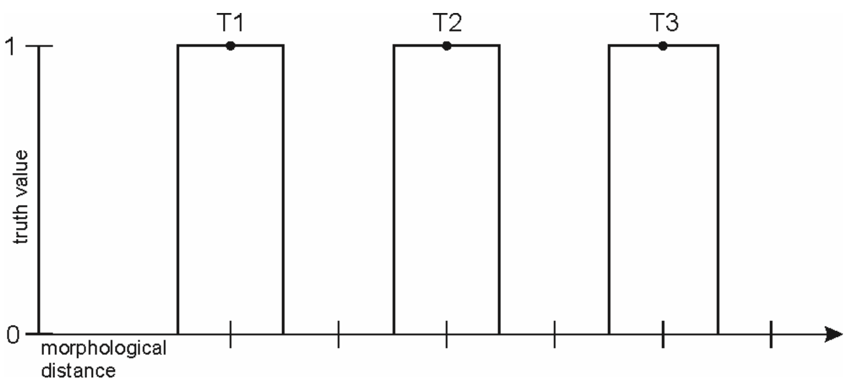


Fig. 4.2: Truth function of a sharp set demonstrating three types defined by their typical representatives T1, T2 and T3

Both desired and troublesome feature of classical typologies is its internal flexibility. Such attribute enables – when suitable - finer-grained analysis or *vice-versa* its simplification (Ragin 1987, 160). On the contrary, interpretative latitude in question creates great potential for misunderstanding among typologies' users, if the types are not well-defined at the first place. Let us discuss typologies represented on fig. 4.2, 4.3 and 4.4 for instance. In all the given cases, we're confronted with three types defined by their typical representatives T1, T2 and T3. As all the typical representatives are placed identically on the morphological distance function, we would presume typologies being identical. However, the definition of the types differs considerably: note that fig. 4.3 and 4.4 represents two definition extremes of the unlimited potential interpretational scale. In case of fig. 4.3, types are defined broadly; even an element relatively remote from its typical representative is considered being part of a given type. Fig. 4.4, on the other hand, represents the typological function in a form of so-called simpleton, where nothing but the typical representative carries the positive truth value.

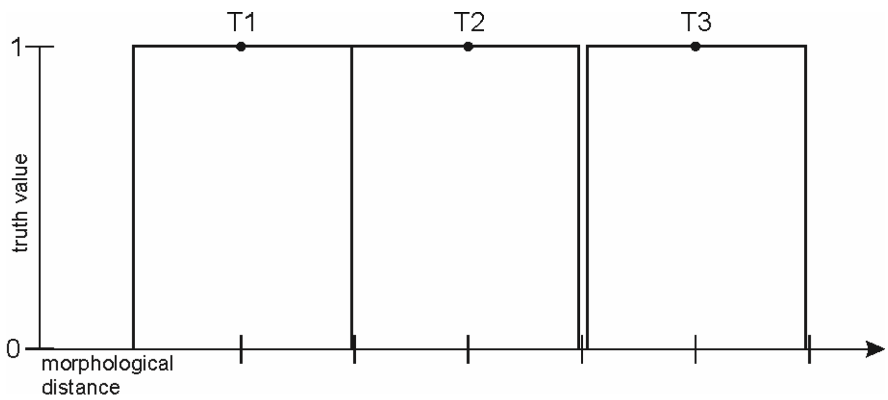


Fig. 4.3: Truth function of a sharp set: broadly defined types

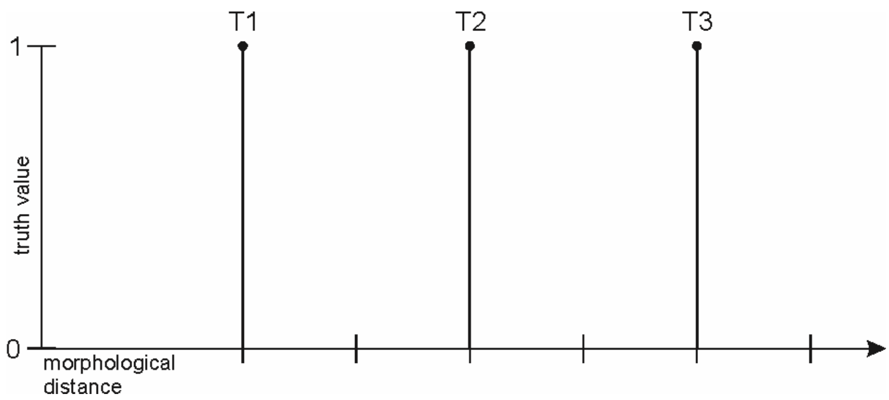


Fig. 4.4: Truth function of a sharp set: simpleton

Vaguely defined type borders epitomize a researchers' general debt even towards otherwise well-established typologies. The situation is all the more alarming as in classical typology, only the typical representatives can be treated with satisfaction, while the non-conform ones are liable to serious distortion. However, as long as the majority of elements are typical, classical typology can proof itself an adequate tool (RAGIN 1987, 160).

Yet the imprecisely stated type definition is not the only disputable feature of the classical typologies. Also the recognition of the typical representatives themselves often causes hesitations. So how do we identify typical representatives of an unconfined set in the first place?

In relation to the classical typology, identifying a typical representative of an arbitrary set resides in a distinct opposition of one representative element to another typical representative. In other words, the basic logical concept traces the aforementioned *either-or* thinking mode in a more complex array (SATTLER 1996, 577). The primary selection of the typical representative 'nominee' is nevertheless virtually always subject to a rather vague and mathematically inconclusive decision of a conscious individual based on initial data available - incomplete by their very nature. This ubiquitous vagueness or fuzziness, so typical for the humanities in general, disconcerted ancient as well as modern philosophers including a founder of a traditional logical concept, Aristotle of Stageira.

Concept of Aristotelian syllogistic logic, which represents a basis for the *either-or* thinking (SATTLER 1996, 577), is drawn up in the collection of treatise generally known as *Organon*. The treatise *On Interpretation* (Περὶ Ἑρμηνείας) proposes a definition of universal affirmative and negative propositions, one of the crucial components of conductive reasoning.[8] The treatise *On Interpretation* thus created an indispensable substrate for further study on logical argumentation. In *Prior Analytics* (Ἀναλυτικὰ Πρότερα), Aristotle examines so-called (categorical) syllogisms: arguments of (at least) two premises and a conclusion.[9] Aristotle proposes generic rules of deduction on the basis of a determination of a premises' and predicate's pattern. However, when defining principles of a modal syllogism (containing

[8] Aristotle, *De Interpretatione* 7-13.
[9] Aristotle, *Analytica Priora* I.25.

at least one modal premise like 'possible' or 'contingent'),[10] Aristotle reached the limit of the bivalent logical concept, as his definitions became uncertain and in many cases obscure. Naturally, there were other fellow philosophers to notice Aristotle's perplexity.

The most resonant reaction to Aristotle's postulates was a collection of seven *paradoxa* formulated in the 4th century BC by Eubulides of Miletus, philosopher of Megarian school. One of these, a famous fallacy of a heap (σωρός in Greek), or the *sorites* paradox (SAINSBURY - WILLIAMSON 1995), impeaches the very basics of Aristotle's principle of bivalence.

According to Diogenes Laertius,[11] Eubolides proposes a simple argument of two premises to act as a fallacy. The first one goes as follows: '*One grain of sand doesn't form a heap.*' The second premise states: '*Adding one grain of sand to one grain of sand doesn't form a heap*'[12]. If we decide to accept the principle of bivalence and Aristotle's rules of inference, we must find both premises true. However, if the second premise is applied repeatedly in the chain of argument – like 10,000 times for example, we will easily reach to a conclusion that 10,000 grains of sand doesn't form a heap, a conclusion that is by all means wrong.

In his the fallacy of the heap, Eubulides of Miletus pointed out a dilemma of the limit of the Aristotelian logical principle: how can we deal with poorly-defined, vague phenomena of uncertain borders (*e.g.* 'a heap') and hope for a high level of 'mathematical' precision at the same time? The fallacy may seem rather distant from the question of defining types in archaeology, yet I declare they both interfere with the same mental obstacle. A single tiny morphological deviation from a typical representative constitutes 'a grain' and it is up to us to decide where to set the limit of 'the heap', in other words, where the old type fade away and the new one emerges. Even though the impact of Eubulides' fallacies was huge and discussion-provoking, a provable answer to the question was not formulated until the second half of the 20th century AD by mathematician Lofti A. Zadeh (ZADEH 1965), when the so-called theory of the fuzzy set was first introduced.

[10] Aristotle, *Analytica Priora* I.8-22.

[11] Diogenes Laertius, *Vitae philosophorum* 2.108: Διαλόγους δὲ συνέγραψεν ἕξ· Λαμπρίαν, Αἰσχίνην, Φοίνικα, Κρίτωνα, Ἀλκιβιάδην, Ἐρωτικόν. τῆς δ' Εὐκλείδου διαδοχῆς ἐστι καὶ Εὐβουλίδης ὁ Μιλήσιος, ὃς καὶ πολλοὺς ἐν διαλεκτικῇ λόγους ἠρώτησε, τόν τε ψευδόμενον καὶ τὸν διαλανθάνοντα καὶ Ἠλέκτραν καὶ ἐγκεκαλυμμένον καὶ σωρίτην καὶ κερατίνην καὶ φαλακρόν.

[12] The fallacy of a heap appears in many different forms; however the principle in all cases remains identical. They are sometimes presumptively called *the continuum fallacies*.

4.2.2 Fuzzy Set Theory: Importance of Being Fuzzy (in Archaeology)

In our everyday lives, we are constantly forced to deal with so called *heuristics*: knowledge admitting no exact proof, a privity originating from uncertain, dynamic database achieved by long-time practical experience. At what time is it advisable to wake up in the morning in order to get to work on time? What is the reasonable speed while driving our car on a highway? Or in a crowded city centre? For many of these situations, we do not need to substantiate our resolutions. We just act as we 'somehow' know. However, as soon as these vague ways of reasoning meet the crude science, substantiation is needful and inevitable. This is when the fuzzy logic stands out.

A concept of the fuzzy logic[13] generalizes the classical (bivalent) set theory, where only two possible truth values are available (see above, chapter 4.2.1). The classical set theory is highly advisable concept as it is explicit and relatively easy to work with. However, it can only be applied when the border in between the given sets are obvious (or crisp) so that an elements' pertinence can be unambiguously assessed (fig. 4.5 to the left). In case of an environment of imprecisely defined borders (fig. 4.5 to the right) or when the substantial part of data is missing, the fuzzy logic comes up with the unlimited range of truth values from 0 to 1, in other words, it assigns a numerical rate of truth and falseness to a statement relevant to the element's pertinence (Hermon *et al.* 2004, 30).

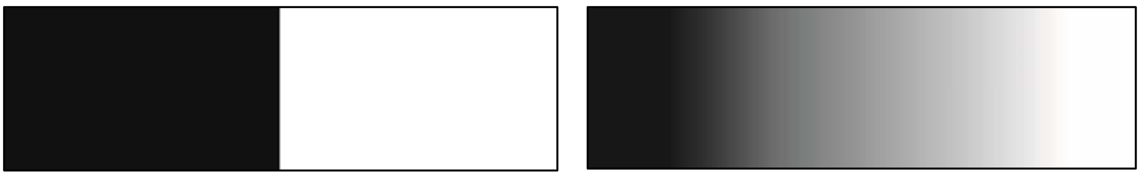


Fig. 4.5: Illustrative representation of crisp sets (left) and a fuzzy relationship (right) of two sets.

Likewise in archaeology, a great deal of concepts can be defined as vague, where the reasoning often occurs by means of a mere approximation. Even the so-called *ansatz* (educated guess) isn't but a result of an individual's subjective judgement, whether authentic or not (Hermon *et al.* 2004, 33). In such cases, fuzzy logic provides a relevant methodological framework.

[13] Further reading: Fuzzy logic generally: Zadeh *et al.* 1975, Jura 2005, Bělohlávek – Vychodil 2006, Werro 2005 and Zimmermann 2001; for application in archaeology see Hermon 2004 and Niccolucci – Hermon 2003.

Let us now briefly examine familiar sets on fig. 4.6 to exemplify the statements. The figure shows the striking difference between two pairs of sets ostensibly alike. Mathematically speaking, elements in the classical crisp sets on fig. 4.6 can be uniquely described by an affirmation as follows:

A is an element of a set *X*, which is defined as 'black'.

B is an element of a set *Y*, which is defined as 'white'.

Fig. 4.6: Elements in crisp (left) and fuzzy sets (right).

The fuzzy sets of the same fig. 4.6, on the other hand, potentially provide far more space for conjecture to a lay observer: elements *A* and *B* could be both considered being part of the 'black' set. We could take distance into account and consider the element *B* being part of the 'white' set, while *A* may belong to the 'black' set. Or we can even consider existence of the third 'grey' set, to which both elements belong. Interpretational scale is virtually unlimited. And the most strikingly, we would always be correct in a certain point of view. Here again, we are facing the continuum dilemma of 'the heap' (chapter 4.2.1).

The fuzzy logic itself, however, is by no means inaccurate. It is a mathematically precise concept of those fuzzy and uncertain qualities that carries potential to provide perceptible distinction between coarse data and mere interpretation. Therefore the result of applying fuzzy logic is that a researcher is able to produce tangible, less subjective evidence for his or her analytic processes (HERMON *et al.* 2004, 33).

As it has already been stated in foregoing paragraphs, every archaeological research produces a wide range of fuzzy data. Among the most interesting features, where fuzzy sets can be recognised, are objects' typologies, crucial topic of the present work. By their very nature, typologies tend to lie on the boundary line between the two logical concepts discussed in chapters 4.2.1 and 4.2.2. Can they thus be by any means linked together?

4.2.3 Classical vs. Fuzzy logic? Concept of complementarity and the 'Extreme type'

Chapters 4.2.1 and 4.2.2 in a nutshell presented two different logical concepts, which may seem to stand in thorough opposition towards each other. However, there are ways to seemly connect both concepts in order to achieve more integral outlook on a particular typology. Two principles were proposed by Sattler (1996):

- principle of complementarity
- concept of the 'extreme type'

The principle of complementarity (Sattler 1996, 578) proposes existence of more than one possible perspective in relation to classification. Merging more typological schemes, even though the different logical concepts are used and typologies may seem contradictory at the first sight, provides more comprehensive picture of the objective reality. In other words, by adding another point of view of a phenomenon, we achieve more plastic image of it. In practise, applying a classical typology emphasizes striking differences between individual representatives. Fuzzy typology, on the other hand, reveals and stresses continuity between them (Sattler 1996, 578, 580).

The concept of 'the extreme type' (Sattler 1996, 578) also spans between divergence of the classical and fuzzy continuum typology. According to the 'the extreme type' concept, individual types flow smoothly into each other, so that there are no fixed boundaries in 'the extreme type' concept (see fig. 4.7).

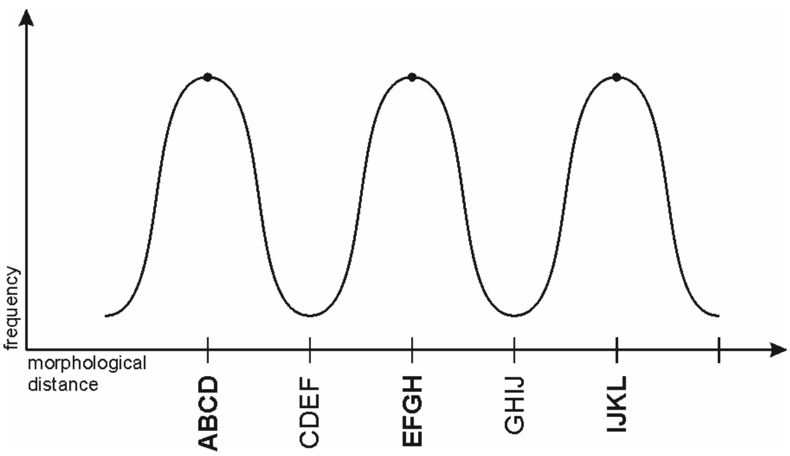


Fig. 4.7: 'Extreme types' scheme, simplified linear function.

Let us now in detail examine an example illustrated in a simplified manner on fig. 4.7. In a given 'extreme types' scheme comprising of a set of interconnected Gaussian curves, three centres (ABCD, EFGH and IJKL) can be identified on the basis of types' frequencies. Types of lower frequency represent intermediates that link the centre of the two extreme types (SATTLER 1996, 578). Intermediates mentioned in the illustration 4.7 (CDEF and GHIJ) are only single representatives of a row of possible intermediates. If we consider the centres of the extreme type ABCD and EFGH as a combination of four properties, we can trace the intermediates as follows (SATTLER 1996, 578):

A B C D

B C D E

C D E F

D E F G

E F G H

If the given illustration on fig. 4.7 was perceived through the logic of the classical classificatory typology (recur to chapter 4.2.1), three distinct types concordant to the 'extreme type' centres would be recognised, while the intermediates would be either completely excluded *ex silentio* or would be - rather violently – included into a neighbouring type. Contingent continuity of types would not be called in question. At this point, typical classical typology is less comprehensive than a fuzzy continuum typology. However, the classificatory type concept is generally implied in typologies even though a continuum is recognised as the classificatory type concept is more synoptic and easier to work with (SATTLER 1996, 579).

To conclude, the concept of classificatory type is focal to the classical typology. However, if categories cannot be regarded as mutually exclusive and the imperfect conformity of cases to types occurs (RAGIN 1987, 160), then the classical typology becomes continuum typology and the classificatory type is understood as the 'extreme type' (SATTLER 1996, 579). So even though the general orientation remains classificatory in character, there's a certain level of continuum thinking present and a border between typical and continuum typology becomes fuzzy and often completely disappears (SATTLER 1996, 579).

4.2.4 CRITICAL EVALUATION OF LOGICAL CONCEPTS IN RELATION TO A CORRESPONDENT TYPOLOGY FOR THE SHEROBOD FIELD SURVEY POTTERY SET

So what are the implications and consequences of the aforementioned logical concepts for the choices made when seek for a proper typological scheme for the Sherobod field survey pottery assemblage? Possessing knowledge of pros and cons of the two proposed logical concepts, we need to balance advantages and limitations in a way that it fits the requirements of functional typologies.

First of all, in this work I acknowledge privilege of the typical classical typology and its essentialistic world view. The concept of types represents an unambiguous, perspicuous and useful tool under a single condition: the aspect of categorization, *i.e. fundamentum divisionis*, was sensibly chosen (MARRADI 1990, 131). In this work, the classificatory logic is thus applied in the high-level division, where the categories were definite and well-definable (see chapter 5.1). Continuum logic, on the other hand, is very exercisable in dynamic and open environment of the low-level subdivision, where the types are open to each other through intermediates. In this context, I proposed a scheme of the 'extreme types' in a more complex, dimensional form than presented previously. The 'extreme type' scheme as illustrated in chapter 4.2.3 as a linear function does not sufficiently reflect the typological reality of the pottery set: individual types do not linearly evolve one from another. More likely, they create a net of interconnected centres and intermediates with many different affinities (fig. 4.8).

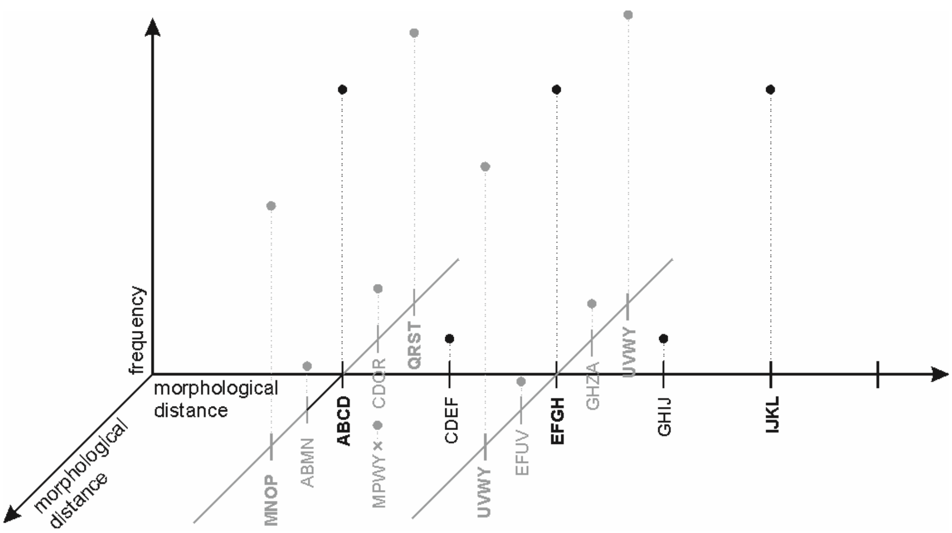


Fig. 4.8: 'Extreme types', a spatial scheme.

As evident on fig. 4.8, it is exceedingly difficult to find a suitable interface for transferring the multi-dimensional reality of the 'extreme types' into a more or less linear environment typical for printed publications. Present work aims only to suggest bigger emphasis on the continual character of typologies and occasional types' transmittance, not to technically solve the problems that occur when dealing with the question. However, I aspired for a fuzzy-friendly concept of the proposed typology, such that can be relatively easily re-examined and analysed. In order to achieve one, it is necessary to frame it by valid arguments about fundamental decision made.

Basis of division, or *fundamentum divisionis*, creates optics through which we perceive the reality. How to choose the most convenient one in order not to disfigure gained information? To answer this question, we need to take a step back and re-examine set's general characteristics proposed in chapter 4.1:

i) fragmentariness of the material in question

ii) multitudinousness of the material in question

iii) quantity of the material in question

iv) relative chronological and local incoherence with the site of withdrawal

v) unrestrictiveness of the set in question

vi) material encompassing an extensive time span

vii) current inaccessibility of the physical material for further analysis

viii) heterogeneity of the primary archaeological record

The aforementioned set's characteristics are crucial for operative selecting of suitable *fundamentum divisionis*. Suggested options, as available in analogous work (see following chapters), are as follows

- morphological aspect division
- fabric quality based division
- decoration/surface treatment based division
- functional aspect division
- chronological aspect division

Let us now compare the suggested *fundamenta* against set's characteristics (table 4.1). The opening horizontal line refers to a respective point of set's characteristics (see the previous page). The first column features a list of *fundamenta*. The correlation table takes three values: sign '+' signify a positive response to a given characteristic in relation to a given *fundamentum*; sign '-' represents a disadvantage towards it; an empty slot signifies mutual indifference.

	i	ii	iii	iv	v	vi	vii	viii
morphological	-		+		+			
fabric quality based	+					-	-	-
decorational	-						-	-
functional		-		-		-		
chronological		-		-	-	+		

Table 4.1: Correlation table of fundamentum divisionis and set's general characteristics.

4.2.4.1 Morphology-based typology

As evident on the table 4.1, morphological approach generally appears to be the most convenient. The quantity of the material in question can be understood as advantageous: reference set is big enough for proper comparison and, reversely, morphological approach provides a suitable tool for reasonable division and making sense of big data set. If the proper morphological *fundamentum divisionis* is chosen, the unrestrictiveness of the set in question does not present any difficulty as morphological typologies are by their very nature open and dynamic.

The fragmentariness of the material in question may cause distress, especially in case the whole vessel's profile is required for analysis. However, there's a possibility to minimalize negative impact by choosing proper morphological aspect.

4.2.4.2 Fabric quality-based typology

A typology based on fabric quality is generally suitable for assemblages of great fragmentariness, however in case of the Sherobod field survey set, negatives prevail. The most apparent disincentive is the fact that the material in question was not re-examined and the data that has arisen from the primary examination are available for only 256 items (*i.e.* for 25% of whole the set).

site #	ware q.	site #	ware q.	site #	ware q.	site #	ware q.
5	CW-RS	187	CW	346	KW	503	CW
6	CW-RS	188	CW	347	CW	505	KW
67	FW	189	FW	348	CW	511	CW
70	CW/FW	190	CW	350	CW	532	CW-RS
71	FW	191	CW	351	CW	533	FW-RS
74	FW	192	FW	352	CW	538	CW-RS
81	CW/FW	209	CW-RS	353	CW	539	CW
82	KW	210	CW	355	CW	548	CW-RS
91	P	211	CW	356	CW	550	FW-RS
93	FW	217	CW-RS	357	CW	553	CW-RS
105	FW	218	CW	358	CW	554	CW
107	FW	220	FW	361	FW-RS	555	CW
118	FW	221	CW-RS	362	FW-RS	556	CW
126	CW	224	CW	363	FW-RS	588	CW
127	CW	225	CW	364	FW-RS	589	FW-RS
128	CW	227	CW	366	FW-RS	590	CW
130	CW	230	CW	368	CW	591	FW-RS
131	CW/KW	231	CW	385	FW-RS	592	CW
133	CW	232	CW	388	FW	593	CW
139	CW	236	FW	389	FW	594	CW/P
140	CW	237	FW	390	FW	595	CW
141	CW/KW	238	CW/P	391	FW	596	CW
142	KW/P	239	CW	392	CW	597	CW-RS
143	CW	254	CW	394	FW	613	CW
144	FW	255	CW	396	FW	614	CW
145	CW	256	CW	397	FW	615	CW/KW
146	CW	257	CW	402	FW	616	CW
147	CW	274	FW	403	CW	617	CW
148	CW-RS	275	FW	404	CW	618	CW
149	CW	293	CW	405	KW	619	CW-RS
151	CW	294	CW	408	FW	620	CW
152	CW	295	FW-RS	409	FW	624	CW
153	CW/KW	296	CW	410	FW	629	CW
155	CW	297	FW-RS	411	CW	634	CW-RS
156	CW	298	CW/P	412	FW	645	FW-RS
158	CW-RS	299	CW	416	CW	647	CW-RS
159	FW-RS	300	CW-RS	417	CW	654	FW
160	FW	301	CW/P	419	FW	656	FW
161	FW	302	CW/P	422	CW	668	FW
162	CW	303	KW/CW	425	CW	672	CW
163	CW-RS	304	CW	426	CW	745	CW
164	CW-RS	305	CW	427	CW	746	FW
165	CW-RS	306	CW	428	KW	747	CW
166	FW-RS	307	CW	431	CW	748	FW
167	CW	308	CW	439	CW	749	FW
168	CW-RS	309	CW	441	CW	750	CW
169	FW-RS	310	CW	443	CW	751	FW
170	CW	327	FW	481	CW	752	FW
171	CW-RS	329	CW	482	CW	753	FW
172	CW	330	CW	483	CW	754	FW
173	CW/P	331	FW	484	CW	755	FW
174	CW/P	332	CW	485	CW	756	CW
175	CW	333	FW	486	CW	757	FW
176	CW	334	CW	487	CW	758	CW
177	CW-RS	335	CW	488	CW	759	FW
178	CW	336	CW	490	CW/P	761	CW
179	CW-RS	337	CW	491	CW	762	FW
180	FW-RS	338	FW	492	CW/P	763	FW
181	CW-RS	339	FW	493	CW	764	FW
182	CW	340	FW	494	CW	765	FW
183	CW-RS	341	FW	498	CW	1009	CW
184	CW-RS	342	CW	499	CW	1011	CW
185	CW	343	CW	500	CW	1015	FW
186	CW	345	CW	501	CW	1023	KW

Table 4.2: List of available data concerning ware quality

Even though the fabric quality is not the standpoint of the typology applied in this work, a list of known fabric quality entries is available in the table 4.2. Four fabric quality categories were described: *Fine Ware* (FW), *Common Ware* (CW), *Kitchen Ware* (KW) and *Pithos* (P). Additionally, information about presence of a red slip (RS) is given. For further information on Sherobod wares' definition, see *e.g.* VČELICOVÁ 2015, 26-29.

4.2.4.3 Decoration-based typology

In case of the Sherobod field survey assemblage, a decoration-based typology is of very little use as a primary tool. Fragments carrying a surface treatment are limited almost purely to a few body sherds and rims. A majority of the items is either free of any decorative features or contains only a simple linear adornment. Stylistic analysis of the decoration is however favourable for the surface-treated body sherds.

4.2.4.4 Inferred function-based typology

By functional-based typology, the typology using 'standard' form/shape terminology for categorization is understood. There is a whole range of challenges and propositions that need to be answered. First of all, there are abysmal differences in terminology as the form description is not but a subject to the idea of each individual author. Another big task is the inexplicit relationship between shape and function of a vessel, which makes the scheme rather interpretative as it infers vessels' use and implies deeper understanding of ancient habits (HOREJS - JUNG – PAVÚK (eds.) 2010, 10). Such approach often leads to substantial subjectivity and absence of explicit criteria (RICE 2005, 211-212). In terms of the latter proposition, a relation between use and shape is rarely unique, so the function itself does not represent a satisfactory criterion for classification (SHEPARD 1985, 224).

In relation to Sherobod field survey set, several negative aspects discourage researchers from use of functional-based typology. The most consequential is however items' relative chronological and local incoherence with the site of withdrawal. As long as a function-based typology infers item's use, it has also a potential to predicate about character of its deposit place. Nevertheless, this only applies to *in situ* finds, as finds accrued from a field survey lose the function.

4.2.4.4 Chronology-based typology

Chronological approach as an initial aspect of division is on principle excluded for Sherobod field survey set as there is no chronological framework (*e.g.* provided by stratigraphy) available at the beginning of a research. Chronological scheme is thus outlined only as a result of an analysis, not as a source data.

4.2.4.5 Analogous typologies

In this chapter, I present an incomplete selection of short notes on ceramic typologies provided by other authors dealing with the Central Asia region. The list contains only the works, in which author's intensions about typological scheme were recognised. Authors are listed alphabetically.

In GURT ESPARRAGUERA *et al.* (2015), multi-level categorization is applied. The high-level division uses the fabric quality as a main aspect (*Table Ware*, *Common Ware* and *Cooking ware*). In low-level subdivision, the functional aspect is taken into account.

MAXWELL-JONES (2015) combines fabric quality (*Utilitarian* and *Table Wares*) and morphological (*Open* and *Closed* shapes) aspects in a single-level categories.

ODLER (2011) proposed purely morphological scheme for rim and base fragments separately.

Two different schemes can be found in PUSCHNIGG (2006). The chronological aspect was chosen as a starting point for further stylistic analysis. Additional code-based rim typology is purely referential and serves the purposes of Puschnigg's statistical analysis.

Also VČELICOVÁ (2015) uses multi-level division. A high-level division into *groups* is functional in character, while a subdivision into *classes* is morphological.

ZAVYALOV (2008) applies a simple single-level functional division using standard Russian terminology.

4.3 Morphological Approach: Contour-based Analysis

In previous chapter, the reasons for application of morphological approach in the Sherobod field survey set typology were presented. However, the term 'morphological' yields many different connotations. In the following paragraphs, I will provide a reason for choosing a contour-based morphological analysis as a principal tool, its implications and limits.

4.3.1 Why Morphological Contour-based Approach?

When dealing with the fundamental question of choice of a proper morphological approach, distinctive features of the Sherobod field survey set were – again – taken as a crucial criterion. As a matter of fact, many of the pivotal features are common to an arbitrary field survey set.

The unrestrictiveness is one of these features. Every field survey set is basically random and dynamic, imbedded neither spatially nor chronologically. As such, it demands a typology that would be as well open and dynamic by their very nature. Morphological approach based on vessels' contour corresponds to the condition: a contour is a feature common to all vessels and the typological scheme can be defined as a whole independently of particular representatives by applying a bounded set of mathematical curves to describe. Such a scheme can consequently be complemented by arbitrary amount of items without causing any major changes to the original concept.

Lucidity and explicitness of the contour-based approach were other valid arguments for applying it. As it was already mentioned in this chapter, herein proposed typology could not be by principle anchored chronologically nor spatially. The main goal is to achieve a user-friendly referential scheme. I aspire to provide such a typology, which would be easy to navigate in; in other words, to provide such a tool for a reader, which would allow anyone to search out for desired parallels on the basis of vessels' contour within a second he or she glimpses a vessel's form. The contour-based analysis provides a great tool for the task.

4.3.2 Defining Contour-based analytic method

Shape description based on mathematical curves' definition was introduced by Birkhoff (1933) within a general treatise on aesthetic perceptions. The topic was later expanded for the archaeological purposes by *e.g.* Clarke (1972), Shepard (1985), Rice (2005) *etc.* The original Birkoff's treatise was recently re-evaluated by Staudek (1999).

A method the most suitable for the purposes of archaeological morphology can be found in Rice (2005), Shepard (1985) and recent works concentrating in computing science in archaeology (i.e. Kampel – Sablatnig – Costa 2001 and Liu *et al.* 2005).

In the following paragraphs, I define more precisely my approach towards the contour-based analytic method in relation to this work. But before that, let us shortly examine basic terminological scheme applied.

4.3.2.1 Essentials: Terminology and Vessels' Anatomy

Despite their substantial variability, there is a set of characteristic features peculiar to all the vessel forms. Shape-related characteristic features can simply be referred to as vessels' fundamental components. Rims, orifices, bodies and bases can - given a certain level of cautiousness - be ascribed to an arbitrary vessel.

A **rim** of a vessel is generally characterised as a finished edge of the top or the opening of a vessel (Shepard 1985, 226). Not to be confused with the former, an **orifice** (or a vessel's opening or mouth) is essential for establishing vessel's minimal opening diameter.[14] Vessel's diameter at the orifice may either be equal to the rim diameter or it can vary considerably. Explicitly, though, the diameter at the orifice can never be larger than the diameter at the rim (Liu *et al.* 2005, 448).

Restrictiveness of vessel's orifice is defined by respect of orifice and vessel's maximum diameter. If diameter at orifice is equal or greater than the maximum diameter, the respective vessel is considered **unrestricted**. If the orifice's diameter is lesser than the maximum diameter, the vessel is **restricted** (Rice 2005, 212; see fig. 5.2).

Certain vessel's components can be recognised on the restricted shapes only. A **neck** is a vessel restriction of the opening beginning on or above the point of maximal diameter, on the

[14] Diameter at the rim and the orifice are sometimes imprecisely designated as rim's "inner" and "outer" diameter respectively.

body part referred to as a **shoulder** (RICE 2005, 212). Shepard also divides all restricted forms according to their neck's dependence: if the neck is connected at the point of vessel's maximum diameter, the vessel is characterized as **dependent**. If the neck meets vessel's shoulders, thus above the place of maximum diameter, it is characterized as **independent** (SHEPARD 1985, 230). In this work, I intentionally do not use vessel's dependence as a main criterion, however this feature turns out as troublesome in case a surveyed set is highly fragmentary (see chapter 4.3.2.4).

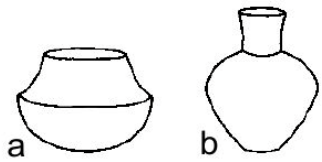


Fig. 4.9: An illustration of a dependent (a) and independent (b) restricted vessel (SHEPARD 1985, 321, fig. 22).

A **body** of a vessel is defined as a form of a vessel below the orifice and above its base. It includes vessel's maximum diameter or region of greatest enclosed volume (RICE 2005, 212). A body region may sometimes carry a **carination**: plastic horizontal ridge-shaped projections.

A **base** is a component at the very bottom of a vessel, a portion upon which it rests. When a vessel is round-base, it may be difficult to make a clear distinction between body and base component, however in most cases the border is self-evident (RICE 2005, 213).

Bands or projections that extend out from the vessel wall, flanges greater that ridges are entitled as **flanges** (more pronounced ones) or **ridges** (RICE 2005, 214). A flange can be medial, basal or labial (RICE 2005, 241).

4.3.2.2 Applying Mathematics: Vessel Contour and Characteristic Points

Vessel contour can be mathematically described by a sequence of curves defined between a set of characteristic points on a vessel's vertical profile (see fig. 4.10).

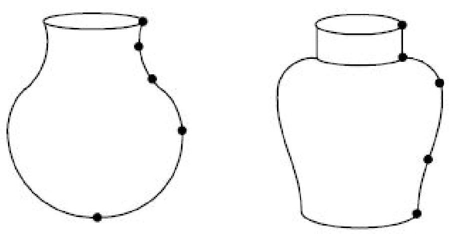


Fig: 4.10: Vessels with a designation of their characteristic points

(LIU et al. 2005, 448, *modified*).

The characteristic points crucial for a curve definition are as follows:

- end point (EP)
- inflection point (IP)
- corner point (CP)

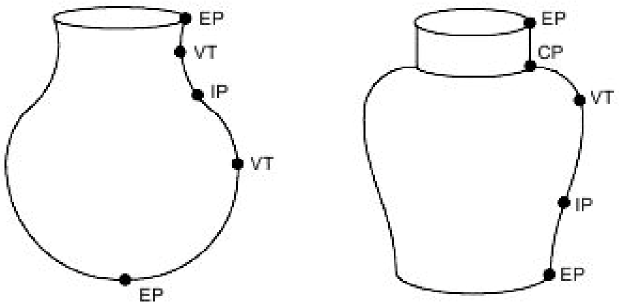


Fig: 4.11: Inflected (left) and composite vessel (right) with a designation of the characteristic points (LIU et al. 2005, 448, *modified*).

End points (EP, see fig. 4.11) define termination of a vessel's vertical profile and can be thus found at the very top and bottom of a wall silhouette (LIU *et al.* 2005, 448;).

Inflection points (IP, see fig. 4.11 and 4.12) mark the place where the vessel's vertical profile's curvature changes from concave to convex and *vice versa* and thus switches direction of the curvature (LIU *et al.* 2005, 448; RICE 2005, 218). Inflection point can be easily found by analysing curvature value and tangent lines as shown on fig. 4.12. When we move a tangent on the curve, in a particular moment it will roll over to another side of the curve. The place of rollover denotes inflection point.

Corner points (CP, see fig. 4.11, right) indicate a point where the direction of the tangent changes abruptly and radically (LIU *et al.* 2005, 448). It typically occurs at the nodal point of body and neck curvature (RICE 2005, 218).

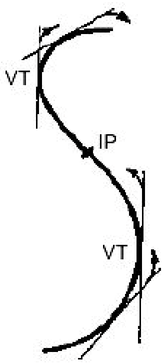


*Fig. 4.12: Scheme of inflection point location (*SHEPARD 1985, 226, fig. 19*, modified)*

An additional remarkable point is a **point of vertical tangency** (VT, see fig. 4.11 and 4.12), the point where the pertinent tangent is vertical. An independent vessel's outermost point of vertical tangency marks place of the vessel's maximal diameter (SHEPARD 1985, 226-227; RICE 2005, 218).

The above-mentioned characteristic points differentiate contour types and degrees of a vessel's complexity (SHEPARD 1985, 227) and thus provide a basis for contour-based classification (RICE 2005, 218). On the basis of presence and absence of characteristic points on the vertical profile, four elementary groups of vessels' form are distinguishable:

- simple contour vessels
- composite contour vessels
- inflected vessels
- complex- shaped vessels

A **simple** vessel's contour is characterised by absence of inflection and corner points. Its course can either be linear or curvy, however outlined smoothly (SHEPARD 1985, 232; RICE 2005, 218).

Composite vessels are characterized by a presence of a single corner point, inflection points are absent (SHEPARD 1985, 232; RICE 2005, 218).

A vessel consisting of at least two inflection or corner points are called **complex**. The same applies for vessels carrying both inflection and corner points (SHEPARD 1985, 232; RICE 2005, 218).

In the subsequent chapter, we will explore the items of the Sherobod field survey set of the complete profile in order to illustrate the proposed analytic method in practise. The Sherobod field survey set will thus provide useful practical samples of the phenomena mentioned only theoretically so far.

4.3.2.3 Reading the contours: The case of the Sherobod vessels of a complete profile

As we have already seen in chapter 3.3.3, there are only eight vessels available for the Sherobod field survey assemblage, of which we know the whole vertical profile. Moreover, one of these eight presents a specific form, a lid, incompatible with the given task.

Let us now explore seven remaining vessels. Four items is recognized as vessels of a simple contour (see fig. 4.13 a-d). When reading a vertical profile for sake of the contour-based analysis, only vessel's plain contour must be taken into account, as marked by a white dashed line in the left section of a vessel. Handles, spouts, fringes, wall bolsters or any other attachments are excluded from the inspection. As mentioned in previous chapter, a simple-contoured vessel lacks both inflection and corner points, so that the contour flows smoothly between two end points.[15]

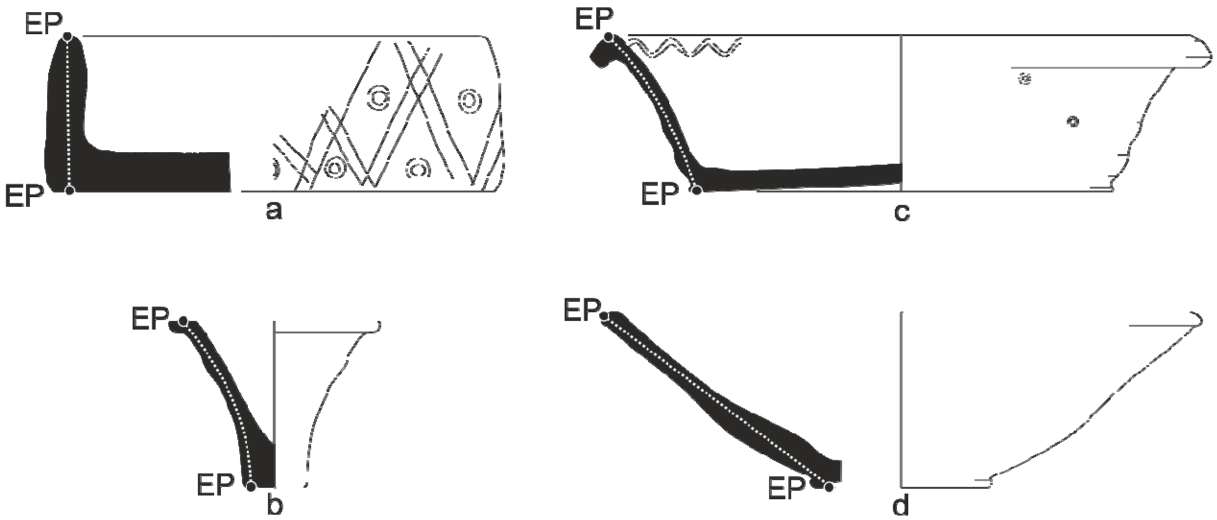


Fig. 4.13: Vessels of a simple contour: cylindrical (a, item 631), hyperboloid (b and c, items 158 and 928) and conical (d, item 766). Items are not in actual mutual scale.

On fig. 4.14, vessels of more elaborate contour are illustrated. The item *a* represents an inflected vessel with a single inflection point between two end points. A composite vessel is represented by item *b* containing a single corner point. A restricted vessel of three inflection point is shown on illustration *c* presenting a complex-contoured form.

As we've seen, reading the whole vessel's contour does not produce major difficulties, however, as already mentioned, vessels of a complete profile are extremely limited for the assemblage in question. Vast majority of it comprises of fragments of different size and character. Pitfall of fragmentariness is the pivotal topic of the following chapter.

[15] For further simple-contoured vessels' categorization, see chapter 5.2.

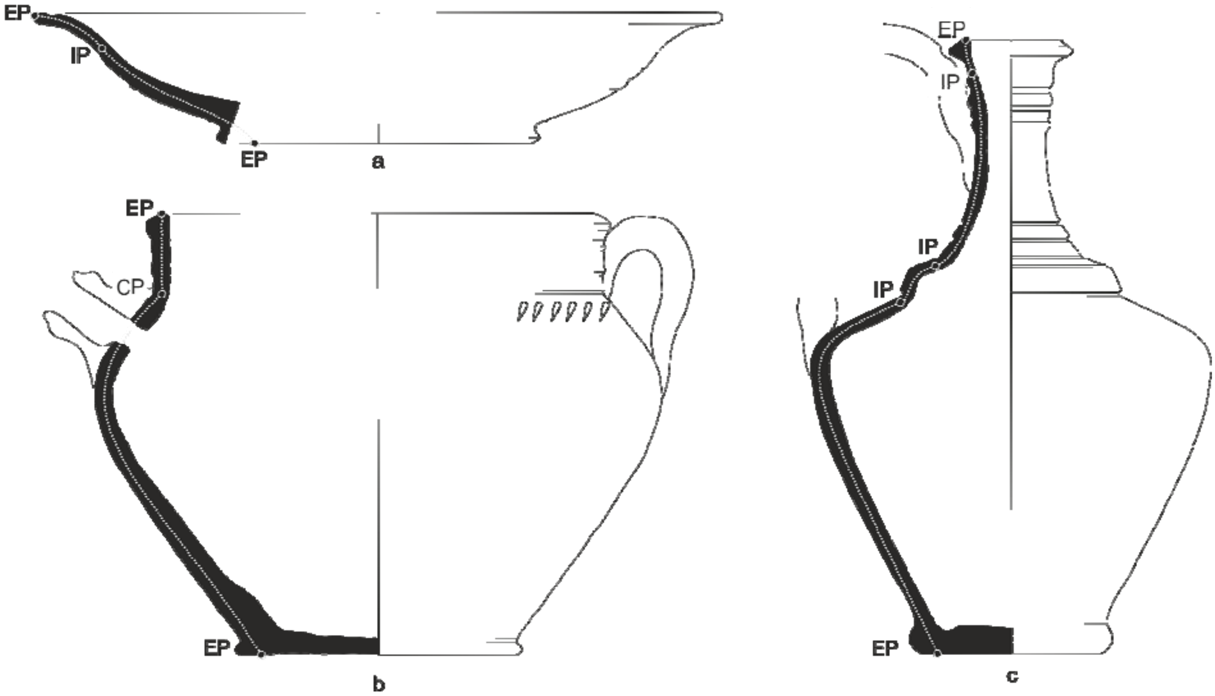


Fig. 4.14: Vessel of an inflected contour (a, item 700), of composite silhouette (b, item 479) and complex contoured vessel (c, item 480). Items are not in actual mutual scale.

4.3.2.4 Limitations: Fragmentation and others

In chapter 4.2.4.1, we discussed pros and cons of morphological approach in relation to the Sherobod assemblage's characteristics. The material's fragmentariness was pointed out as a problem that needs to be dealt with. How can a vessel's contour be plausibly recognized if all we have is a tinny rim fragment? Even a statement about a vessel's restrictiveness can never be absolute and the level of indeterminateness is ever-present. The solution to the caustic challenge was - I dare to claim - proposed by the concept fuzzy logic presented earlier.

Another problem is represented by unclear contour reading, often caused by extensive body treatment or damage. Contour designation may thus be ambiguous and subjective. Nevertheless, the fuzzy aspect of the typology provides a tool to reduce the divergence through the principle of mutual interconnections and implication (see chapter 5.1.2)

On the example of the Sherobod field survey rim typology, I demonstrate a contour-based typology that combines figures of merit of both categorical and fuzzy logic through directed permeability of categories.

5. RIM TYPOLOGY

Rim fragments represent the most numerous group of the Sherobod field survey assemblage. They constitute 64% of the whole set (see table 3.2) and not seldom they bear considerable amount of information about a vessel (*i.e.* about vessel's opening diameter).[16]

Dynamic rim classification proposed for this paper is a multi-level typology investigating three morphological characteristics of fragments in given order:

- orifice's restrictiveness
- contour complexity and rim volume classification

5.1 Using the Contour-based typology

As stated already, the proposed typology combines two phenomena discussed in previous chapters: contour-based morphological approach and concept of a fuzzy typology. Vessel's contour presents a feature peculiar to every potsherd so the usage of the approach is universal and applicable – with fairy reservations – to an arbitrary pottery assemblage. The most significant of them is a problem of fragmentariness, discussed in detail in chapter 5.1.1. However, effects of the fragmentariness are diminished by application of the fuzzy aspect.

The proposed typology uses a multi-level categorization. The orifice restriction assignation represents the highest-positioned category (see fig. 5.1, for detailed determination of orifices' restriction, see chapter 5.2). It divides all fragments into two clusters: fragments of unrestricted (RI) and restricted (RII) orifice.

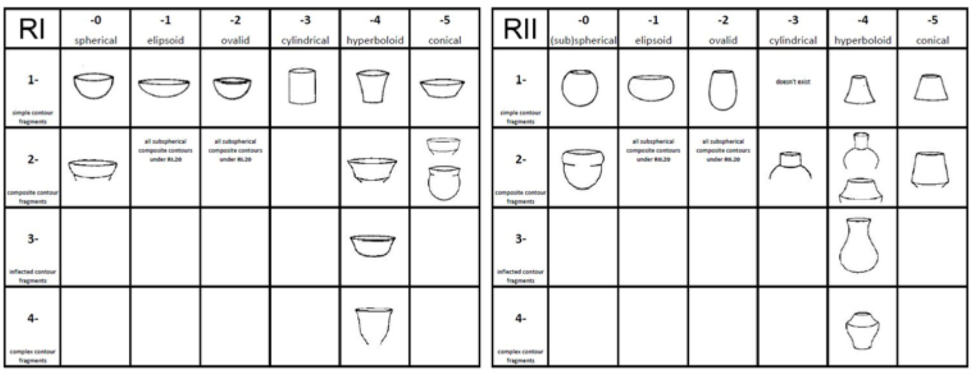


Fig. 5.1: List of shapes according to orifice's restriction categories: unrestricted (RI) and restricted vessels (RII)

[16] Vessel's asymmetry and other irregularities can produce a problem when estimating a vessel's diameter.

Tributary categorization combines two morphological features of a vessel: a contour complexity (as presented in chapter 4.3.2.2) and rim volume classification (see 5.3 for details). These morphological groups are common to both superior clusters and thus enable implementation of the fuzzy aspect: permeability of both clusters and groups according to predefined formulas (see chapter 5.1.2)

In the following paragraphs, I investigate functional regulation and rules of stating item's pertinence to a respective clusters and groups.

5.1.1 Orifice Classification

The classification based on orifice's restrictiveness stands highest in rim's typological hierarchy of the work. Pursuant to an orifice's characteristic, item belongs to one of two clusters defined:

- RI: Vessels with an unrestricted orifice
- RII: Vessels with a restricted orifice

When dealing with simple-contoured vessels, a decision making is likewise simple as the end point tangent serves as a precise indicator of restrictiveness (fig. 5.2). If the end point tangent is vertical (fig. 5.1 c) or its upper part inclines outwards (fig. 5.2 a-b), the vessel is considered unrestricted. In case the tangent inclines inwards (fig. 5.2 d-e), it is referred to as restricted (Shepard 1985, 230).

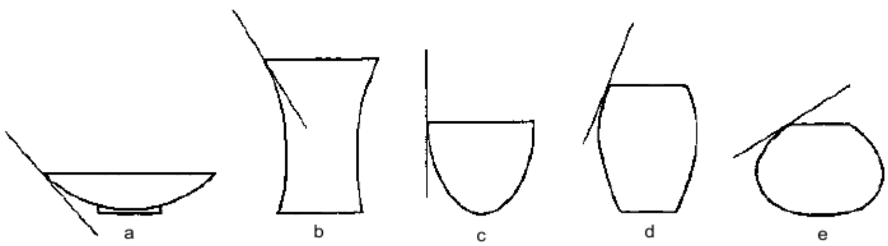


Fig. 5.2: Unrestricted (a-c) and restricted (d-e) simple-contoured vessels (Shepard 1985, 229).

The simple proposition, however, applies to simple-contoured vessels exclusively. In case of more complicated shapes, the relation between vessel's maximum diameter and orifice is taken into account. The routine goes as follows: a) vessel's outermost vertical tangent is identified; b) vessel's diameter at the orifice is identified; c) both diameters are compared. If a vessel's diameter at vertical tangent is larger than opening diameter, the vessel is considered restricted and *vice versa*.

As advised in preceding page, vessels' fragmentariness causes enormous trouble and the definition of orifice's restrictiveness cannot be applied without criticism. Due to fragments' size, it is often impossible to assess vessels' form. Especially when dealing with Shepard's restricted independent (necked) vessels (SHEPARD 1985, 228, see chapter 4.3.2.1), we face difficulties as a fragment of restricted independent vessel's neck may easily appear as a fragment of unrestricted simple vessel.

In this typological scheme, I wish not to speculate about a fragment's unknown continuation. Neck fragments are thus an integral part of bivalent restricted/unrestricted orifice scheme as typology's fuzzy aspect helps to deal with the dilemma. In practice, fragment's restrictiveness is judged from the fragment's actual – not estimated – condition. As seen on fig. 5.3, a possible neck fragment is classified with unrestricted vessels (RI) as the diameter at the orifice is larger than fragment's maximum diameter attested. The proposed typology's coherence enables to search for parallels in the respective group of the restricted cluster (RII) as the morphological groups respects predefined scheme introduced in the following chapter.

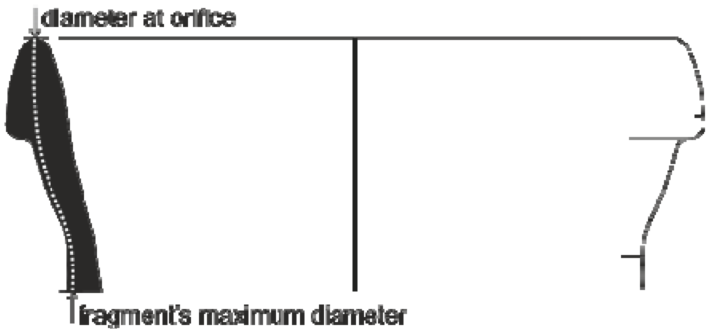


Fig. 5.3: A possible neck's fragment is understood as unrestricted (RI) for the purpose of this work.

5.1.2 CONTOUR AND VOLUME CLASSIFICATION

The proposed typology's secondary classification takes vessels' morphological as a main classificator. Typological groups are recorded as a two-digit Arabic numeral and are separated from cluster's denotation by a dot (*e.g.* RII.15, where 'RII' refers to 'restricted vessel' and '15' to 'simple contoured conical' silhouette, see table 5.2). The numeral's first digit is a reference to fragments contour (see chapter 4.3.2.2). In the present scheme, four contour groups are distinguished:

- simple-contoured silhouettes
- composite-contoured silhouettes
- inflected-contoured silhouettes
- complex-contoured silhouettes

The numeral's second digit refers to previously undiscussed phenomenon: volume (or geometric) classification (RICE 2005, 219-222). According to the classification, every vessel's contour can be mathematically described by means of geometric solids (sphere, ellipsoid, ovaloid) and surfaces (cylinder, cone, hyperboloid) (see fig. 5.4; RICE 2005, 219)

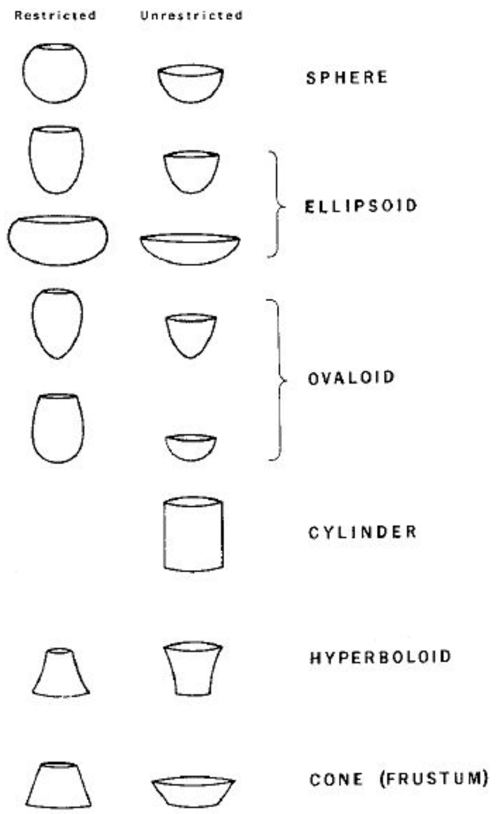


Fig. 5.4: Referential geometric solids for vessel shape description (RICE 2005, 219, fig. 7.6)

The geometric reference is self-evident in case of simple-contoured vessels. However, every complex vessels can be defined as an assembly of basic shapes' segments conjoined in the characteristic points (see chapter 4.3.2.2). Consequently, when dealing with more intricate forms, individual segments need to be described separately.

For a purpose of the proposed typology, I identify five geometric figures that characterize fragment's silhouette as:

- spherical
- ellipsoid
- ovalid / ovoid
- cylindrical
- hyperboloid
- conical

Let us re-examine Table 5.1 for a reference. The table's vertical column lists contour-based categories encoded by a one-digit numeral. Analogously, the horizontal line features possible geometric volumes, as well encoded by a numeral. The written record's paradigm thus unfolds as a two-digit numeral code from a set of numbers 10-45.

The morphological scheme on Table 5.1 is clear within the simple-contoured forms, but how do we understand the geometric reference, when the intricate shapes are examined? The geometric reference pertains a vessel's uppermost segment, in other words, it describes curvature between a vessel's opening and its proximate characteristic point. Other segments are not taken into account for the purpose of this typology.

Even though the distinct reference to a geometric shape is applied, there's no reason to expect that an actual vessel's contours are mathematically perfect (SHEPARD 1985, 233). There's again a certain level of approximation manifested in categorization as the examined subject is not but a random fuzzy set. Results of approximation together with assemblage's fragmentariness can both be modulated by conceding the typology's fuzziness.

The fuzzy aspect of the proposed typology is the most lucid in the morphological categorical aspect. Mutual relations among the morphological groups of the adjacent categories are predefined in several respects and provide a tool for parallel prospecting.

The most beneficial relationship observable on fig. 5.5 is represented by linear[17] vertical contiguity of the superimposed categories. General relation between the vertically adjacent categories can be mathematically described as 'material implication' (*i.e.* one-direction implicative relation).

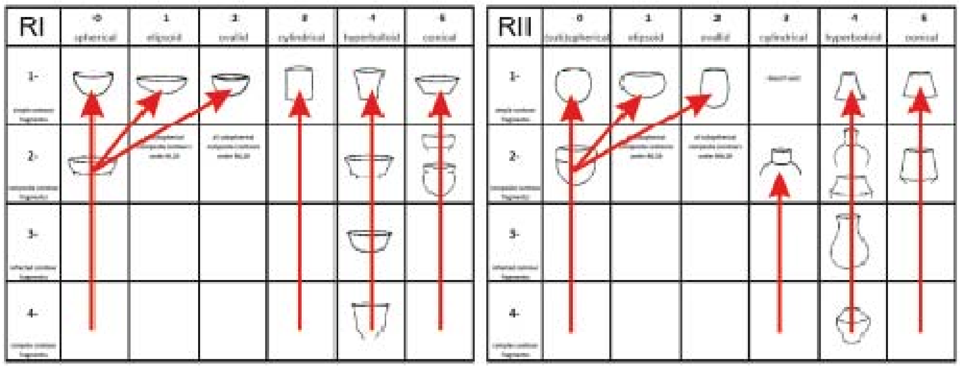


Fig. 5.5: Possible morphological implication within vertical typological groups.

Let us focus on a practical example of the implicative relation. We're searching for a parallel to an arbitrary vessel belonging morphologically to RII.44. As it is evident from the implicative relation RII.44→RII.34/24→RII.14 on fig. 5.5, there's an implicated potential for finding suitable (fragmentary) parallels among categories RII.34, RII.24 and RII.14.

Another implication - related to aforementioned fragmentariness - is the conditional relation RII→RI. Such a relation applies predominantly for necked vessels and was already partially described in chapter 5.1.1 on fig. 5.3. Let us return to the example of the previous paragraph. We've already seen the implied vertical relation between RII.44, RII.34, RII.24 and RII.14. However, as for necked vessels, it is advisable to check the respective simple-contoured group of the cluster RI, namely RI.14. Reversed implication RI→RII is impossible.

In the next chapters, the actual representatives of the Sherobod field survey assemblage will be presented in the context of contour-based typology.

[17] Illusive violation of the rule in implication RI.20→RI.11/RI.20→ RI.12 and RII.20→RII.11/RII.20→ RII.12 respectively is exclusively due to artificial simplification of the proposed table, where all sub-spherical (or spheroid, *i.e.* spherical, ellipsoid and ovoid shapes) contours are classified as 'spherical' within more complex vessels.

5.2 Cluster RI: Vessels with an Unrestricted Orifice

Following chapter provides a typology of the unrestricted vessels pertaining to the Sherobod field survey assemblage. Available unrestricted items were evaluated as described in chapter 5.1 and subsequently they fell into ten groups, as illustrated in table 5.1.

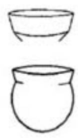
	-0 spherical	-1 elipsoid	-2 ovalid	-3 cylindrical	-4 hyperboloid	-5 conical
1- simple contour fragments						
2- composite contour fragments		all subspherical composite contours under **RI.20**	all subspherical composite contours under **RI.20**			
3- inflected contour fragments						
4- complex contour fragments						

Table 5.1: Table of shapes of the Cluster RI: Vessels with an unrestricted orifice

For both restricted and unrestricted vessels applies that – with the exception of simple-contoured vessels - all the sub-spherical or spheroid contours (*i.e.* spherical, ellipsoid and ovoid) are classified as 'spherical'. Vessels with simple convex contours do not in general conform perfectly to mathematical solids, so whenever they are part of a vessel of an intricate silhouette, they are best designated as sections of spheroids (SHEPARD 1985, 233).

The proposed 'types' denoted by minor letters, are not types in a common sense of the world. They are rather described as features of a non-linear morphological distance function, as illustrated on fig. 4.8. Alphabetical denotation thus do not involve any linear morphological sequence, it serves exclusively as a functional code.

Further details concerning the typological record will be given in footnotes of a respective article.

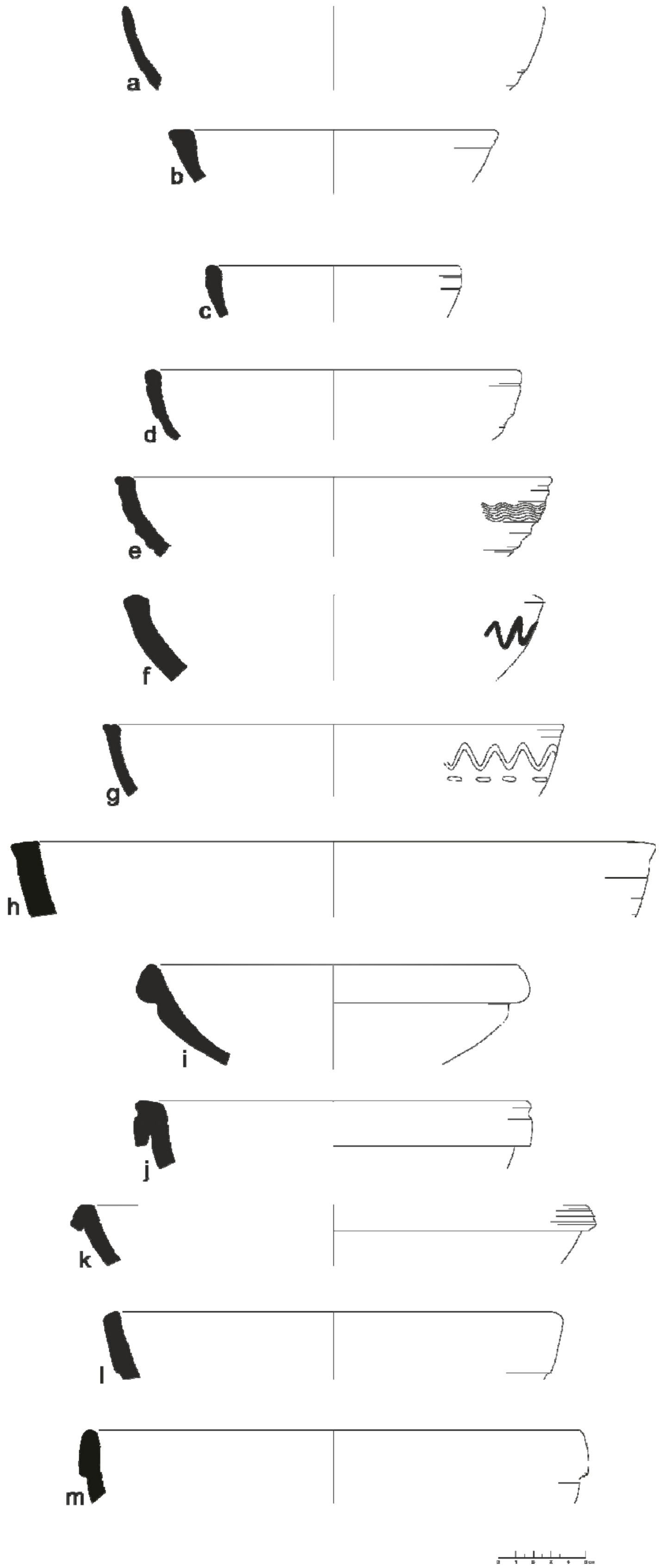


Fig. 5.6: Unrestricted simple spherical-contoured fragments RI.10

5.2.1 Groups RI.1: Unrestricted Simple-contoured fragments

5.2.1.1 Unrestricted simple spherical-contoured fragments RI.10 (fig. 5.6)

Total number of items in the group: 31

Number of recognized types: 13

Number of items of recognized types: 13

Frequency:[18] a single representative for every type

Typical items:[19] 109 (*c*), 139 (*i*), 175 (*k*), 176 (*j*), 194 (*b*), 401 (*a*), 411 (*l*), 447 (*g*), 507 (*f*), 732 (*e*), 913 (*d*), 955 (*m*), 956 (*h*)

Parallels:

a: Včelicová 2015, 34, fig. 9: Bowls gr. 9(1); Zavyalov 2008, 180: 93.4

b: Puschnigg 2006, R75; Zavyalov 2008, 166: 79.17

c: Zavyalov 2008, 166: 79.8

d: Zavyalov 2008, 169: 82.17(?)

f: Maxwell-Jones 2015, 198: 242 (R50)(?); Zavyalov 2008, 167: 80.13

g: Zavyalov 2008, 178: 91.16

i: Maxwell-Jones 2015, 199: 244 (R51); Zavyalov 2008, 164: 77.12

k: Maxwell-Jones 2015, 302: 375 (R129); Zavyalov 2008, 172: 85.10

l: Maxwell-Jones 2015, 173: 204 (R62)

m: Tušlová 2012, 134, tab. 14.1

[18] Defines possible repetitive occurrence of a given type, frequency is given in brackets

[19] A reference list containing catalogue numbers of items recognized as 'a type' (denotation in brackets) pertaining to a given contour-based group.

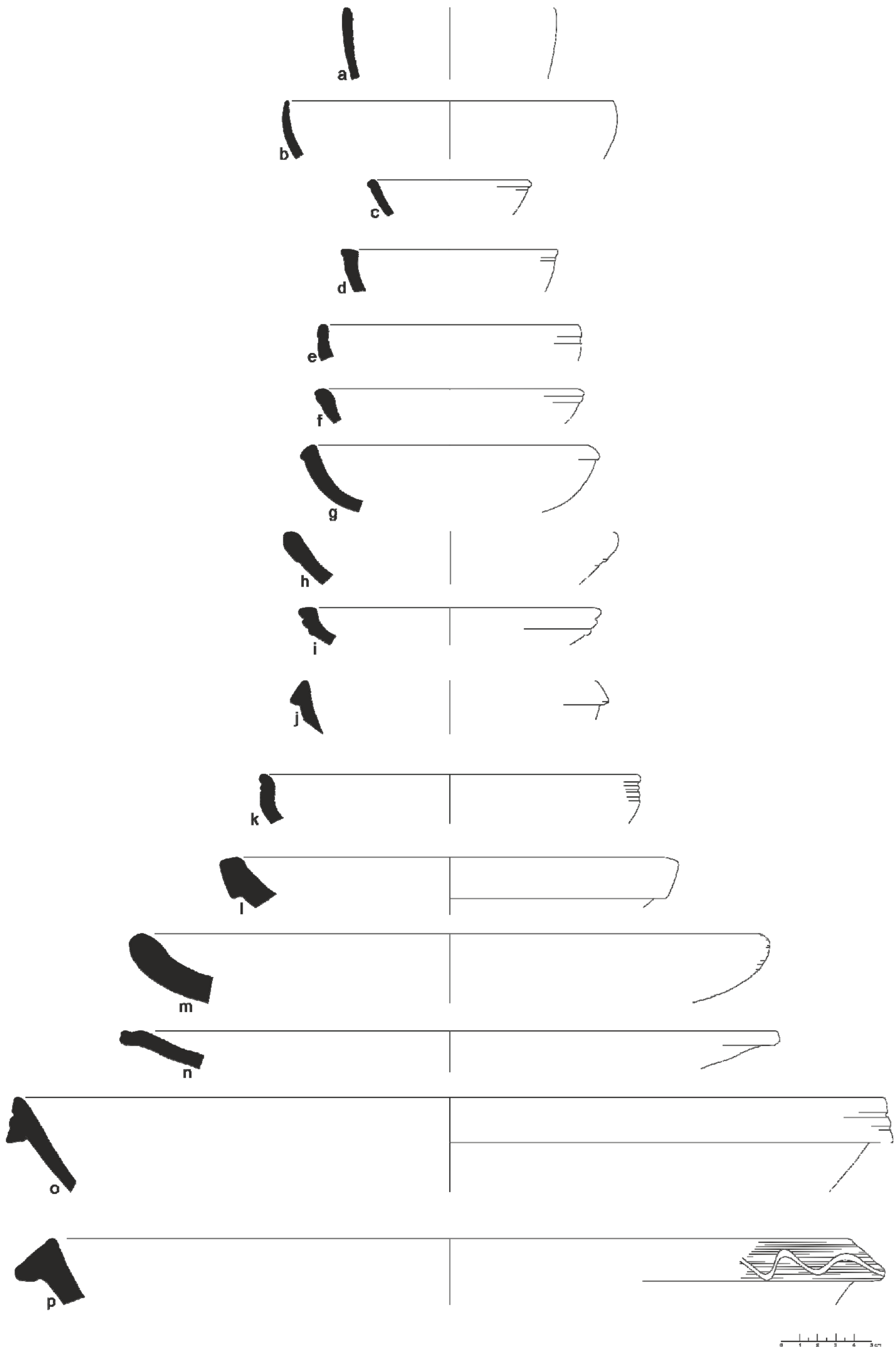


Fig. 5.7: Unrestricted simple ellipsoid-contoured fragments RI.11

5.2.1.2 <u>*Unrestricted simple ellipsoid-contoured fragments RI.11*</u> (fig. 5.7)

Total number of items in the group: 49

Number of recognized types: 16

Number of items of recognized types: 30

Frequency: multiple occurrences: *a* (2), *b* (3), *e* (4), *n* (3), *o* (7)

Typical items: 11, 62 (both *o*), 63 (*n*), 78, 138 (both *o*), 196 (*g*), 198 (*f*), 199 (*e*), 201 (*l*), 225 (*e*), 236 (*e*), 408 (*a*), 422 (*j*), 455 (*o*), 506 (*a*), 529 (*c*), 544 (*o*), 550 (*b*), 568 (*d*), 579 (*k*), 652 (*e*), 668, 684 (both *b*), 695 (*m*), 707, 708 (both *n*), 735 (*h*), 752 (*p*), 754 (*i*), 917 (*o*)

Possible filiations: [20]RI.11b≈RI.12b; RI.11d≈RI.12f ; RI.11p≈RI12l; RI.11o≈RI.15bb; RI.11c≈RI.15bl; RI.11b≈RII.11e; RI.11k≈RII.11h; RI.11l≈RI.34k; RI.11k≈RII.12p

Parallels:

a: MAXWELL-JONES 2015, 343: 440 (R166)(?); ZAVYALOV 2008, 174: 87.11(?)

b: MAXWELL-JONES 2015, 332: 421 (R152); PUSCHNIGG 2006, R94; ZAVYALOV 2008, 169: 82.11; ANNAEV 1988, tab. II.11; VČELICOVÁ 2015, 33, fig. 8: Bowls gr. 1A(3)

c: ZAVYALOV 2008, 164: 77.9

e: MAXWELL-JONES 2015, 344: 442 (R168); ZAVYALOV 2008, 188: 101.9

f: ZAVYALOV 2008, 185: 98.11

g: ZAVYALOV 2008, 164: 77.12

h: ZAVYALOV 2008, 174: 87.21

j: MAXWELL-JONES 2015, 305: 380 (R132); ZAVYALOV 2008, 165: 78.17

k: ZAVYALOV 2008, 167: 80.6

l: MAXWELL-JONES 2015, 298: 369 (R125); ZAVYALOV 2008, 164: 77.16(?); VČELICOVÁ 2015, 47, fig. 24: Fishplates (1)

m: MAXWELL-JONES 2015, 327: 411 (R141)(?)

n: ZAVYALOV 2008, 180: 93.21; VČELICOVÁ 2015, 48, fig. 25: Plates (5)

o: MAXWELL-JONES 2015, 302: 375 (R129); ZAVYALOV 2008, 167: 80.10, 187: 100.4; VCELICOVA 2015, 50, fig. 26: Tagora (17); GURT ESPARRAGUERA 2015, tab. 1 : 2.2.1

p: VČELICOVÁ 2015, 50, fig. 26: Tagora (16)

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[20] There are two types of affiliation symbols used: a) ≈ marks a type's possible affinity or similarity to another type; b) → marks implication, *i.e.* one type is a segment or a derivate of another one.

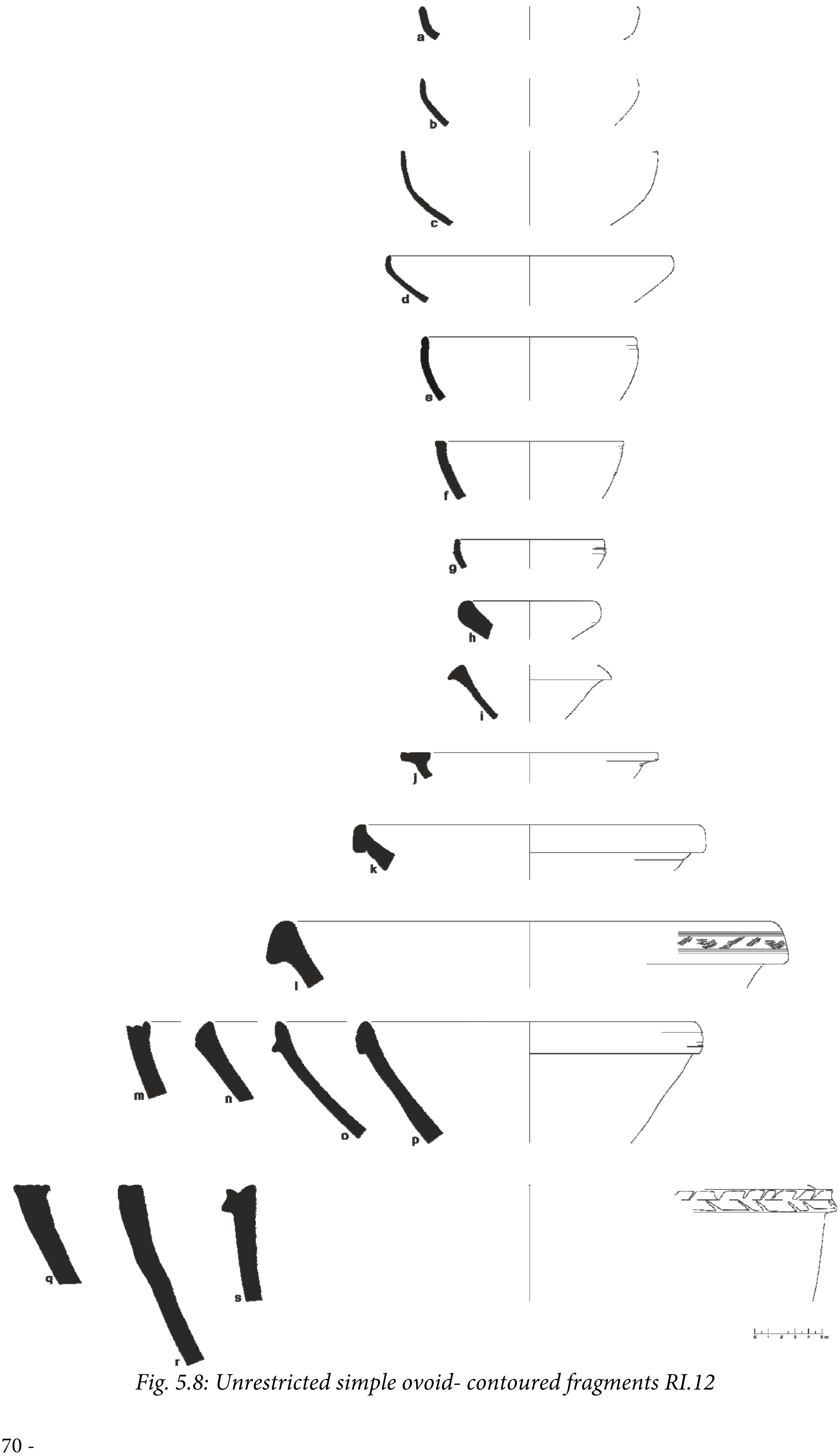


Fig. 5.8: Unrestricted simple ovoid- contoured fragments RI.12

5.2.1.3 Unrestricted simple ovoid- contoured fragments RI.12 (fig. 5.8)

Total number of items in the group: 45

Number of recognized types: 19

Number of items of recognized types: 34

Frequency: multiple occurrences: *a* (2), *b* (6), *c* (5), *d* (2), *e* (4), j (2), *p* (2)

Typical items: 6 (*b*), 76 (*i*), 134 (*r*), 171 (*p*), 172 (*o*), 192 (*d*), 202 (*k*), 227, 271 (both *e*), 275 (*b*), 281 (*e*), 335 (*p*), 388 (*a*), 395 (*g*), 402 (*c*), 403 (*j*), 445 (*b*), 446 (*d*), 481 (*c*), 488 (*n*), 531 (*e*), 533, 548 (both *b*), 562 (*h*), 606 (*q*), 624, 645 (both *c*), 653 (*f*), 711 (*j*), 740 (*b*), 767 (*a*), 783 (*l*), 810 (*s*), 845 (*m*), 862 (*c*)

Possible filiations: RI.11b≈RI.12b; RI.11d≈RI.12f ; RI.11p≈RI12l; RI.12l≈RI.15bf

Parallels:

a: MAXWELL-JONES 2015, 329: 416 (R148); ZAVYALOV 2008, 163: 76.2; PUSCHNIGG 2006, R102

b: MAXWELL-JONES 2015, 328: 414 (R142); ZAVYALOV 2008, 169: 82.11; PUSCHNIGG 2006, R1

c: MAXWELL-JONES 2015, 351: 454 (R149)(?); VČELICOVÁ 2015, 34, fig. 9: Bowls gr. 2(1)

d: MAXWELL-JONES 2015, 328: 414 (R142); ZAVYALOV 2008, 169: 82.11; PUSCHNIGG 2006, R3; ANNAEV 1988, tab. VII.6

e: MAXWELL-JONES 2015, 333: 422 (R167); ZAVYALOV 2008, 165: 78.8

f: ZAVYALOV 2008, 160: 71.6a

g: ZAVYALOV 2008, 164: 72.17

h: ZAVYALOV 2008, 182: 95.9(?)

i: MAXWELL-JONES 2015, 335: 426 (R160); GURT ESPARRAGUERA 2015, tab. 1 : 2.3.2(?) ; ZAVYALOV 2008, 160: 71.8

j: ZAVYALOV 2008, 188: 101.21; PUSCHNIGG 2006, R100

k: ZAVYALOV 2008, 169: 82.41(?)

n: ZAVYALOV 2008, 165: 78.19

p: MAXWELL-JONES 2015, 302: 375 (R129); ZAVYALOV 2008, 165: 78.16

q: ZAVYALOV 2008, 172: 85.15

r: ZAVYALOV 2008, 172: 85.15; PUSCHNIGG 2006, R81

Fig. 5.9: *Unrestricted simple cylindrical-contoured fragments RI.13*

5.2.1.4 *Unrestricted simple cylindrical- contoured fragments RI.13* (fig. 5.9)

Total number of items in the group: 23

Number of recognized types: 16

Number of items of recognized types: 19

Frequency: multiple occurrences: *c* (2), *e* (2), *p* (2)

Typical items: 5 (*c*), 90 (*n*), 105 (*e*), 107 (*j*), 212 (*g*), 224 (*i*), 261 (*d*), 307 (*l*), 359 (*e*), 526 (*f*), 539 (*h*), 745 (*b*), 808, 809 (both *p*), 811 (*o*), 831 (*a*), 871 (*c*), 875 (*k*), 938 (*m*)

Possible filiations: RII.23a→RI.13j

Parallels:

c: ZAVYALOV 2008, 166: 79.38

e: ZAVYALOV 2008, 181: 94.14(b)

f: PUSCHNIGG 2006, R19(?)

g: ZAVYALOV 2008, 189: 102.12(?)

j: MAXWELL-JONES 2015, 351: 454 (R149) (?); ZAVYALOV 2008, 166: 79.3(?)

l: ZAVYALOV 2008, 163: 76.33

m: PUSCHNIGG 2006, R136(?)

n: MAXWELL-JONES 2015, 167: 191 (R58); ZAVYALOV 2008, 168: 81.17(?)

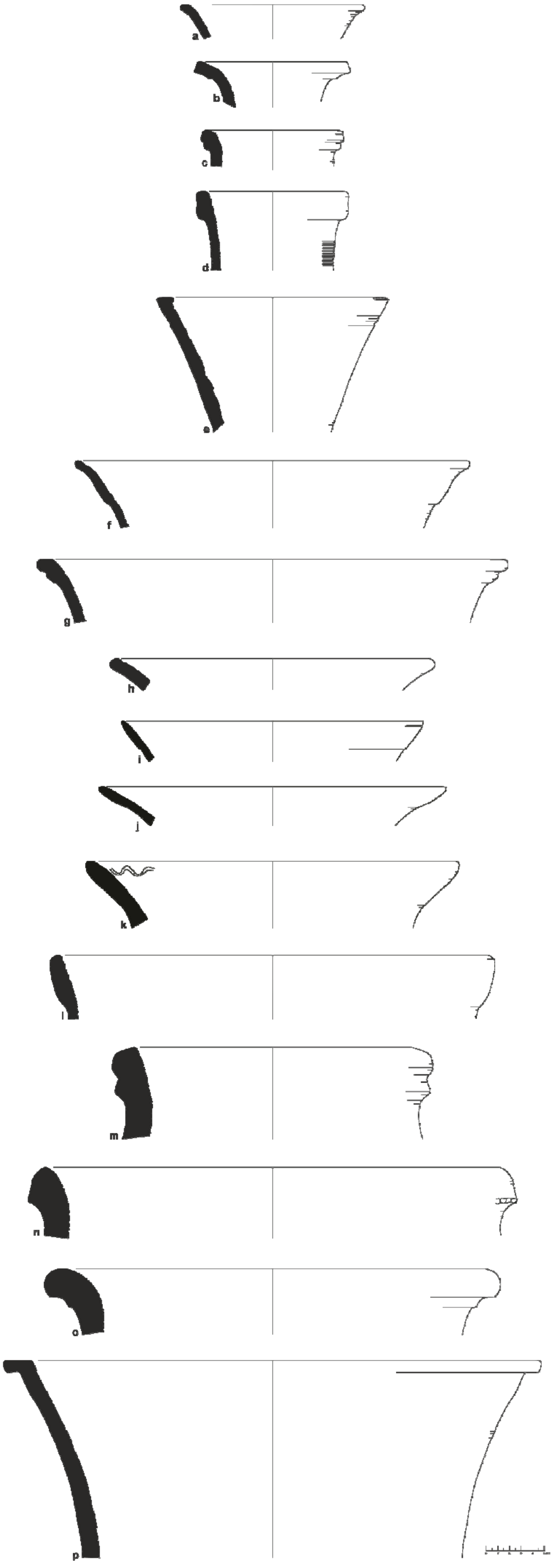


Fig. 5.10: Unrestricted simple hyperboloid-contoured fragments RI.14

5.2.1.5 Unrestricted simple hyperboloid- contoured fragments RI.14 (fig. 5.10)

Total number of items in the group: 41

Number of recognized types: 16

Number of items of recognized types: 21

Frequency: multiple occurrences: *b* (2), *d* (2), *j* (4)

Typical items: 47, 48 (both *j*), 317 (*e*), 369 (*a*), 375 (*c*), 482, 483 (both *b*), 490 (*n*), 559 (*f*), 658 (*m*), 674 (*l*), 701 (*d*), 749 (*o*), 792 (*p*), 796 (*h*), 828 (*g*), 937 (*i*), 939 (*k*), 940 (*d*), 966, 967 (both *j*)

Possible filiations: RI.14a≈RI.15ac ; RI.14f≈RI.15ai; RI.14d≈RII.14aa; RI.14d≈RII.14aa

Parallels:

a: ZAVYALOV 2008, 169: 82.26

c: MAXWELL-JONES 2015, 223: 268 (R96); ZAVYALOV 2008, 163: 76.25

e: MAXWELL-JONES 2015, 210: 254 (R86)

f: MAXWELL-JONES 2015, 129: 133 (R5); ZAVYALOV 2008, 185: 98.13

h: ZAVYALOV 2008, 163: 76.7(?)

j: ZAVYALOV 2008, 163: 76.7

k: PUSCHNIGG 2006, R251

l: MAXWELL-JONES 2015, 177: 213 (R65)

m: MAXWELL-JONES 2015, 144: 155 (R15)(?); ZAVYALOV 2008, 168: 81.8(?)

n: MAXWELL-JONES 2015, 190: 233 (R78)

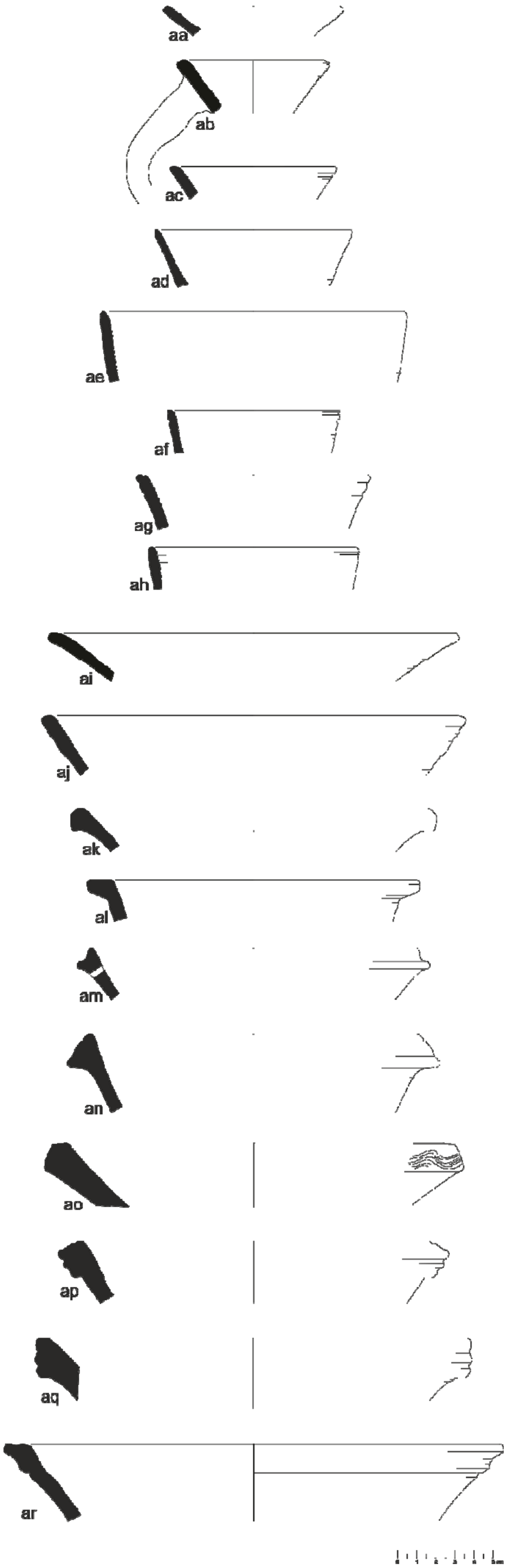


Fig. 5.11: Unrestricted simple conical-contoured fragments RI.15, part one

5.2.1.6 Unrestricted simple conical-contoured fragments RI.15 (fig. 5.11 and 5.12)

Total number of items in the group: 69

Number of recognized types: 33

Number of items of recognized types: 38

Frequency: multiple occurrences: *ad* (2), *ae* (3), *ai* (2), *bl* (2)

Typical items: 7 (*ae*), 58 (*aq*), 96 (*al*), 97 (*am*), 102 (*ak*), 135 (*ag*), 189 (*aa*), 231 (*bd*), 260 (*bc*), 311 (*ar*), 314 (*af*), 343 (*ae*), 344 (*bm*), 389, 390 (both *ad*), 421 (*an*), 439 (*bo*), 450 (*ba*), 451 (*bb*), 489 (*bh*), 522 (*ah*), 573 (*ae*), 622 (*bi*), 729 (*bg*), 739 (*ab*), 766 , 778 (both *bl*), 780 (*bj*), 781 (*be*), 782 (*bf*), 784 (*bk*), 827 (*bn*), 876 (*ap*), 887 (*ac*), 898 (*aj*), 899 (*ao*), 957, 965 (both *ai*)

Possible filiations: RI.14a≈RI15ac; RI.14f≈RI.15ai; RI.12l≈RI.15bf; RI.11o≈RI.15bb; RI.11c≈RI.15bl

Parallels:

aa: ZAVYALOV 2008, 160: 72.3

ad: PUSCHNIGG 2006, R89; ZAVYALOV 2008, 164: 77.17

ae: MAXWELL-JONES 2015, 352: 455 (R157); PUSCHNIGG 2006, R17

ah: ZAVYALOV 2008, 180: 93.1(?)

ai: ZAVYALOV 2008, 163: 76.7

aj: ZAVYALOV 2008, 163: 76.7

ak: ZAVYALOV 2008, 169: 82.20; ANNAEV 1988, tab. II.26; PUSCHNIGG 2006, R214

al: ZAVYALOV 2008, 188: 102.20

am: ZAVYALOV 2008, 167: 80.12(?); perforation: PUSCHNIGG 2006, R42

an: MAXWELL-JONES 2015, 219: 264 (R92)(?); ZAVYALOV 2008, 163: 76.29(?)

ao: ZAVYALOV 2008, 187: 100.6

aq: ZAVYALOV 2008, 163: 76.29

ar: MASSON 1976, 34, fig. 3: 23

ba: ZAVYALOV 2008, 167: 80.12(?)

bb: MAXWELL-JONES 2015, 302: 375 (R129); ZAVYALOV 2008, 167: 80.10

bc: ZAVYALOV 2008, 165: 78.14(?)

be: ZAVYALOV 2008, 165: 78.16

bh: ZAVYALOV 2008, 172: 85.15

bm: MAXWELL-JONES 2015, 301: 374 (R128)

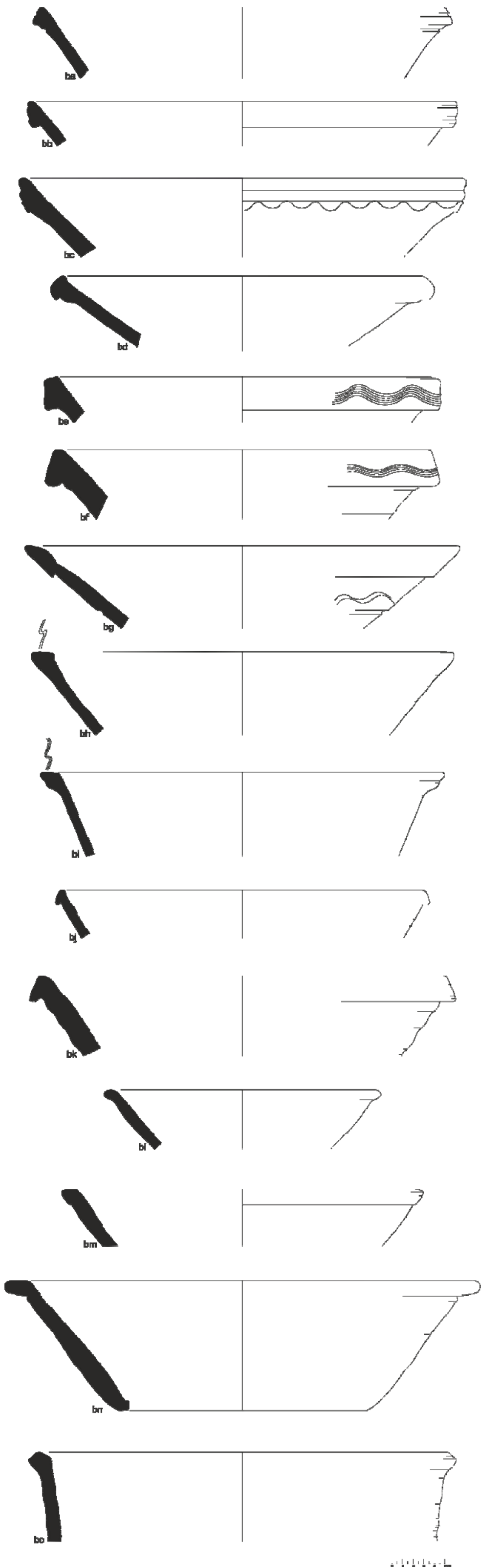


Fig. 5.12: Unrestricted simple conical-contoured fragments RI.15, part two

5.2.2 Groups RI.2: Unrestricted composite-contoured fragments

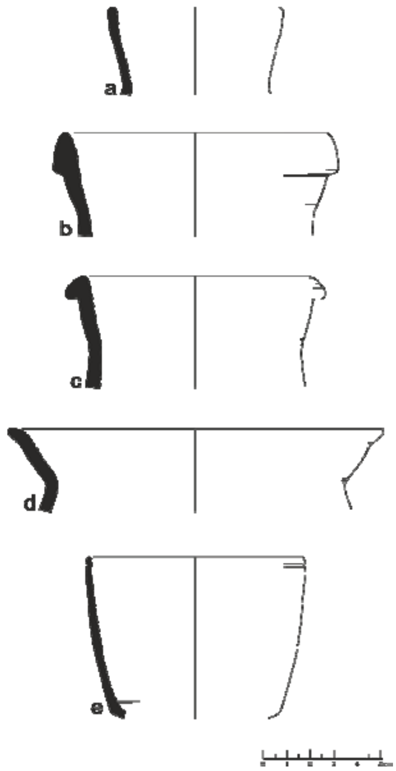


Fig 5.13: Unrestricted composite spherical-contoured fragments RI.20

5.2.2.1 *Unrestricted composite spheroid-contoured fragments RI.20* (fig. 5.13)

Total number of items in the group: 9

Number of recognized types: 5

Number of items of recognized types: 5

Frequency: a single representative for every type

Typical items: 40 (*a*), 417 (*b*), 400 (*e*), 590 (*c*), 676 (*d*)

Possible filiations: RI.20d≈RII.25e

Parallels: *a*: Maxwell-Jones 2015, 355: 459 (R169) (?)

b: Maxwell-Jones 2015, 361: 470 (R173); Zavyalov 2008, 164: 77.32

c: Zavyalov 2008, 164: 77.32

d: Zavyalov 2008, 181: 94.3(?)

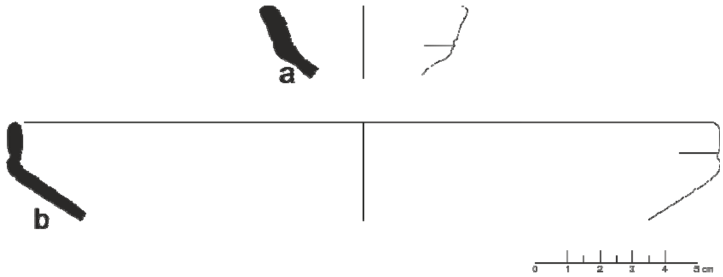


Fig 5.14: Unrestricted composite hyperboloid-contoured fragments RI.24

5.2.2.2 Unrestricted composite hyperboloid-contoured fragments RI.24 (fig. 5.14)

Total number of items in the group: 11

Number of recognized types: 2

Number of items of recognized types: 11

Frequency: multiple occurrences: *b* (10)

Typical items: 45, 60, 67, 68 (all *b*), 70 (*a*), 340, 362, 366, 614, 685, 686 (all *b*)

Parallels: *b*: MAXWELL-JONES 2015, 313: 392 (R144); STANČO 2013, FWI-A; VČELICOVÁ 2015, 35, fig. 10: Bowls gr. 3A(5); ZAVYALOV 2008, 169: 82.2; PUSCHNIGG 2006, R132

Chronological notes: overview of type RI.24*b* is provided in STANČO 2013, 136, table 1: AD 230-350; for a profound study see STANČO 2013

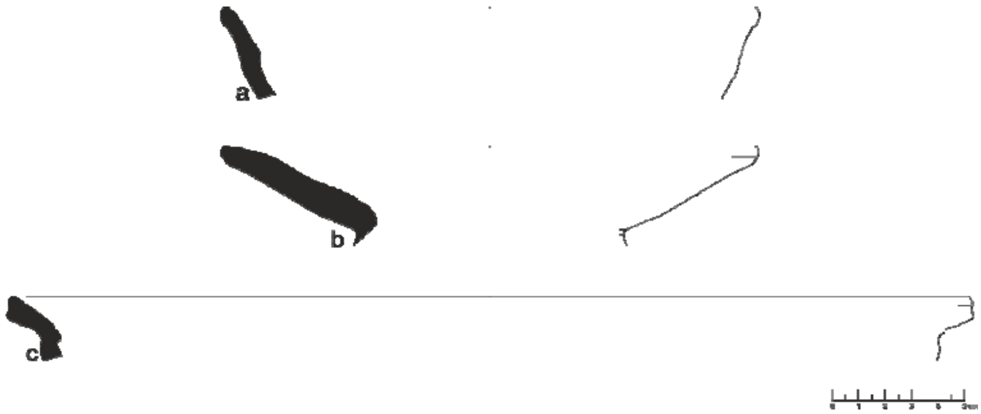


Fig 5.15: Unrestricted composite conical-contoured fragments RI.25

5.2.2.3 Unrestricted composite conical-contoured fragments RI.25 (fig. 5.15)

Total number of items in the group: 3

Number of recognized types: 3

Number of items of recognized types: 3

Frequency: a single representative for every type

Typical items: 65 (*b*), 232 (*c*), 753 (*a*)

Parallels: *b*: PUSCHNIGG 2006, R92(?)

c: MAXWELL-JONES 2015, 293: 358 (R122); ZAVYALOV 2008, 174: 87.43(?)

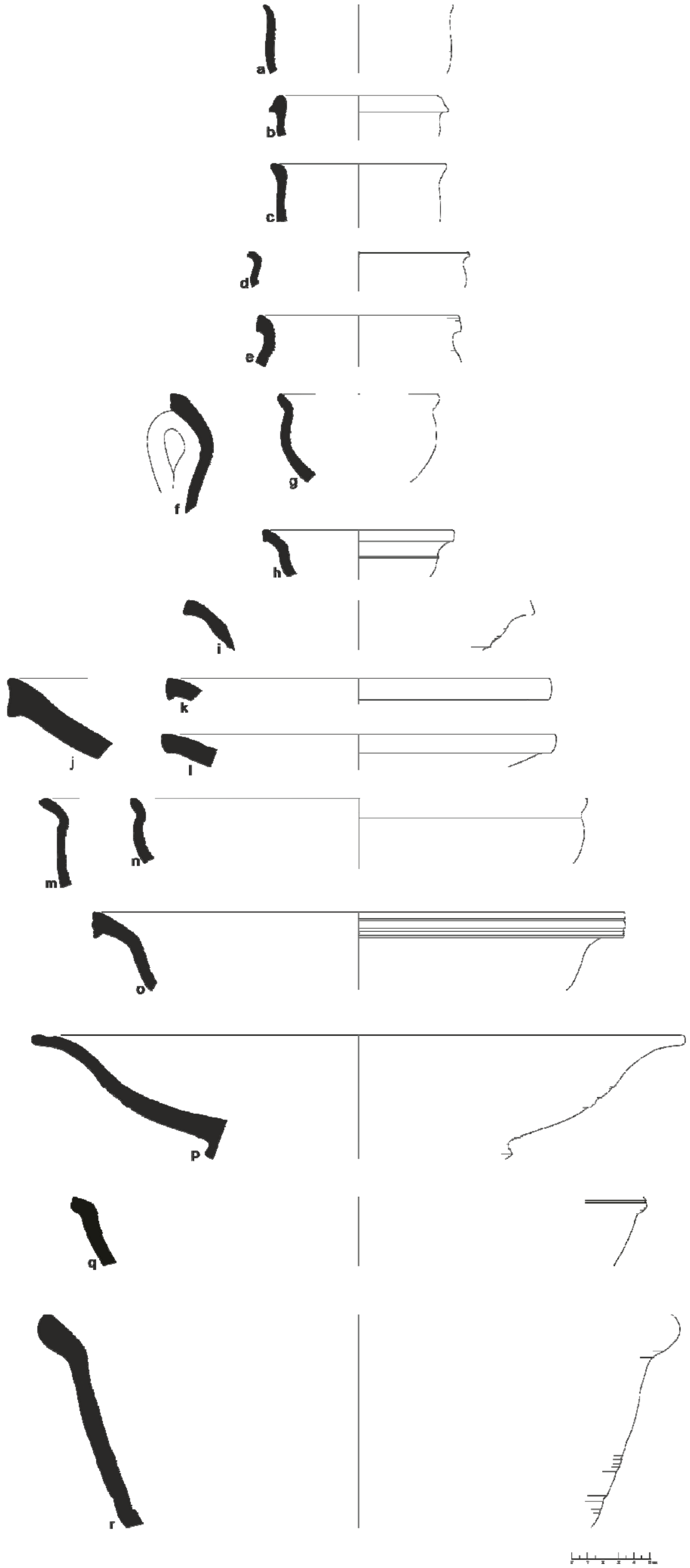


Fig 5.16: Unrestricted inflected hyperboloid-contoured fragments RI.34

5.2.3 Groups RI.3: Unrestricted inflected-contoured fragments

5.2.3.1 Unrestricted inflected hyperboloid-contoured fragments RI.34 (fig. 5.16)

Total number of items in the group: 3

Number of recognized types: 17

Number of items of recognized types: 19

Frequency: multiple occurrences: *a* (2), *j* (2)

Typical items: 148 (*n*), 161 (*g*), 200 (*l*), 203 (*o*), 217 (*h*), 219 (*d*), 223 (*c*), 229 (*k*), 230 (*b*), 269 (*a*), 347 (*m*), 464 (*i*), 471 (*a*), 484 (*e*), 593, 660(both *j*), 700 (*p*), 817 (*f*), 929 (*r*), 1004 (*q*)

Possible filiations: RI.11l≈RI.34k

Parallels:

a: Maxwell-Jones 2015, 321: 404 (R139); Zavyalov 2008, 163: 76.6; Puschnigg 2006, R10

g: Maxwell-Jones 2015, 207: 252 (R3); Zavyalov 2008, 168: 81.20

h: Zavyalov 2008, 171: 84.2

i: Maxwell-Jones 2015, 293: 359 (R122); Zavyalov 2008, 1860: 71.7b

j: Maxwell-Jones 2015, 300: 373 (R127); Zavyalov 2008, 165: 78.15

k: Zavyalov 2008, 169: 82.39(?)

l: Maxwell-Jones 2015, 335: 426 (R160); Zavyalov 2008, 164: 77.16(?)

m: Maxwell-Jones 2015, 292: 357 (R122)(?); Zavyalov 2008, 168: 81.20

n: Zavyalov 2008, 163: 76.6

o: Zavyalov 2008, 163: 76.14; Puschnigg 2006, R12(?)

5.2.4 GROUP RI.4: UNRESTRICTED COMPLEX-CONTOURED FRAGMENTS

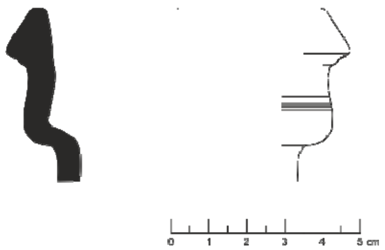


Fig. 5.17: Unrestricted complex hyperboloid-contoured fragment RI.44

5.2.4.1 <u>Unrestricted complex hyperboloid-contoured fragments RI.44</u> (fig. 5.17)

Total number of items in the group: 1

Number of recognized types: 1

Number of items of recognized types: 1

Frequency: a single representative available

Typical item: 678

Parallels: TUŠLOVÁ 2012, 124: ShFS02.1

5.3 Cluster RII: Vessels with a Restricted Orifice

Following chapter provides, similarly to chapter 5.2, a list of identified types of restricted profiles. As evident from definition given in 5.1.1, simple restricted vessels of cylindrical contour do not exist (see fig. 5.2), so the group RII.13 is by definition absent as well.

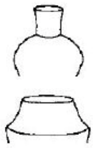
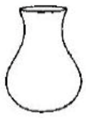
	-0 (sub)spherical	**-1** elipsoid	**-2** ovalid	**-3** cylindrical	**-4** hyperboloid	**-5** conical
1- simple contour fragments				doesn't exist		
2- composite contour fragments		all subspherical composite contours under RII.20	all subspherical composite contours under RII.20			
3- inflected contour fragments						
4- complex contour fragments						

Table 5.2: Table of shapes of the Cluster RII: Vessels with a restricted orifice

5.3.1 GROUPS RII.1: RESTRICTED SIMPLE- CONTOURED FRAGMENTS

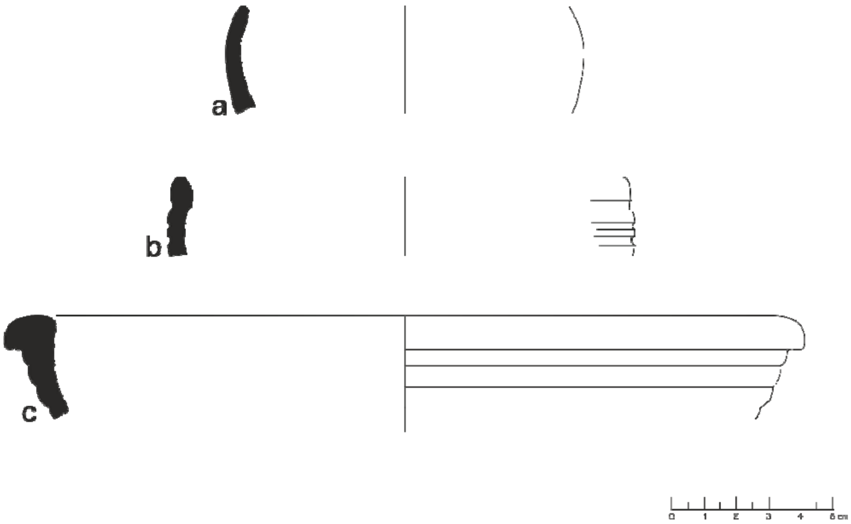


Fig. 5.18: Restricted simple spherical-contoured fragments RII.10

5.3.1.1 <u>Restricted simple spherical-contoured fragments RII.10</u> (fig. 5.18)

Total number of items in the group: 6

Number of recognized types: 3

Number of items of recognized types: 3

Frequency: a single representative for every type

Typical items: 59 (*c*), 394 (*a*), 694 (*b*)

Parallels: *a*: MAXWELL-JONES 2015, 328: 413 (R142); ZAVYALOV 2008, 163: 76.1; VČELICOVÁ 2015, 32, fig. 7: Bowls 1B(1)

c: ZAVYALOV 2008, 165: 78.12(?)

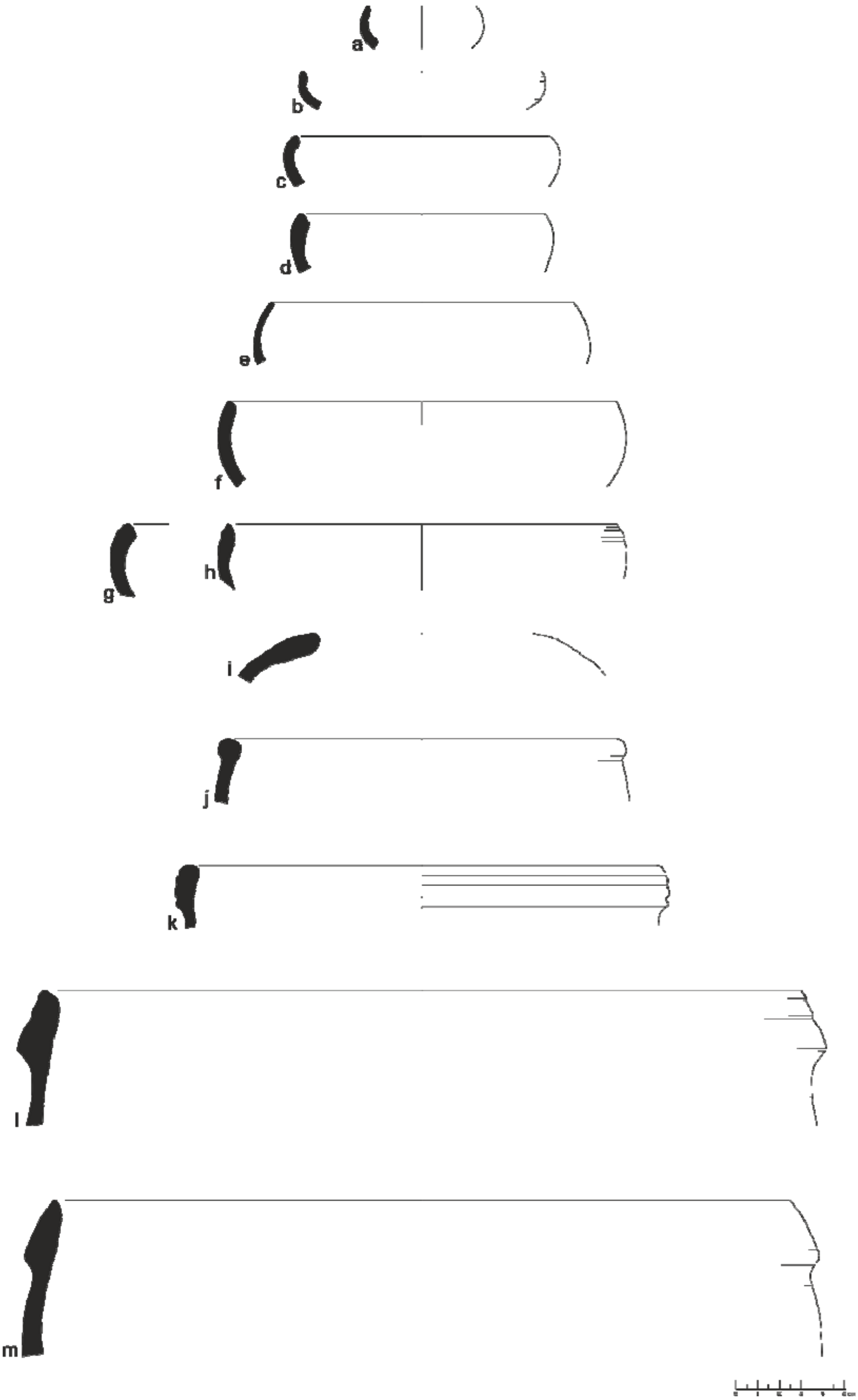


Fig. 5.19: Restricted simple ellipsoid-contoured fragments RII.11

5.3.1.2 Restricted simple ellipsoid-contoured fragments RII.11 (fig. 5.19)

Total number of items in the group: 15

Number of recognized types: 13

Number of items of recognized types: 13

Frequency: a single representative for every type

Typical items: 72 (*k*), 94 (*i*), 147 (*d*), 209 (*j*), 386 (*m*), 387 (*l*), 396 (*b*), 406 (*c*), 465 (*f*), 514 (*g*), 543 (*a*), 589 (*e*), 690 (*h*)

Possible filiations: RI.11b≈RII.11e; RI.11k≈RII.11h; RI.11b≈RII.12f

Parallels:

a: MAXWELL-JONES 2015, 351: 454 (R149); ZAVYALOV 2008, 169: 82.30(?)

b: MAXWELL-JONES 2015, 330: 417 (R148); VČELICOVÁ 2015, 39, fig. 14: Bowls gr. 4C-I(9); ZAVYALOV 2008, 163: 76.2

c: MAXWELL-JONES 2015, 329: 415 (R148); ZAVYALOV 2008, 164: 77.4

d: ZAVYALOV 2008, 163: 76.2

e: ZAVYALOV 2008, 163: 76.1; VČELICOVÁ 2015, 39, fig.14: Bowls gr. 4C-I(2)(?)

f: MAXWELL-JONES 2015, 329: 416 (R148); ZAVYALOV 2008, 163: 76.1

g: MAXWELL-JONES 2015, 344: 443 (R168)(?)

h: MAXWELL-JONES 2015, 333: 424 (R167); ZAVYALOV 2008, 163: 76.9

i: ZAVYALOV 2008, 168: 81.6

j: MAXWELL-JONES 2015, 260: 310 (R32); ZAVYALOV 2008, 165: 78.8

k: MAXWELL-JONES 2015, 244: 293 (R111); ZAVYALOV 2008, 172: 85.12

l: MAXWELL-JONES 2015, 173: 204 (R62); ZAVYALOV 2008, 183: 96.4(?)

m: MAXWELL-JONES 2015, 167: 191 (R58); ZAVYALOV 2008, 172: 85.4

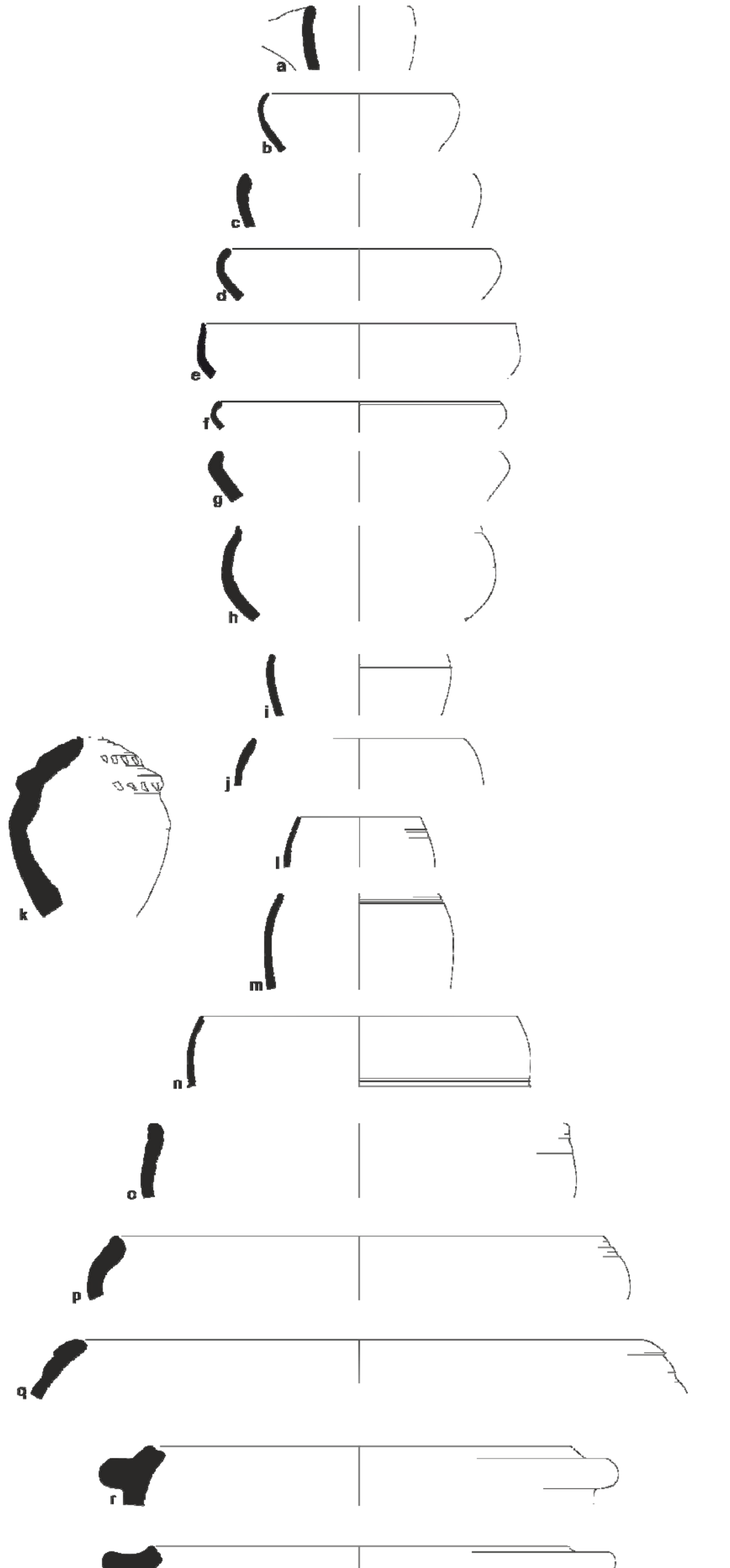


Fig. 5.20: Restricted simple ovoid-contoured fragments RII.12

5.3.1.3 Restricted simple ovoid-contoured fragments RII.12 (fig. 5.20)

Total number of items in the group: 35

Number of recognized types: 19

Number of items of recognized types: 22

Frequency: multiple occurrences: *b* (2), *d* (2), *s* (2)

Typical items: 93 (*f*), 137 (*i*), 160 (*m*), 180 (*n*), 193 (*j*), 220 (*b*), 274 (*e*), 297 (*b*), 331 (*l*), 397 (*d*), 418 (*g*), 419 (*d*), 435 (*h*), 460 (*s*), 569 (*c*), 580 (*o*), 581 (*p*), 582 (*s*), 733 (*k*), 795 (*r*), 846 (*a*), 861 (*q*)

Possible filiations: RI.11b≈RII.12f; RI.11k≈RII.12p

Parallels:

b: MAXWELL-JONES 2015, 317: 399 (R147); ZAVYALOV 2008, 169: 82.11; PUGACHENKOVA – RTVELADZE 1978, 26, riz. 11g(1).

c: MAXWELL-JONES 2015, 329: 416 (R148); ZAVYALOV 2008, 169: 82.9

d: MAXWELL-JONES 2015, 330: 417 (R148); PUSCHNIGG 2006, R103; ZAVYALOV 2008, 169: 82.10

e: MAXWELL-JONES 2015, 328: 414 (R142); ZAVYALOV 2008, 169: 82.11

f: ZAVYALOV 2008, 174: 87.20(?)

g: MAXWELL-JONES 2015, 326: 410 (R155); ZAVYALOV 2008, 164: 77.4

h: MAXWELL-JONES 2015, 205: 250 (R1); ZAVYALOV 2008, 180: 93.5(?)

i: MAXWELL-JONES 2015, 344: 443 (R168); ZAVYALOV 2008, 180: 93.15

j: ZAVYALOV 2008, 163: 76.1(?);PUSCHNIGG 2006, R183(?)

k: GALIEVA 2014, 77: 13

m: ZAVYALOV 2008, 166: 79.1

n: ZAVYALOV 2008, 174: 87.1

o: ZAVYALOV 2008, 169: 82.12

p: MAXWELL-JONES 2015, 333: 422 (R167); ZAVYALOV 2008, 165: 78.6

r: ZAVYALOV 2008, 184: 97.11; VČELICOVÁ 2015, 71, fig. 51: storage jar gr.4C(9)

s: MAXWELL-JONES 2015, 155: 171 (R84); VČELICOVÁ 2015, 7, fig. 50: Storage jar gr. 4B(4); ZAVYALOV 2008, 179: 92.18

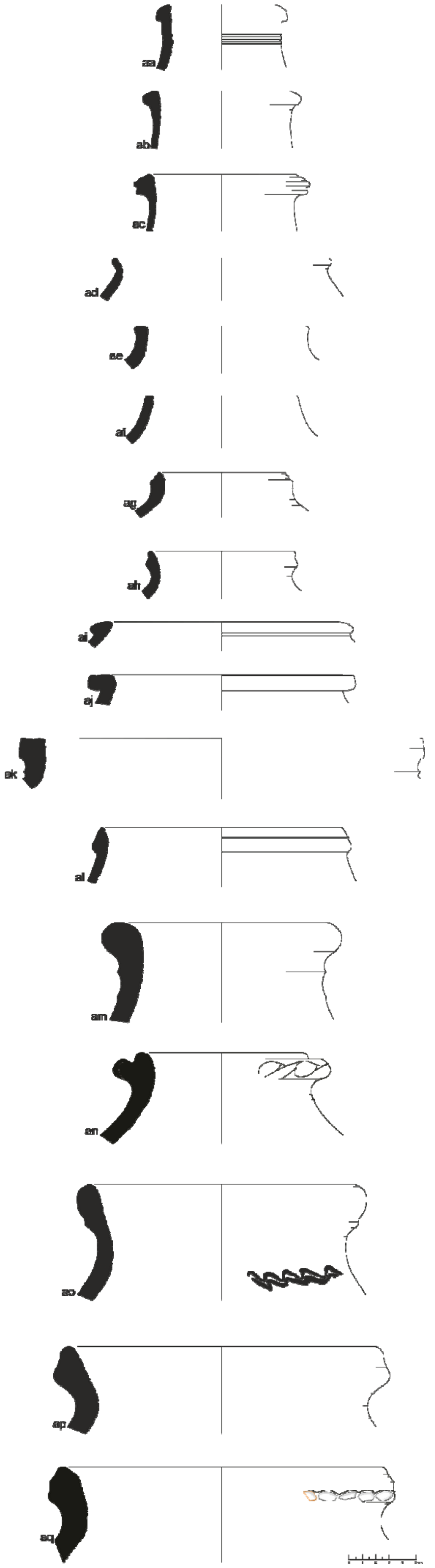


Fig. 5.21: Restricted simple hyperboloid-contoured fragments RII.14, part one

5.3.1.4 *Restricted simple hyperboloid-contoured fragments RII.14* (fig. 5.21 and 5.22)

Total number of items in the group: 52

Number of recognized types: 29

Number of items of recognized types: 32

Frequency: multiple occurrences: *ae* (3), *bk* (2)

Typical items: 14 (*bg*), 54 (*ai*), 88 (*ae*), 89 (*af*), 91 (*bf*), 101 (*aj*), 106 (*ae*), 136 (*aa*), 140 (*ak*), 141 (*bc*), 174 (*bi*), 191 (*al*), 259 (*bk*), 277 (*ag*), 282 (*be*), 303 (*ba*), 329 (*bl*), 330 (*bh*), 371 (*bj*), 374 (*ah*), 405 (*ad*), 453 (*ac*), 454 (*ab*), 468 (*bk*), 470 (*ao*), 558 (*bd*), 741 (*ae*), 750 (*ap*), 842 (*am*), 933 (*bb*), 935 (*an*), 989 (*aq*)

Possible filiations: RI.14d≈RII.14aa; RI.14d≈RII.14aa; RII.14bb≈RII.15e

Parallels:

aa: MAXWELL-JONES 2015, 217: 261 (R91); ZAVYALOV 2008, 181: 94.18(?)

ab: Maxwell-Jones 2015, 142: 152 (R14)(?); ZAVYALOV 2008, 181: 94.14(?)

ac: MAXWELL-JONES 2015, 214: 258 (R89)(?); ZAVYALOV 2008, 163: 76.23(?)

ad: MAXWELL-JONES 2015, 127: 131 (R4)

ae: MAXWELL-JONES 2015, 144: 154 (R15); ZAVYALOV 2008, 184: 97.19

af: MAXWELL-JONES 2015, 132: 135 (R6)

ag: MAXWELL-JONES 2015, 136: 141 (R10); ZAVYALOV 2008, 166: 79.29(?)

ah: MAXWELL-JONES 2015, 128: 132 (R5)

ai: MAXWELL-JONES 2015, 199: 245 (R51), 346: 445 (R156); ZAVYALOV 2008, 175: 88.33

aj: ZAVYALOV 2008, 186: 99.6(?); VČELICOVÁ 2015, 41, fig. 16: Bowls gr. 5A(3)(?)

ak: MAXWELL-JONES 2015, 152: 166 (R21)(?)

ao: MAXWELL-JONES 2015, 144: 155 (R15); ZAVYALOV 2008, 173: 86.21

ba: MAXWELL-JONES 2015, 155: 171 (R84); VČELICOVÁ 2015, 70, fig. 49: storage jar gr.4A(6); ZAVYALOV 2008, 187: 100.15

bb: VČELICOVÁ 2015, 70, fig. 49: storage jar gr.4A(5)

bc: MAXWELL-JONES 2015, 138: 144 (R11); ZAVYALOV 2008, 171: 84.22

be: ZAVYALOV 2008, 169: 97.3; PUSCHNIGG 2006, R128

bf: MAXWELL-JONES 2015, 162: 182 (R59); ZAVYALOV 2008, 181: 94.12

bg: ZAVYALOV 2008, 184: 97.8; PUGACHENKOVA - RTVELADZE 1978, 16.

bh: MAXWELL-JONES 2015, 256: 305 (R29); ZAVYALOV 2008, 184: 97.7

bi: ZAVYALOV 2008, 168: 81.11

bj: ZAVYALOV 2008, 173: 86.21

bk: MAXWELL-JONES 2015, 191: 234 (R79); ZAVYALOV 2008, 168: 81.11/184: 97.14; VČELICOVÁ 2015, 68, fig. 47: storage jar gr.2(5)

bl: ZAVYALOV 2008, 184: 97.6

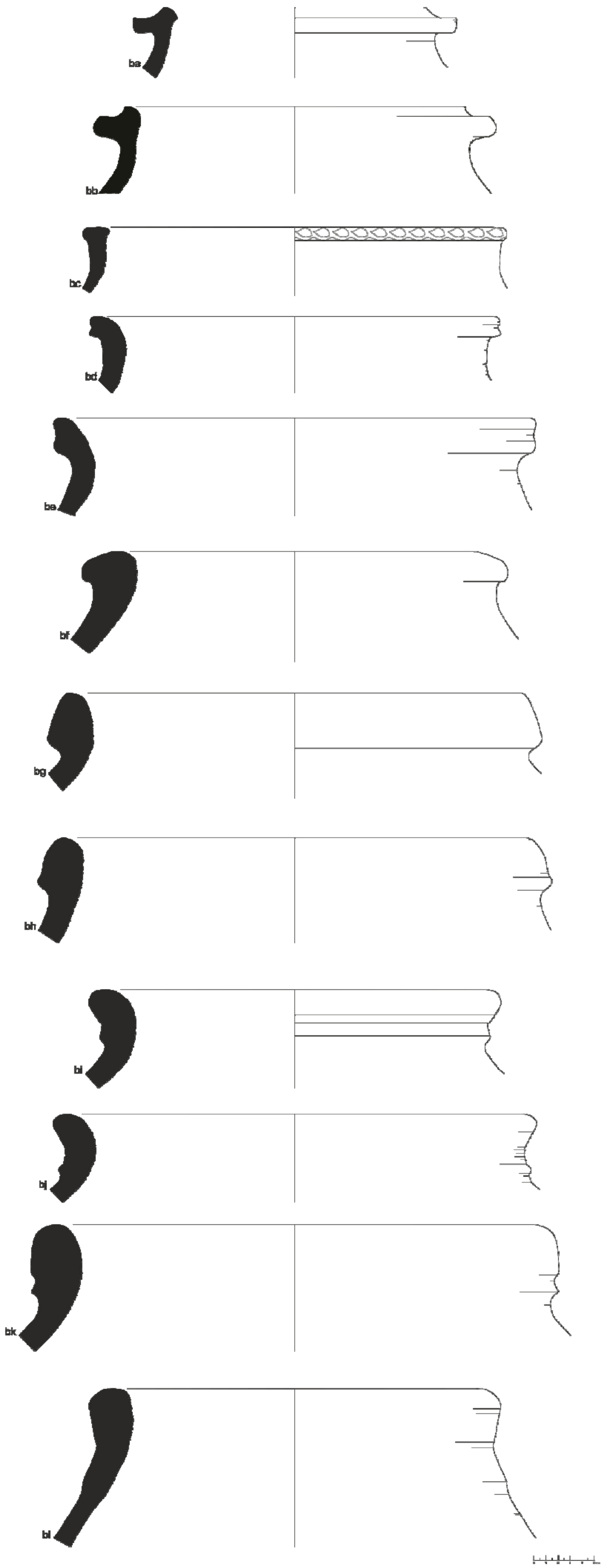


Fig. 5.22: Restricted simple hyperboloid-contoured fragments RII.14, part two

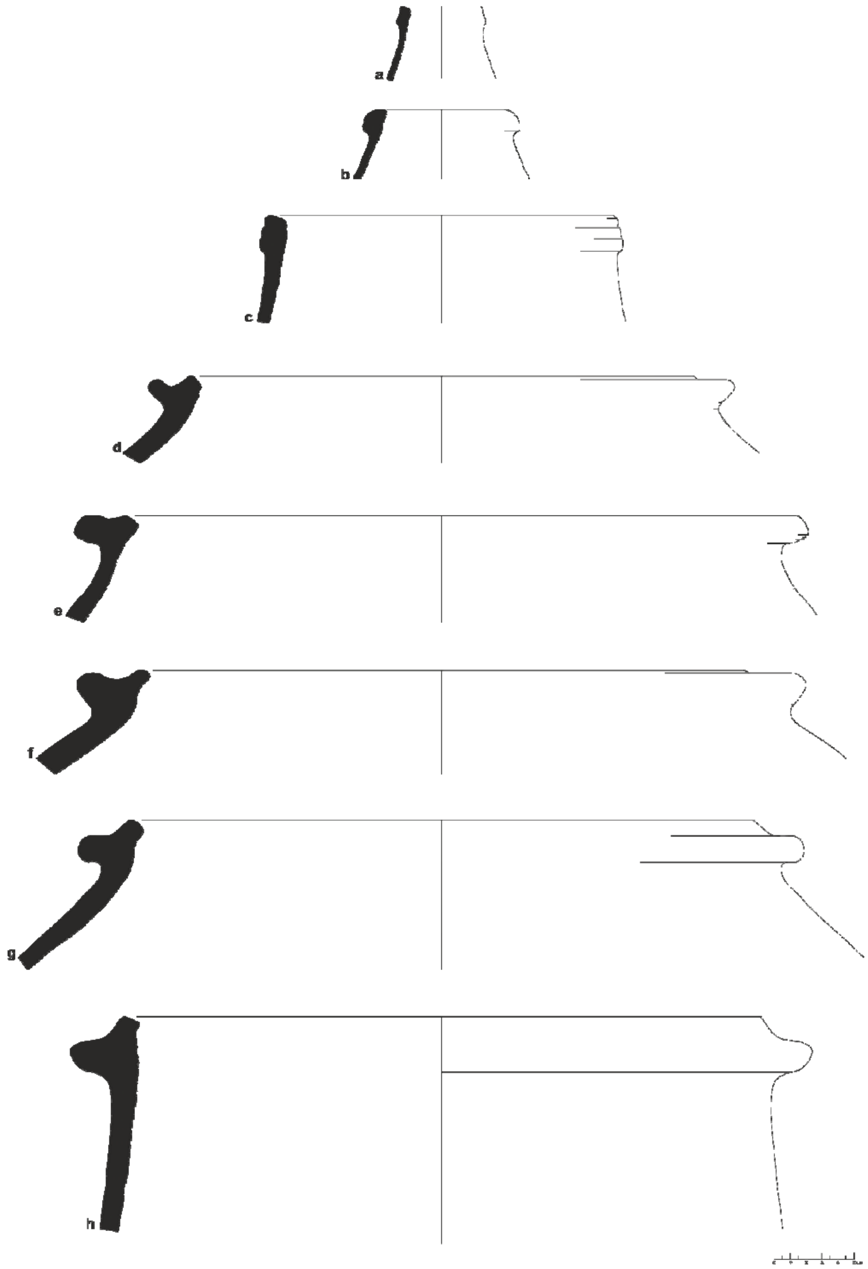


Fig. 5.23: Restricted simple conical-contoured fragments RII.15

5.3.1.5 Restricted simple conical-contoured fragments RII.15 (fig. 5.23)

Total number of items in the group: 12

Number of recognized types: 8

Number of items of recognized types: 8

Frequency: a single representative for every type

Typical items: 41 (*a*), 142 (*h*), 334 (*c*), 509 (*e*), 575 (*b*), 785 (*f*), 868 (*d*), 869 (*g*)

Possible filiations: RII.14bb≈RII.15e; RII.12s≈RII.15g

Parallels: *a*: ZAVYALOV 2008, 186: 99.5(?)

b: MAXWELL-JONES 2015, 361: 470 (R173)

c: ZAVYALOV 2008, 183: 96.4

e: MAXWELL-JONES 2015, 154: 170 (R83); ZAVYALOV 2008, 168: 81.14

f: ZAVYALOV 2008, 179: 92.20

h: ZAVYALOV 2008, 184: 97.11(?)

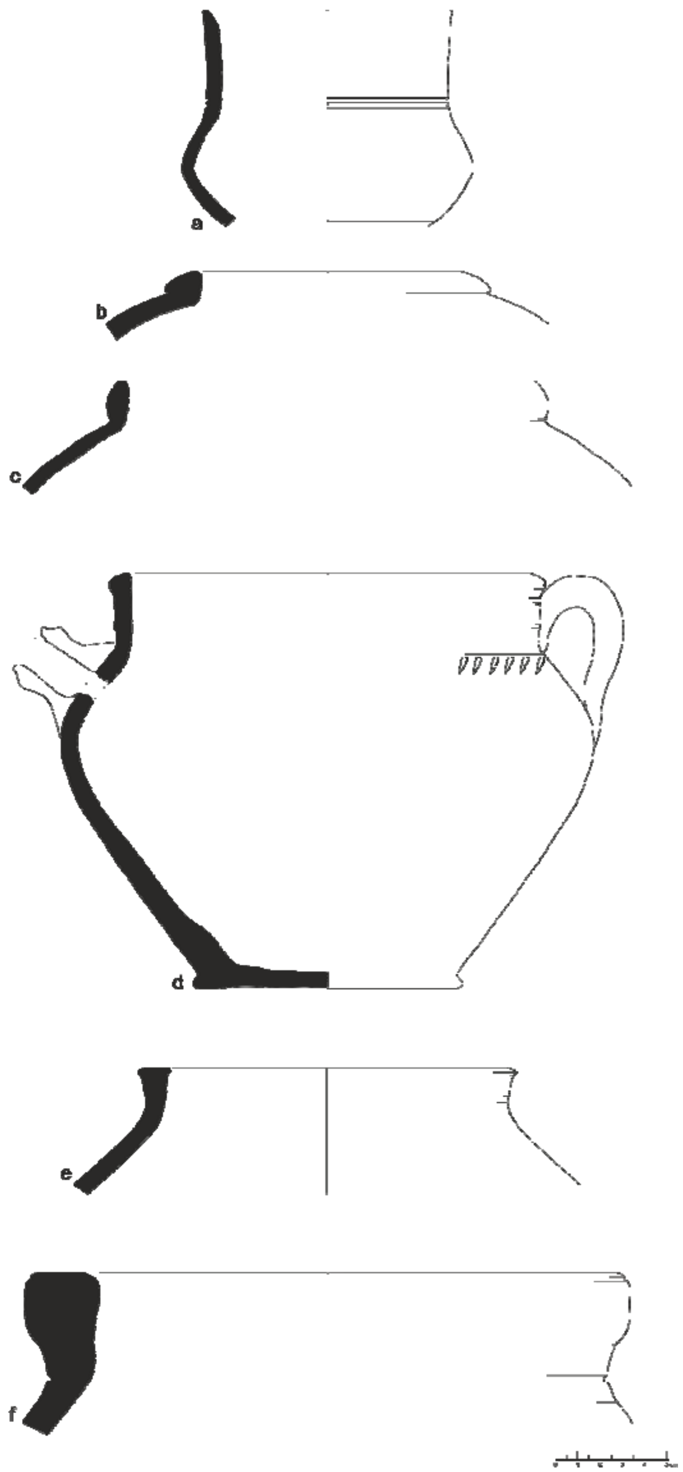


Fig. 5.24: Restricted composite cylindrical-contoured fragments RII.23

5.3.2 GROUPS RII.2: RESTRICTED COMPOSITE- CONTOURED FRAGMENTS

5.3.2.1 Restricted composite cylindrical-contoured fragments RII.23 (fig. 5.24)

Total number of items in the group: 7

Number of recognized types: 6

Number of items of recognized types: 7

Frequency: multiple occurrences: *a* (2)

Typical items: 98, 99 (both *a*), 440 (*c*), 479 (*d*), 505 (*e*), 731 (*f*), 769 (*b*)

Possible filiations: RII.23a≈RII.25d; RI.13j→RII.23a

Parallels: *a*: ZAVYALOV 2008, 160: 71.1

d: MAXWELL-JONES 2015, 135: 140 (R9)

e: MAXWELL-JONES 2015, 138: 143 (R11); ZAVYALOV 2008, 173: 86.18; VČELICOVÁ 2015, 59, fig. 36: Pot group 9 (4)

f: MAXWELL-JONES 2015, 153: 168 (R81)(?)

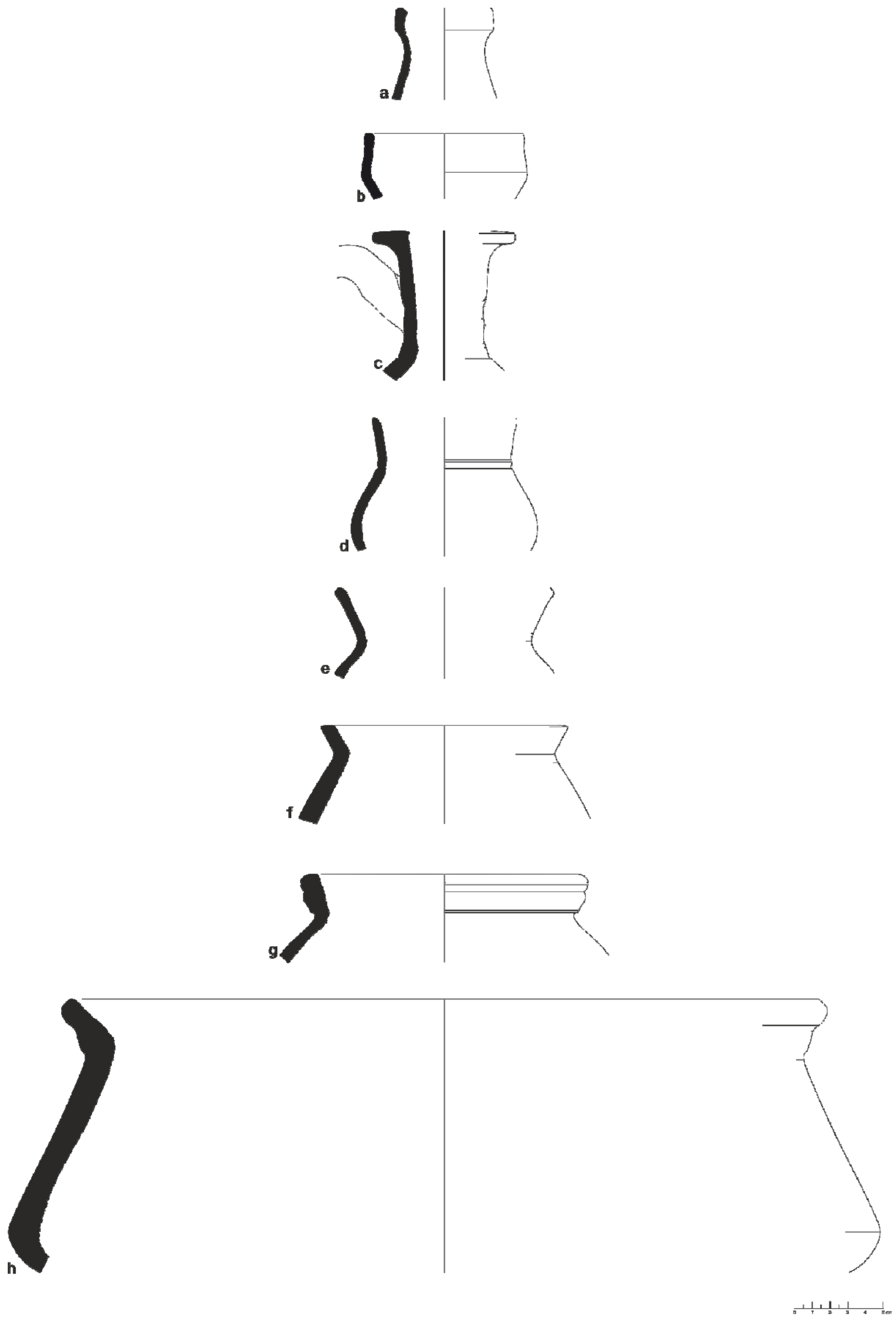


Fig. 5.25: Restricted composite conical-contoured fragments RII.25

5.3.2.2 Restricted composite conical-contoured fragments RII.25 (fig.5.25)

Total number of items in the group: 9

Number of recognized types: 8

Number of items of recognized types: 8

Frequency: a single representative for every type

Typical items: 81 (*a*), 100 (*d*), 165 (*g*), 285 (*b*), 632 (*e*), 679 (*c*), 713 (*f*), 836 (*h*)

Possible filiations: RI.20d≈RII.25e; RII.23a≈RII.25d

Parallels: *a*: MAXWELL-JONES 2015, 134: 138 (R8) (?); ZAVYALOV 2008, 181: 94.8

b: ZAVYALOV 2008, 160: 71.6b

d: ZAVYALOV 2008, 160: 71.1

e: PUSCHNIGG 2006, R25(?)

f: MAXWELL-JONES 2015, 146: 159 (R22)

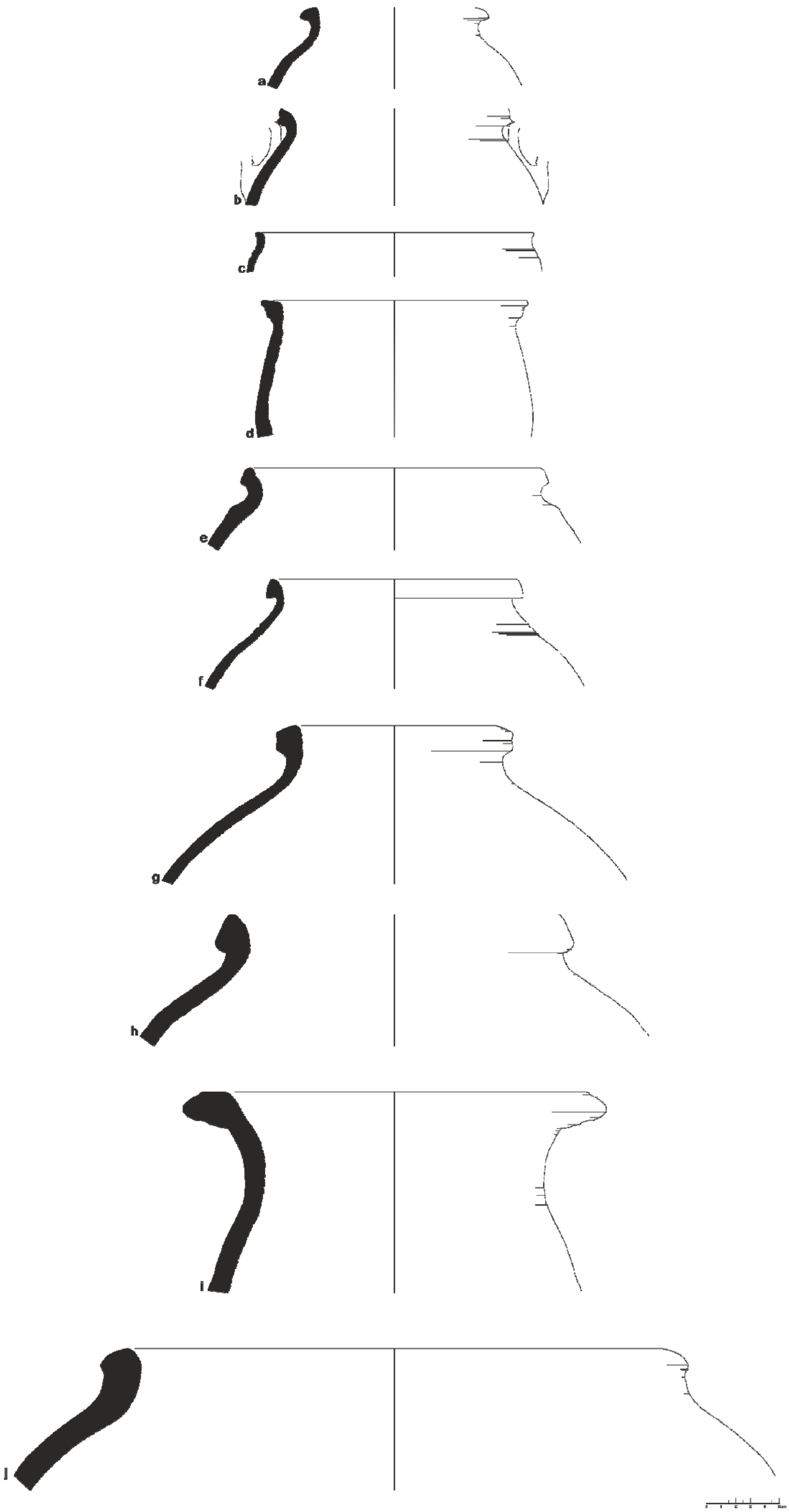


Fig. 5.26: Restricted inflected hyperboloid-contoured fragments RII.34

5.3.3 Groups RII.3: Restricted inflected- contoured fragments

5.3.3.1 Restricted inflected hyperboloid-contoured fragments RII.34 (fig. 5.26)

Total number of items in the group: 12

Number of recognized types: 10

Number of items of recognized types: 11

Frequency: multiple occurrences: *j* (2)

Typical items: 43 (*f*), 52 (*c*), 84 (*e*), 273 (*g*), 315 (*h*), 370 (*a*), 379 (*i*), 458 (*d*), 486 (*b*), 793, 794 (both *j*)

Parallels:

a: Maxwell-Jones 2015, 142: 152 (R14)(?)

b: Maxwell-Jones 2015, 129: 133 (R5)

c: Zavyalov 2008, 163: 76.6

d: Zavyalov 2008, 183: 96.8

e: Zavyalov 2008, 179: 92.9

f: Zavyalov 2008, 173: 86.30; Puschnigg 2006, R107

g: Zavyalov 2008, 169: 82.11

h: Maxwell-Jones 2015, 142: 152 (R14)(?)

i: Zavyalov 2008, 170: 83.11(?)

5.3.4 GROUP RII.4: RESTRICTED COMPLEX- CONTOURED FRAGMENTS

5.3.4.1 Restricted complex hyperboloid-contoured fragments RII.44

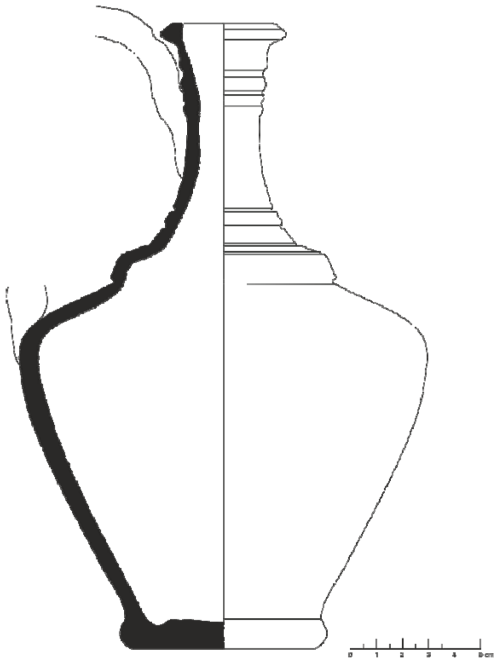


Fig. 5.27: Restricted complex hyperboloid-contoured fragment RII.44

5.3.4.1 Restricted complex hyperboloid-contoured fragments RII.44 (fig.5.27)

Total number of items in the group: 1

Number of recognized types: 1

Number of items of recognized types: 1

Frequency: a single representative available

Typical item: 480

6. QUANTIFICATION AND STATISCICS

6.1 Rim statistics

The final practical chapter deals with the results of the proposed rim typology applied on the examined assemblage and their statistical formulation.

The orifice restriction was determinable at 635 of all cases, which implies that the orifice determination was more or less possible in almost 93% of all cases.[21] The occurrence of the unrestricted orifice fragments is higher unrestricted fragments: 375 RI-items *vs*. 260 RII-items, which makes the unrestrictive vessels 59% of all determinable fragments.

Both restrictive and unrestrictive items have been identified as 'types' at 294 cases in total. When comparing the recognized typical items, the ratio between restricted and unrestricted fragments follow the latter pattern: the amount of unrestricted orifice fragments (*i.e.* 190 items in total) is higher than that of the restricted ones (*i.e.* 109 items in total), while the gap between them with respect to the restricted *vs*. unrestricted ratio is even more substantial than the latter: unrestricted fragments forms almost 65% of the typical items.

The statement does not necessarily mean ostentative preference of unrestricted vessel forms. As demonstrated in chapter 5.1.2, there's an implicative relation between restricted necked vessels' fragments and their respective unrestricted simple-contoured vessels, while the reversed relation is not valid.

The multiple occurrence of the typical representative (or likely phenomenon's virtual absence) is worth noticing: 234 distinctive types have been recognized which are represented by 294 items. The statement implies that the types' multiple occurrences are extremely rare. Only 34 types are represented by more than one item. For stunning 85.5% of all types, only a single representative is available. Only four types were recognized in more than five representatives (RI.11*o*, RI.12*b*, RI.12*c* and RI.24*b*).

The lack of typical representatives makes it difficult to think of the representatives as of the 'extreme types'. The amount of items might have been too low after all or the assemblage's extensive chronological span and heterogeneity might have caused the unfavourable situation.

[21] The ratio is counted out of the total amount of rim / rim and handle and the whole-profiled items.

However, traces of the extreme type's principle are recognisable within the tiny group of more than five representatives, where the apex in frequency is obvious.

6.2 Distribution of types within sites

Effects of applying morphological typology in relation to their site's pertinence can be best described by table 6.1. It represents a respective site's potential to be credibly dated in relation to amount of recognised parallels. The content column to the left shows a number of typical representatives pertinent to the given site. The right column lists the amount of such types, which parallels are available at the moment (chapters 5.2 and 5.3). The number may appear self-evident and depending on the actual amount of rim fragments pertinent to the site. This relation however, is not any means conventional.

In the table 6.1, twenty-six sites are represented by more than two typological representatives carrying a potential parallel (marked in bold). As obvious from the sites containing more than 10 pertinent types cannot be a guarantee of a good dating criterion as long as the parallels are absent.

site	types	parallels
2	5	**5**
3	3	**3**
4	10	**10**
5	25	**24**
7	5	**4**
8	6	**6**
10	12	**9**
11	3	2
12	9	**9**
16	14	**9**
17	3	2
18	9	**9**
19	1	1
22	2	2
23	4	**3**
24	9	**8**
25	9	**9**
26	22	**21**
27	3	1
32	14	**14**
33	10	**6**
35	4	**4**
37	4	**4**
40	7	**6**
41	2	1
42	3	2
43	6	**6**
45	3	**3**
48	1	1
52	1	1
55	2	1
56	2	2
57	1	1
58	2	2
61	2	2
63	1	1
71	1	1
72	3	2
75	3	**3**
77	1	1
78	2	1
79	2	0
80	4	**4**
88	5	**3**
90	2	2
94	6	1
95	10	**3**
98	5	2
99	5	0
100	4	0
101	3	0
107	2	1
109	5	1
112	1	0
119	2	2
131	2	1
133	4	2
138	1	1
139	1	0
141	1	1
143	3	**3**
149	1	0

Table 6.1: List of sites containing typical representatives ('types') and typical representatives with parallels available ('parallels')

7. CONCLUSION

In the previous six chapters, I tried to re-examine the very substance of classical typologies in relation to the Sherobod field survey assemblage' characteristics. The resulting typology provided a rather surprising advantage while searching through the typological list's contents and simplified, at least from a personal point of view, a quest for a random vessel form. Also processing the big data proved itself excessively useful and productive

On the other hand, the overall result as originally erroneously presumed fell behind expectation in relation to a number of recognised types and unable further data exploitation and study of relations of the fuzzy logical concept.

Yet I dare to proclaim the concept of fuzzy typologies extremely attractive, useful and worth studying. Even though the presented thesis contains more theoretical concepts than may behove for an archaeological work, I acknowledge the importance the archaeological theory as a integral part of a practical archaeological activities.

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LIST OF FIGURES

LIST OF TABLES

LIST OF SUPPLEMENTS