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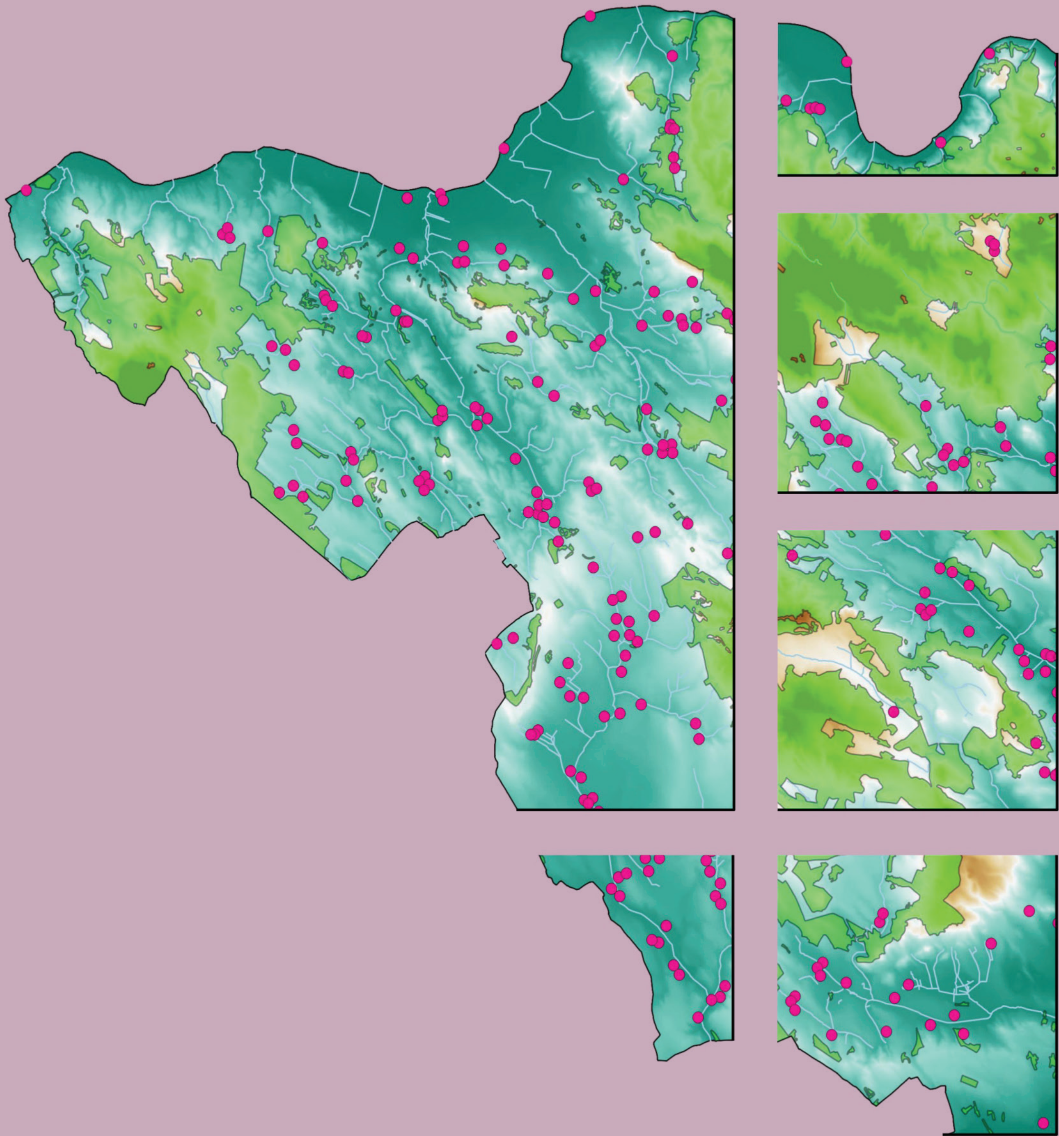

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Grd-i Tle knapped and ground stone artefacts, excavation seasons 2016–2017

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Abstract
Knapped lithics and ground stone artefacts of the first and second excavation season at Grd-i Tle (Iraqi Kurdistan) derived from secondary contexts. We present these artefacts as assets to build an attribute-based methodology for recording and analysing lithics at the site, according to a life-history approach of material culture.

Grd-i Tle (Iraki Kurdisztán) lelőhely pattintott, csiszolt kőeszközei és szerszámkövei másodlagos helyzetben kerültek elő az ELTE régészeti expedíciójának első, illetve második ásatási évadja során. E tárgyak alkalmat kínáltak a kőanyag feldolgozási módszertanának kialakítására, amit az „anyagi kultúra élettörténete” elméleti megközelítés mentén végeztünk el. A leletek bemutatása mellett a továbblépés lehetőségeit tárgyaljuk a rövid jelentésben.

Introduction

The Eötvös Loránd University of Sciences archaeological expedition conducted excavations at Grd-i Tle, Iraqi Kurdistan during 2016 and 2017 *(Fig. 1).*[1] According to our surveys this tell site has been occupied since at least the Late Neolithic period. So far, our expedition unearthed *in situ* Islamic and Hellenistic-Parthian remains, with an increasing number of lithic artefacts from different occupational periods, in secondary contexts.

Detailed documentation of these artefacts is justified by two factors. With our work we aimed to construct an archaeological reference site in the microregion, as this tell offers a 28-metre thick stratigraphy. Encompassing lithic stray finds in our stratigraphic analyses helps to understand site formation processes. These finds also offer an opportunity to assess lithic variability across the ages represented, addressing methodological issues about their proper handling and interpretation in one single system of study.

Context, materials and methods

The collection consists of 125 knapped and 49 other modified lithic artefacts in 2017 *(Tab. 1).* They were found as surface scatter (18 pieces) and as stray finds in stratigraphic units we investigated during excavation, without sieving (156 pieces). Knapped lithics, as well as ground stone items were distributed unevenly among the excavated trenches with a strong bias towards Trench II, especially if we take trench sizes into account (25 square meters against e.g.

1 Dezső et al. 2016.

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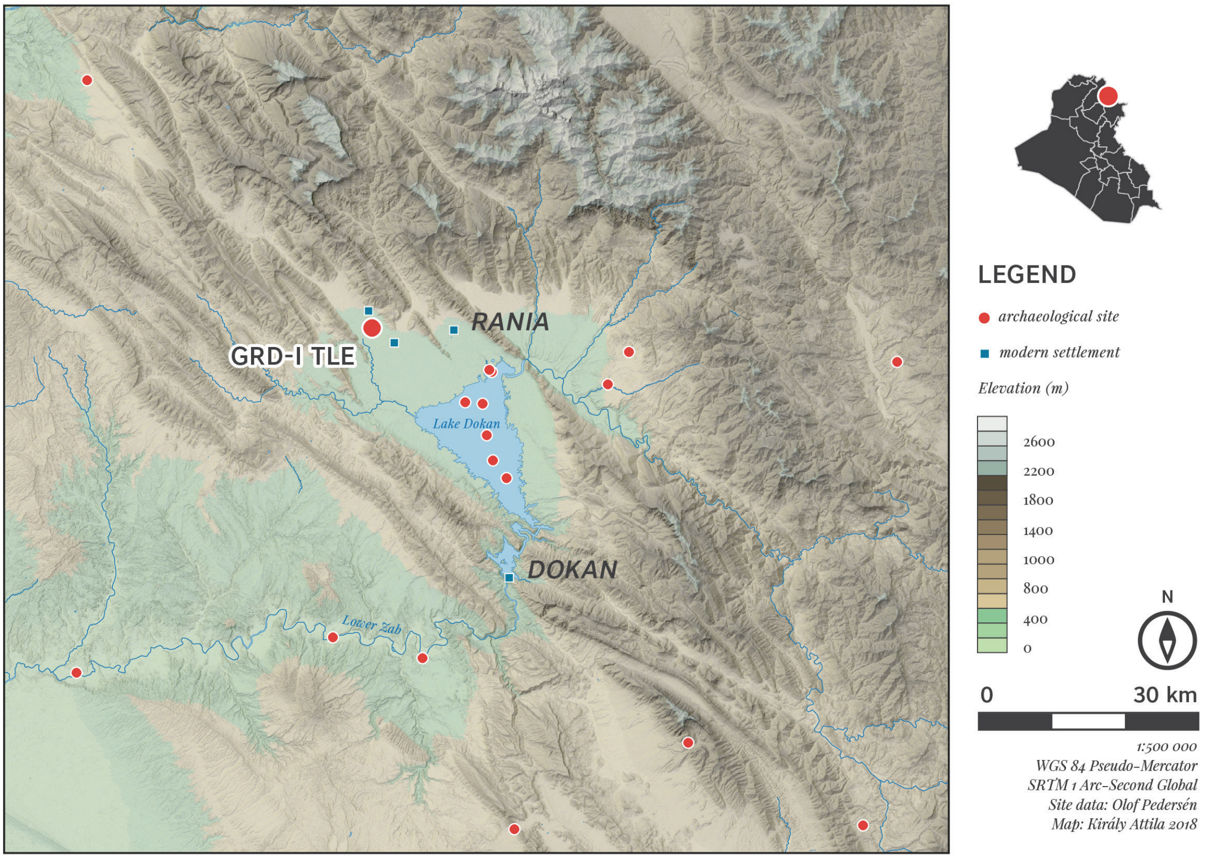

Fig. 1. Grd-i Tle and its environment in the Zagros High-Folded Zone, Iraqi Kurdistan (map: A. Király).

Trench I with 175 square meters, *Fig. 2*). According to our preliminary observations, Trench II also contained a considerable amount of prehistoric ceramic sherds too. These distributional differences raise future research questions about the tell's depositional history.

Our methodology for lithic analysis utilizes a life-history approach promoted by the French technological school's *chaîne opératoire* and Michael Schiffer's *behavioral chain* concepts.[2] Artefacts are considered as focal objects collecting traces of interactions during their production, use and abandonment. In concert with this approach we recorded discrete attributes of these processes that are visible for the naked eye *(Tab. 2)*.[3] We did not have opportunities to conduct microscopic use-wear and residue analyses nor geochemical sourcing.

The investigation protocol included typological identification. For the knapped artefacts we adapted John Shea's lists that synthetize standard classifications with age- and region-specific types.[4] Our protocol allows researchers to use our data with their respective typologies as we recorded attributes in higher resolution than attribute-aggregate units, i.e. types. Definition of attributes, as well as basic data recorded are given in a separate supplement, as we pursue intelligent openness concerning data publication.[5]

2 Gosden – Marshall 1999; Hamon 2009; Knappett 2014; Miller 2007; Skibo – Schiffer 2008; Soressi – Geneste 2011.
3 Eitam 2009; Inizan et al. 1999; Shea 2013.
4 Shea 2013.
5 For intelligent opennes see Király 2017. As the database grows and criteria are prone to change, we deposited these data in the Figshare repository that has version control options. The actualized supplementary material is accessible through the DOI referred under Király 2018.

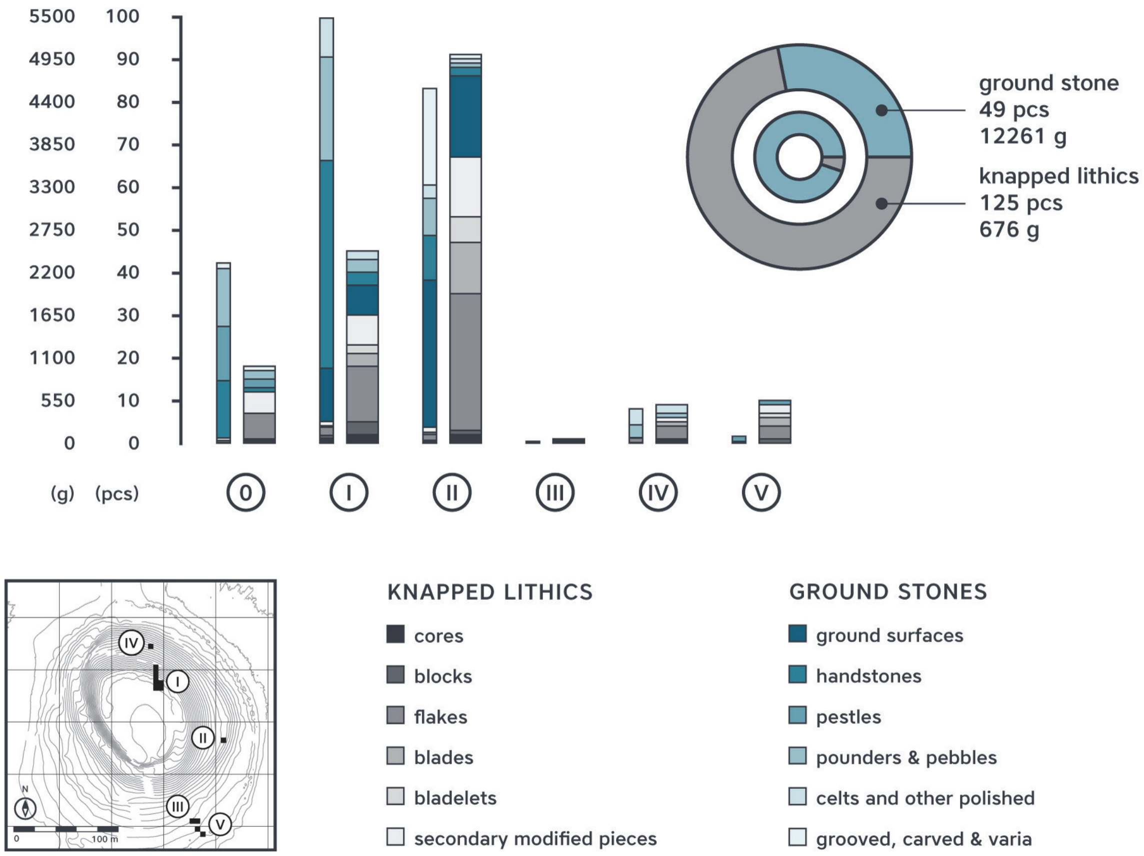

Fig. 2. Grd-i Tle, spatial distribution of knapped lithics and ground stone items among excavation trenches (I–IV) and on the surface (0), according to artefact classes. Left coloumns represent weight data, right coloumns represent quantity. Inset map shows trench positions (data and graphics: A. Király; map data: A. Weisz, Salisbury Ltd).

Polished stone tools, hammerstones and ground stone implements (together: ground stones) occur diverse contexts in almost every archaeological period in the region: as tools of food processing, pottery manufacture and metallurgy, as containers, items of social status or paraphernalia of ritual.[6] Because of this variability, terminology, typology and research methods are manifold.[7] The fundamental typology of prehistoric Near Eastern ground stone items is compiled by Katherine Wright with the help of Levantine collections.[8] This typology provides guidelines for expeditions in Iraqi Kurdistan.[9] To maintain uniform terminology we applied Wright's system supplemented by the work of David Eitam, keeping in mind that: 1) our small collection now represents only a portion of the variability expected at Grd-i Tle; 2) currently we do not possess *in situ* contextual informations that can have an impact on classification; 3) the typology is based on Epipalaeolithic, Neolithic and Chalcolithic examples and has to be tested on artefacts of later ages.[10]

6 Adams 2008; Barkai 2011; Crandell et al. 2016; Delgado Raack – Risch 2008; Edwards 2007; Kadowaki 2006; Nadel 2011; Rosenberg – Nadel 2014.
7 Rosen 1997; Rosenberg et al. 2016; Rowan – Ebeling 2008.
8 Wright 1992; 2013.
9 E.g. Mudd 2017; Squitieri 2017.
10 Eitam 2009; Wright 1992; 2008.

Raw material:	*obsidian*		*limnic silicites*				*quartz and quartzite*		*igneous and metamorphic*		*limestones*		*sandstones*		*total*	
			varieteies		*burnt*											
	pcs	*g*	*pcs*	*g*	*pcs*	*g*	*pcs*	*g*	*pcs*	*g*	*pcs*	*g*	*pcs*	*g*	*pcs*	*g*
Cores	1	20,4	5	91,1	1	22,8	0	0,0	0	0,0	0	0,0	0	0,0	7	134,3
Blocks	1	2,8	4	41,7	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	5	44,5
Blocklike flakes	1	0,5	8	80,5	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	9	81,0
Flakes	7	7,4	32	151,7	3	14,5	1	0,6	1	1,5	1	5,0	0	0,0	45	180,7
Characteristic debitage	1	2,0	3	8,1	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	4	10,1
Blades	3	2,0	14	43,9	1	5,8	0	0,0	0	0,0	0	0,0	0	0,0	18	51,7
Bladelets	3	0,8	5	3,1	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	8	3,9
Tools	7	10,7	19	133,7	3	25,0	0	0,0	0	0,0	0	0,0	0	0,0	29	169,4
Knapped lithics total	**24**	**46,6**	**90**	**553,8**	**8**	**68,1**	**1**	**0,6**	**1**	**1,5**	**1**	**5,0**	**0**	**0,0**	**125**	**675,6**
Work surfaces	0	0,0	0	0,0	0	0,0	0	0,0	2	340,0	0	0,0	24	2243,0	26	2583,0
Handstones	0	0,0	1	2275,0	0	0,0	0	0,0	3	1315,0	2	402,1	0	0,0	6	3992,1
Pounders and pebbles	0	0,0	0	0,0	0	0,0	1	120,0	5	2205,2	1	400,0	0	0,0	7	2725,2
Pestles	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	3	766,8	0	0,0	3	766,8
Celts & other polished	0	0,0	0	0,0	0	0,0	0	0,0	5	877,2	0	0,0	0	0,0	5	877,2
Grooved and carved tools	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	1	1245,0	0	0,0	1	1245,0
Ground varia	0	0,0	0	0,0	0	0,0	0	0,0	0	0,0	1	71,5	0	0,0	1	71,5
Ground stone total	**0**	**0,0**	**1**	**2275,0**	**0**	**0,0**	**1**	**120,0**	**15**	**4737,4**	**8**	**2885,4**	**24**	**2243,0**	**49**	**12260,8**
Total	24	46,6	91	2828,8	8	68,1	2	120,6	16	4738,9	9	2890,4	24	2243,0	174	12936,4

Tab. 1. Knapped and groundstone artefact classes by raw material groups (Legend: pcs = pieces; g = grams. N = 174 pieces, all the retrieved knapped lithics and ground stone tools).

Raw materials

Grd-i Tle is situated on the fringe of the Rania Plain, along the upper reaches of River Lesser Zab, in the northwestern portion of the Zagros High-folded Zone.[11] The mountains embracing this alluvial plain are mostly built up of Jurassic and Cretaceous carbonate rocks (e.g. limestone and dolomite) degraded into different clastic formations (e.g. marl and conglomerates), with cherts suitable for knapping.[12] There are numerous cavities in the area – for example, the well-known Shanidar cave – where rich carstic water reservoirs formed.[13] Fed by these reservoirs, high-energy braided rivers transported considerable amount of sediments and clastics into the Rania Plain during Pleistocene times. These sediments, as well as contemporary terraces of the Lesser and Greater Zab rivers, contained a variety of sedimentary, igneous and metamorphic rocks originated in the Zagros high folded, imbricate and suture zones.[14] We found these locally available blocks, pebbles and cobbles as raw materials at the site *(Tab. 1)*.

11 Jassim – Goff 2006; Sissakian – Fouad 2013. I thank Zsolt Veres (Hungarian Geological Protective Union) for the discussion of proper geological terms in Hungarian and English.

12 Ameen – Gharib 2014; Sissakian – Saeed 2012.

13 Stevanović et al. 2009.

14 Sissakian – Al-Jiburi 2014; Sissakian et al. 2016.

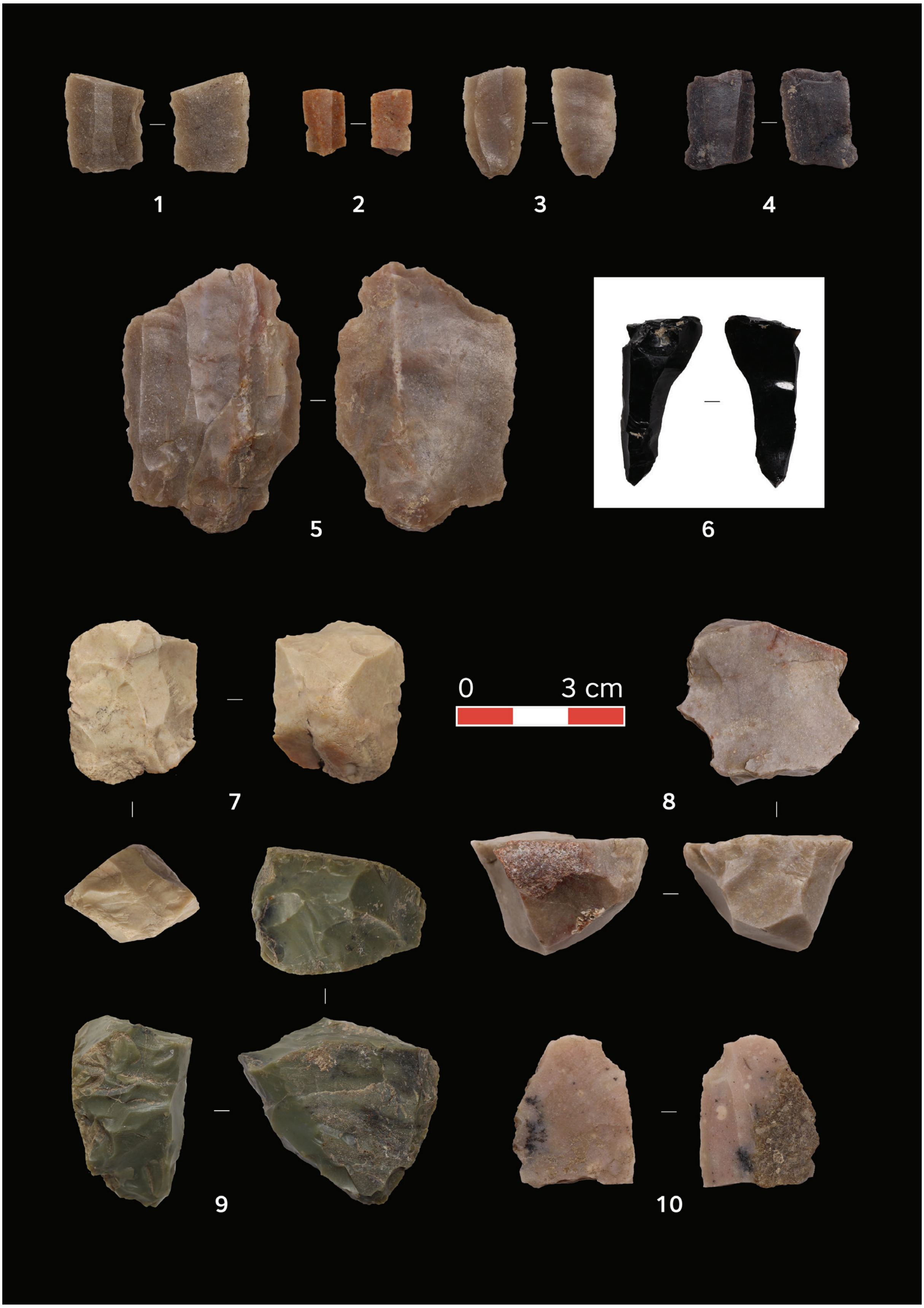

Fig. 3. Grd-i Tle, knapped lithics. 1–6, 10 – debitage products from regular blade production, 7–8 – exhausted single platform cores, 9 – exhausted narrow fronted blade core, 1–5, 7–10 – limnic silicite, 6 – obsidian (photos: A. Király).

1. Contextual data	**3. Basic variables**	**4. Flake variables**	**5. Core variables**
Inventroy number	Raw material	Breakage unit	No. of knapping surfaces
Date of recovery	Raw material form	Breakage type	No. of debitage surfaces
Trench	Raw material texture	Dorsal scar count	**6. Debitage surface variables**
Excavation unit	Raw material brightness	Dorsal scar pattern	No. of negatives
Stratigraphic unit	Cortex amount	Bulb dimensions	No. of whole negatives
Package unit	Patina amount	Talon type	No. of imperfect negatives
2. Typology data	Heat alteration	Termination of force type	Biggest negative length
Artefact category	Roundedness	Talon width	Biggest negative width
Artefact class	Weight	Talon thickness	**7. Tool variables**
Artefact type	Length	Exterior platform angle	type of modification
	Width	Interior platform angle	location, extent and intensity of modifications (according to predefined zones)
	Thickness	Maximum dimension	

Tab. 2. Knapped lithics recorded attributes (variables).

Limnic silicite (chert) is the most common raw material among knapped lithics. We differentiated at least four varieties based on color, shine and texture. Obsidian is present as an exotic material with the nearest source in Southeastern Turkey.[15] Ground stones have a wide raw material spectrum, that supposedly accords to the initial technomic function of the tools (i.e. abrading, cutting, polishing, pounding). Well delineated groups are rough-surface sandstone plaquettes; smooth and polished blackish basalt or metamorphite objects. Coarse-grained igneous rocks, limestones, quartz cobbles complement the picture – obsidian is not represented in this artefact category.

Knapped lithics

The obviously mixed sample does not justify a coherent quantitative study. In the following two sections we offer qualitative description of the two artefact categories, knapped lithics and ground stone items.

Production

At least three production modes can be differentiated on the 125 knapped pieces. 32 out of 39 blades, bladelets and secondary modified pieces (tools) on supports of blade/let proportions show dorsal negatives in concord with the debitage axes of the pieces. These artefacts testify regular unipolar blade debitage *(Fig. 3)*. Only one of the seven cores could exemplify this method: the artefact shape, the convexity, preparation and angle of the striking platform lend a narrow-fronted blade core appearance to this piece, characteristic for the Epipalaeolithic in the region (GDT3.000.3/0023, *Fig. 3.9*). Nevertheless, last detachments were conducted by bipolar-on-anvil technique leaving fractured, scaled and hinged scars on the knapped surface in opposite directions.

Mostly pebbles and cobbles had been transformed into cores *(Fig. 3)*, they are retrieved in exhausted state: debitage surfaces are covered with irregular flake scars instead of blade ne-

15 Robin et al. 2016.

Fig. 4. Grd-i Tle, knapped lithics. 1 – reused retouched flake, 2, 5, 7: endscrapers; 6: retouched blade fragment; 8: retouched flake; 9–11: sickle blades. 1–3, 5, 9–11: limnic silicite; 4, 6–8: obsidian (photos: A. Király).

gatives, and their average length is only 29,7 millimeters, i.e. cores are small in comparsion with blades and flakes in the collection. Although average length of blades and bladelets are also around 30 millimeters, most of these artefacts are broken, representing only a portion of their original size. Two unipolar, one centripetal and four bipolar-on-anvil cores (including GDT3.000.3/0023) are complemented with blocks of lithics, also worked bipolar-on-anvil. In our terminology, blocks do not have stigmata of flakes as bulb or talon and also lack stigmata of core *reduction* such as differentiation between knapping and knapped surfaces, patterned removals – they are typically pieces shredded on anvil.

The three observed production modes are 1) regular blade debitage on single platform, prismatic cores; 2) other unipolar, opposed and centripetal reduction methods; 3) application of bipolar-on-anvil technique on nearly exhausted cores and/or small pebble cores. Tested raw material blocks, fully cortical flakes and other initial stage elements are not represented in the sample yet. Advanced stages of manufacture are testified by blades and flakes including preparation elements. Exhausted cores and tools are seen as late stage artefacts. It is worth mentioning that advanced stage obsidian debitage is also present (e.g. GDT2.067.3/0037, *Fig. 3.6*; GDT5.353.3/0067, *Fig. 4.4*) as a cue for regional exchange of raw materials beyond tools, in nodule or core form.

As expected, tool type composition is eclectic *(Fig. 4)*. Besides retouched blades (2), bladelets (2) and flakes (5), endscrapers (3) backed or truncated tools (3), notch and denticulé (2), sickle blades (3) and other modified pieces (3) are present. Most of the identified tool types were present in the region since the Epipalaeolithic period until the Early Bronze Age, strictly Palaeolithic types are missing.[16]

Use and post-depositional history

Microburin blow and other deliberate breaking techniques are observed among blades. These 30–50 millimetre-long pieces can be used as insets; two of them bear sickle sheen on one of their edges (GDT1.151.3/0050, *Fig. 4.4*; GDT2.400.3/0120, *Fig. 4.10*).[17] Some retouched tools and at least six flakes and blades have more or less abraded edges considered as traces of intensive use. Use retouch differs from post-depositional fragmentation by its localized and regular distribution along the edges of an artefact. Fragmentation and patination were also observed in the sample.

Ground stone items

Production

Ground stones of Grd-i Tle are forming three groups according to their intensity of modification. Sandstone plaquettes have only minimal shaping – delibarate partitioning of the mass through breakage *(Fig. 6.3)*. A few hammerstones and pounding stones disfigured only by use wear, their 'production' were limited to the selection of pebbles with appropriate shape. The second and third groups consist of objects with more intensive shape and surface modification. Examples of the second group are oval and rectilinear handstones *(Fig. 5.4,6)*. Artefacts

16 Rosen 2012.
17 Rosen 1997, 49–50.

Fig. 5. Grd-i Tle, ground stone items. 1 – polished axe preform, metamorphite, 2 – small pestle (?), limestone, 3 – small axe, basalt, 4 – rectilinear handstone, metamorphite, 5 – polished stone plaquet (pounder), basalt, 6 – oval handstone, granite (photos: A. Király).

with the highest modification intensity includes an unipolar cylindrical pestle *(Fig. 6.4)*, polished basalt pounders *(Fig. 5.5, Fig. 6.2)*, and a miniature axe *(Fig. 5.3)*. In the latter cases, shaping of the artefacts is difficult to determine as surface treatment obscures stigmata of previous production stages. Such an early stage usually is the determination of shape by knapping.[18] A possible example for this stage is a thick flake of metamporphic rock with detachments shaping the whole mass of the piece, as well as inverse covering retouch along the distal part resembling an axe edge preform *(Fig. 5.1)*.

Use and post-depositional history

Through macroscopic inspection we only can presume general uses of the artefacts. Shea delineates functional groups in accord with the raw material and shape *(Fig. 5–6)*.[19] Pulverizing equipments aim to process materials through friction: they are the above mentioned sandstone working surfaces, handstones and pestles in our collection. Hammerstones for knapping do not always have an extensive working surface as with the case of handstones. Macroscopic traces of percussion are points of contact between the hammer and the passive object, but these traces can assemble an extended surface comparable to the working surfaces of pulverizing tools. The second functional group consist of polished celts and axes in Shea's system. We also encounter here those artefacts that have an emphasis on polished surfaces, but the naked eye can not decide their exact function(s). The collection lacks examples of the next functional group, containers, and only have one instance of the perforated and incised objects' group – a limestone block with smoothened base and a deep, straight groove on the upper surface. Some artefacts in the sample certainly surpass these categories as they demonstrate diverse shapes and more than one type and/or locale of usewear.

Patination is not remarkable but almost all the pieces have fracture surfaces. Breaks that obviously interrupt a silhouette formed with special care are considered as results of post-depositional events (e.g. GDT2.067.4/0004, *Fig. 5.4*; GDT1.116.4/0040, *Fig. 5.2*). In other cases there are no clear indications when the break surfaces incorporated in the life history of an artefact (e.g. GDT0.000.4/0048, *Fig. 6.2*).

Discussion and conclusions

The 2016 and 2017 season provided us a heterogenous lithic collection from secondary contexts, well suited for the methodological groundwork to study this longstanding artefact category at Grd-i Tle. Local raw material use is not unexpected with regard to the broad petrographic spectrum of easily accessible rocks. The identified knapped stone production methods and tool types are common from the Neolithic to the Bronze Age. Deliberately broken blades and sickle blades display considerable formal variability that, in closed contexts, can indicate chronological or cultural differentiation. Other characteristic 'markers' e.g. backed bladelets, geometric microliths and points have to be found at the moment. Polished and ground stones represent vauge artefact classes and open contexts too.

Typological identification became a secondary avenue of research behind techno-economic considerations for various reasons. Typologies of Holocene Near Eastern lithics are over-

18 Rosenberg et al. 2016.
19 Shea 2013.

Fig. 6. Grd-i Tle, ground stone items. 1 – grooved limestone block, 2 – polished double pounder with specific shape, basalt, 3 – sandstone plaquette, 4 – unipolar cylindrical pestle, sandstone (photos: A. Király).

whelmingly based on Levantine and Northern Mesopotamian samples, we do not recognize publications that translate them into the Zagros region of Iraq.[20] Moreover, the typological composition of these late industries are more restricted than for example Upper Palaeolithic ones, apart from a few very characteristic pieces like points. One of the reasons behind this could be the restricted time intervals for typological differentiation. Rosen explains a more prevalent cause, the changing role of lithic tools implemented in more complex socioeconomic systems, and of course into an enriched material culture:

"When examining lithic assemblages from complex societies in the Levant, factors such as craft specialization in both manufacture and use of chipped stone tools, a range of differing modes of distribution and exchange, and much regional, ethnic, and chronological variation render the idea of integrated assemblages almost useless."[21]

We consider this reasoning valid for ground stones as well. Traditional typological comparsions, (site-) inventory-based units and industries have an altered significance with the growing social complexity in the Zagros region during the lifetime of Grd-i Tle. Consequently our present methodology emphasizes technology and taphonomy over typology. In order to understand life histories of knapped lithics, apart from stigmata of production, we record the location and extent of modifications (e.g. retouch), use retouch and damage on the surface of the pieces, according to Clarkson's zonal recording system.[22] An unavoidable task for the future is to create a similar attribute-based formal study protocol of ground stones at the site.

We plan to grade up the resolution of these investigations with traceology/tribology to pursue the diverse tasks in which the artefacts – or different parts of the same artefact – took part. We also prepare a closer cooperation with other archaeological expeditions in the vicinity in order to explain access, distribution and use of lithic tools at a regional scale. In our opinion, knapped and ground stone tools offer a great potential in understanding everyday life and socioeconomic organization at Grd-i Tle and the region as well.

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20 For the terminology of regions see Rosen 2013.

21 Rosen 1997, 34.

22 Clarkson 2002.

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