

QUARRY SOURCES FOR THE STONE IMPLEMENTS FROM THE AZMAK TELL NEAR STARA ZAGORA (SOUTH BULGARIA)

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ABSTRACT. A total of 2003 stone implements (573 from the Early Neolithic and 56 from the Middle Neolithic layers) comes from cultural strata of the Azmak Tell near Stara Zagora (Central Southern Bulgaria). The artefacts were subjected to micro- and macroscopic analysis in order to determinate their mineralogical and petrographical composition. The main raw materials at this Neolithic settlement are andesite tuff, sandstone and schist. About 66% of the Neolithic tools come from these rocks. The possible quarries of these rocks are located.

The Azmak Tell near Stara Zagora was excavated by a team of archeologists lead by prof. G. Georgiev in the early 1960s. The following stratigraphic sequence was established: five construction horizons of the Early Neolithic, one from the Late Neolithic and four horizons from the Early and Late Chalcolithic each.

The stratigraphy, chronology and periodization of the cultural strata of this Tell have been intensively studied for decades and have resulted in numerous publications (Georgiev, 1963, 146; Georgiev, 1974, 1-18).

A total of 2003 stone implements, 573 of which are from the Early Neolithic and 56 – from the Middle Neolithic construction horizon, comes from the cultural strata of the Azmak Tell. They were subjected to micro analysis and macroscopic analysis. The exploration work was done by the late Ivan Borissov (Former Higher Institute of Chemical Technology, Sofia), Elena Dimitrova and the late Georgi Chatalov (both from the Institute of Geology, Bulgarian Academy of Sciences, Sofia), to whom we thank for their contribution. Only well preserved samples, which could be exhibited, were examined macroscopically; samples for the preparation of sections were taken from the remaining specimens.

The main task of this study is the introduction of petrographic and mineralogical analysis of the raw materials used at the Neolithic settlements in the Stara Zagora Region and partially in the Thracian Plain. The results of the petrographic and mineralogical studies of the entire stone inventory of the Tell are listed in Table 1.

Subject of this study are the artefacts from the six construction horizons from the Neolithic. First are the artefacts from the five settlement levels of the Early Neolithic (Table 2).

The Neolithic implement complex is distributed as follows among implements and among raw materials. The artefacts were made of 18 main types of rocks or their varieties. In order to achieve a better clarity, the rock used for each separate type of implement is listed below (Tables 3-10).

The Karanovo-III culture at the Azmak Tell is represented in one construction strata. The following types of stone implements have been studied from a petrographic point of view (Table 11; for each type of artefact see Tables 12-18).

According to their use the rocks were classified as shown on Table 19. The types of rocks and rock varieties used during the Neolithic (both Karanovo I and III periods) at the Azmak Tell are given in Table 20. This table shows that throughout the Early Neolithic at least 18 types of rock were used by the inhabitants of the Azmak Tell. The first 10 were used systematically, while the use of the remaining eight rock types was sporadic. Most frequently used was the andesite tuff 31.93%, followed by sandstone 21.11%, schist 12.21%, quartz 8.90%, diorite 6.20% and others. During the Middle Neolithic ten types of rocks were extracted. In comparison with the Early Neolithic rocks the number is eight – 44% have fallen out of use, namely amphibolitic gneiss, granite, diabase and metamorphic rocks. Among the rocks are such as andesite tuff 32%; sandstone 21%; schist 12%; diorite 66%; marl 6%; amphibolite 3%; andesite 2%. Clearly almost a half of the studied Neolithic inventory was made of andesite tuff and sandstone. The main raw material types at this Neolithic settlement are andesite tuff, sandstone and schist. About 66% of the Neolithic tools come from these rocks. Again, it is evident from the last table that throughout the Early and Middle Neolithic there was a sharp increase in the use of diorite – 13%; compared to 2% of schist. Andesite tuff shows the greatest fall in use – 2%.

Table 1

Petrographic types and varieties of artefacts from different horizons (different age) of the Azmak Tell

Used rocks	Early Neolithic		Late Neolithic		Chalcolithic		Difference	Total	
	N	%	N	%	N	%		N	%
1. Andesite tuff	164	31.72	19	33.9	427	9.86	-1.86	610	30.45
2. Sandstone	115	22.24	6	10.71	337	0.55	+8.3	558	27.85
3. Marl; limestone	37	6.45	4	7.14	146	10.20	+3.75	187	9.33
4. Schist	62	11.99	8	14.12	114	7.97	-4.02	184	9.18
5. Quartz	46	8.89	5	8.92	66	4.61	-4.28	117	5.84
6. Quartzite	19	3.67	2	3.57	77	5.38	+1.81	98	4.89
7. Diorite	26	5.02	10	17.85	47	3.28	-1.74	83	4.14
8. Andesite	12	2.32	1	1.78	35	2.44	+0.12	48	2.39
9. Amphibolite	15	2.90	-	-	28	1.95	+0.05	43	2.14
10. Lamprophyre	8	1.54	-	-	7	0.48	-1.06	15	0.74
11. Gneiss	2	0.38	-	-	2	0.38	+0.45	14	0.69
12. Altered rock	1	0.17	-	-	10	0.69	+0.52	11	0.05
13. Gabbro	1	0.17	-	-	8	0.56	+0.39	9	0.44
14. Serpentinite	3	0.58	1	1.78	5	0.34	-0.24	9	0.44
15. Marble	4	0.77	-	-	3	0.21	-0.56	7	0.34
16. Basalt	-	-	-	-	3	0.21	±	3	0.14
17. Granite	1	0.17	-	-	2	0.14	-0.03	3	0.14
18. Diabase	1	0.17	-	-	1	0.06	0,11	2	0.09
19. Dolomite	-	-	-	-	2	0.14	±	2	0.09
Total	517	100.00	56	100.00	1320	100.00		2003	100.00

Table 2

Implements from the Early Neolithic from the Azmak Tell

N	Type of implement	Total	Number of rocks
1	Adzes	204	14
2	Axes	86	9
3	Chisels	36	6
4	Hammer	95	9
5	Polishers	60	10
6	Hoes	7	3
7	Hammer-mortars	38	6
8	Sharpener	47	7
	Total	573	

Table 4

Axes from the Azmak Tell

N	Type of rock	Number of implements	%
1	Andesite	43	51.81
2	Schist	17	20.48
3	Sandstone	7	8.43
4	Marl	6	7.23
5	Diorite	4	4.88
6	Amphibolite	2	2.41
7	Lamprophyre	2	2.41
8	Quartzite	1	1.2
9	Gabbro	1	1.2
	Total	83	99.99

Table 3

Adzes from the Azmak Tell

N	Type of rock	Number of implements	%
1	Andesite tuff	84	48.00
2	Schist	25	14.28
3	Diorite	18	10.18
4	Sandstone	10	5.71
5	Marl	9	5.14
6	Andesite	9	5.14
7	Lamprophyre	4	2.28
8	Quartz	4	2.28
9	Quartzite	2	1.14
10	Serpentine	2	1.14
11	Diabase	1	0.57
12	Metamorphic rock	1	0.57
	Total	175	100.00

Table 5

Chisels from the Azmak Tell

N	Type of rock	Number of implements	%
1	Andesite tuff	20	58.82
2	Schist	6	17.65
3	Sandstone	3	8.82
4	Marl	2	5.88
5	Marble	2	5.88
6	Andesite	1	2.94
	Total	34	100.00

Table 6

Hammers from the Azmak Tell

N	Type of rock	Number of implements	%
1	Sandstones	24	28.23
2	Quartz	20	23.55
3	Andesite tuff	15	17.65
4	Quartzite	13	15.29
5	Schist	6	7.05
6	Amphibole	2	2.35
7	Granite	1	1.18
8	Gneiss	1	1.18
9	Lamprophyre	1	1.18
10	Diorite	1	1.18
11	Andesite	1	1.18
	Total	85	100.00

Table 7

Polishers from the Azmak Tell

N	Type of rock	Number of implements	%
1	Quartz	20	36.36
2	Sandstone	18	29.09
3	Schist	5	9.09
4	Andesite tuff	4	7.27
5	Marl	3	5.45
6	Quartzite	2	3.64
7	Marble	2	3.64
8	Limestone	1	1.82
9	Amphibole	1	1.82
10	Diorite	1	1.82
	Total	55	100.00

Table 8

Hammers for pestels from the Azmak Tell

N	Type of rock	Number of implements	%
1	Sandstone	18	54.55
2	Andesite tuff	8	24.24
3	Quartz	2	6.06
4	Limestone	2	6.06
5	Schist	1	3.03
6	Diorite	1	3.03
7	Quartzite	1	3.03
	Total	33	100.00

Table 9

Sharpener (abrasive) from the Azmak Tell

N	Type of rock	Number of implements	%
1	Sandstone	37	82.22
2	Marl	2	4.44
3	Limestone	2	4.44
4	Andesite tuff	1	2.22
5	Amphibolite	1	2.22
6	Serpentinite	1	2.22
7	Gneiss	1	2.22
	Total	45	99.99

Table 10

Hoes from the Azmak Tell

N	Type of rock	Number of implements	%
1	Marl	4	57.14
2	Schist	2	28.57
3	Andesite	1	14.29
	Total	7	100.00

Table 11

Type of implement

N	Type of implement	Total	Number of rocks
1	Adzes	29	7
2	Axes	3	3
3	Chisels	2	2
4	Hammer	10	5
5	Sharpeners	2	2
5	Polishers	5	4
6	Hammers pestels	3	3
7	Sharpeners	2	2
	Total	56	

Table 12

Adzes

N	Type of rocks	Number of implements	%
1	Andesite tuff	10	34.48
2	Schist	6	20.69
3	Diorite	8	27.59
4	Marl	2	6.90
5	Sandstone	1	3.45
6	Serpentinite	1	3.45
7	Gabbro	1	3.45
	Total	29	100.00

Table 13

Axes

N	Type of rocks	Number of implements	%
1	Schist	1	33.33
2	Diorite	1	33.33
3	Andesite	1	33.33
	Total	3	99.99

Table 14

Chisels

N	Type of rocks	Number of implements	%
1	Andesite tuff	2	66.66
2	Diorite	1	33.33
	Total	3	99.99

Table 15
Hammers

N	Type of rock	Number of implements	%
1	Andesite tuff	2	20.00
2	Sandstone	2	20.00
3	Quartz	3	30.00
4	Quartzite	2	20.00
5	Limestone	1	10.00
	Total	10	100.00

Table 16
Polishers

N	Type of rock	Number of implements	%
1	Andesite tuff	2	40.00
2	Sandstone	1	20.00
3	Quartz	1	20.00
4	Marl	1	20.00
	Total	5	100.00

Table 17
Hammers for pestels

N	Type of rock	Number of implements	%
1	Andesite tuff	1	20.00
2	Schist	1	20.00
3	Sandstone	3	60.00
	Total	5	100.00

Table 18
Sharpeners (abrasives)

N	Type of rock	Number of implements	%
1	Sandstone	1	50.00
2	Quartz	1	50.00
	Total	2	100.00

Table 19
Petrographic type for the stone artefacts from Karanovo-III

N	Type of rock	Number of artefacts	%
1	Andesite tuff	18	32.14
2	Diorites	10	17.85
3	Schist	8	14.28
4	Sandstone	6	1.74
5	Quartz	5	8.92
6	Marl	3	5.35
7	Quartzite	2	3.57
8	Serpentinite	1	1.78
9	Gabbro	1	1.78
10	Andesite	1	1.78
11	Limestone	1	1.78
	Total	56	100.00

Table 20
Petrographic list of all the studied stone artefacts from the Karanovo I and III periods at the Azmak Tell

N	Type of rock	Karanovo I		Karanovo III		Total	%
		N	%	N	%		
1	Andesitic tuff	164	31.72	19	33.92	183	31.93
2	Sandstone	115	22.24	6	10.71	121	21.11
3	Schist	62	11.99	8	14.12	70	12.21
4	Diorite	26	5.02	10	17.85	36	6.28
5	Andesite	12	2.32	1	1.78	13	2.26
6	Marl	26	5.02	3	5.35	29	5.06
7	Amphibolite	15	2.90	-	-	15	2.61
8	Lamprophyre	8	1.54	-	-	8	1.39
9	Quartz	46	8.89	5	8.92	51	8.90
10	Quartzite	19	3.67	2	3.57	21	3.66
11	Limestone	11	2.12	1	1.78	12	2.09
12	Serpentinite	3	0.58	1	1.78	4	0.69
13	Marble	4	0.77	-	-	4	0.69
14	Gneiss	2	0.38	-	-	2	0.34
15	Gabbro	1	0.17	-	-	1	0.17
16	Granite	1	0.17	-	-	1	0.17
17	Diabase	1	0.17	-	-	1	0.17
18	Altered rock	1	0.17	-	-	1	0.17
	Total	517	100.00	56	100.00	573	100.00

Quarries of these rocks are located as follows:

- rocks around the Azmak Tell;
- in the vicinity of the village Christene – schist, diabase, diorite and granite (Bonchev, 1903, 22-23, 92-96; Tsekov, 1958, 57) (Fig. 1);
- East of Stara Zagora – Triassic sediments for conglomerates, arkose and limestone, sandstone, dolomites and marl;

- andesite tuff and andesite were situated to the North and Northeast of Stara Zagora (Bonchev, 1903, 22-23, 102; Bonchev, 1907; Bonev, 1947, 71; Bonchev, 1955, 106, 123, 147; Cheshitev et al., 1958) (Fig. 1);
- gabbro rocks are found in the Sredna Gora mountain (I. Borissov, personal communication). It should be noted that not a single artefact was brought beyond the Stara Zagora region.

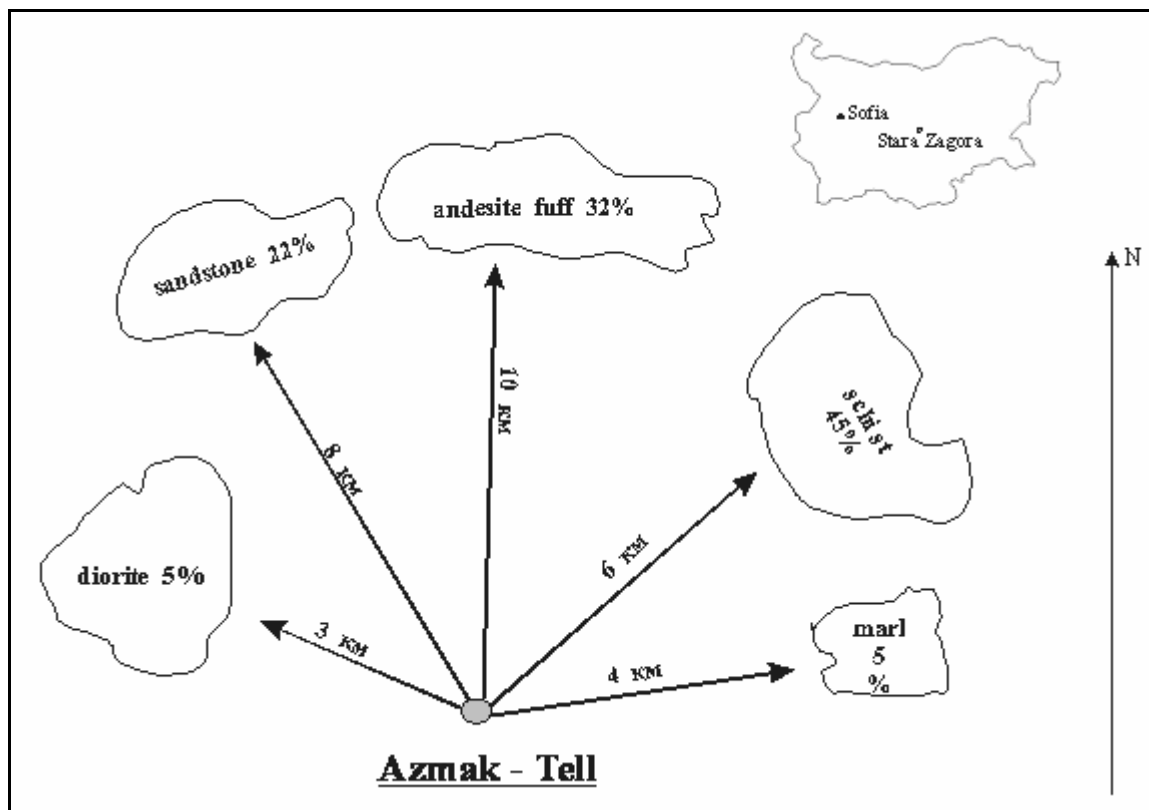


Fig. 1. Main types of rocks found among the stone artefacts at the Azmak Tell from the Karanovo I and III period with probable distance from the raw material source

Prior to their use for the production of implements the above rocks were the basis for the soils in soil profiles of the Upper Thracian Plain. This profile consisted of a thick humus layer of hard pan clays, which ensures soil moisture, a high water level, and is easy to cultivate manually. Fertile soils, which are suited to primitive soil cultivation appear, while the examined rocks were the basic component of the exploited raw materials among the earliest agricultural producers (agriculture and cattle-breeding), within the Maritsa River basin. This raw material base has ensured all the conditions for the high steppe settled life for almost one millennium throughout the Neolithic. The numerous tells are an indication in this respect, the Azmak Tell being one of them. Evidently the inhabitants of the Azmak Tell had adapted to a maximum, to the soil and climatic conditions and resources, building up a prosperous agriculture and settlement.

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