New data of Darkveti rock shelter
(according to interdisciplinary investigation)

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ABSTRACT - *The Imereti region holds a particularly significant place in the prehistoric epoch of Georgia. The favorable natural-geographical location, the abundance of raw material sources for tool-making, the narrow river valleys, and the rich flora and fauna have drawn human attention since ancient times. This is evidenced by the existence of hundreds of caves, grottos, and open-air sites, most of which exhibit multiple layers of habitation. Notably, the Darkveti multi-layered site stands out, with its discovery and scientific study conducted in the 1960s and 1970s by the renowned Georgian archaeologist Lamara Nebieridze. The stratigraphy, cultural layers, stone collections, paleontological material, and other aspects of the site were comprehensively examined. However, certain issues could not be fully clarified at that time due to various reasons.*

The aim of this study is to determine the mobility of the inhabitants of the Darkveti site through collaborative, interdisciplinary research by Georgian and foreign scientists. Crucially, the study seeks to accurately date the cultural layers of the Mesolithic and Neolithic epochs using absolute dating methods.
KEY WORDS - *Georgia, Darkveti, Mesolithic, Neolithic, Artefacts*

Introduction

Western Georgia, notably the Kvirila River valley, is distinguished by its remarkable concentration and variety of Stone Age sites. This region is characterized by a rich array of natural caves, grottos, and open-air sites, all of which have provided evidence of extensive and prolonged human habitation.

Archaeological investigations have established that the Kvirila River valley was first inhabited by early humans during the Paleolithic era. Successive discoveries of significant archaeological sites in this region have been well-documented by numerous researchers *(Bernatsky 1884; Krukovsky 1916; Nioradze 1933;1953;Kiladze 1944;1948; Tushabramishvili 1960; 1969; Tushabramishvili, Tsereteli 1975;*

Javakhishvili 1971; Nioradze 1975; Dochanashvili 1973; Nebieridze 1973). A major advancement in the study of these sites occurred in the 1990s, with the launch of joint international archaeological expeditions that included both Georgian and foreign scientists *(Meshveliani et al. 1999; 2004; 2007; Tushabramishvili et al. 1999; Bar-Yosef et al. 2011; Baz-Oz et al. 2008; Adler et al. 2006).*

One of the most prominent sites within the valley is the multi-layered Darkveti rock shelter, notable for its extensive stone tool collection and a diverse array of paleontological findings. This site was extensively documented in a seminal work by archaeologist L. Nebieridze (*Nebieridze 1978*). However, recent interdisciplinary research on the stone inventory and bone material has yielded valuable new information regarding the mobility of early humans at the Darkveti site and the chronological framework of its habitation.

This paper presents the latest data obtained from these laboratory analyses, along with the corresponding archaeological context and overarching conclusions.

Archaeological background.

The Darkveti rock shelter was extensively studied from 1968 to 1972 by the Kvirila Valley Archaeological Expedition of the Institute of History, Archaeology, and Ethnography, led by L. Nebieridze (*Nebieridze 1978*). The site, known as Darkveti rock shelter, is situated in the northwestern part of Upper Imereti (Fig. 1), within the Chiatura municipality, on the left bank of the Kvirila River, embedded in the limestone massif of the canyon-like valley. The Darkveti rock shelter is located approximately 5 meters above the current river level, with its entrance facing northeast. The dry and clear conditions inside the rock shelter would have made it a highly favorable living space.

Unfortunately, the archaeological site has since been completely destroyed. During the Soviet era, the construction of a narrow-gauge railway along the river's scarp led to the cutting and toppling of the main and side sections of the rock shelter. This destruction exposed material in the collapsed layers and on the surface. Fortunately, timely intervention by the archaeological expedition allowed for the study of untouched areas (*Nebieridze 1978. 10*).

An area of approximately 75 m^2 was excavated, revealing the following stratigraphy (Fig. 2-4):

- Layer I: Ash mixed with fine gravel, lying on an 8 cm thick compacted clay floor. This layer contained materials from the Chalcolithic-Early Bronze Age.
- Layer II: Brown loose loam with ash admixture, approximately 30-35 cm thick, resting on a 5 cm thick compacted clay floor. A thin coal layer (5 cm) was found directly on the floor, topped by fine gravel (3 cm). This layer contained numerous ceramics, stone, and bone tools.
- Layer III: Ash, approximately 30-32 cm thick, was the richest in archaeological remains.

- Layer IV: Peaty ash, with hearth remains (burnt earth, ash) in the lower part. Only stone and bone materials were found in this layer.
- Layer V: Gravel and large boulders, approximately 1 meter thick, contained no material (*Nebieridze 1978. 11-12*).

Beneath the coarse layer on the main excavation area, an 8-30 cm thick ash layer was found, representing the sixth cultural layer. Archaeologist L. Nebieridze observed that, despite differences in structure and color, all cultural layers of the rock shelter shared a common feature: an abundance of ash, indicating intensive use of fire by the ancient inhabitants. The large boulders deposited on top of the Mesolithic and Neolithic layers suggest significant changes in the area, likely causing temporary abandonment of the site. During the excavations the large fallen boulders were still visible atop the Neolithic layer, leading to the assumption that habitation ceased before the Chalcolithic era (*Nebieridze 1978. 17*).

Natural disasters likely forced the inhabitants to leave the rock shelter temporarily. However, the ceiling collapse might have continued during human occupation, as evidenced by fine cracks in the cultural layers. The study of the layers in Darkveti rock shelter revealed that the site was selected as a place of residence starting from the Mesolithic Age and continued to be used until the Early Bronze Age. Favorable ecological conditions, such as dryness, clear walls, proximity to water, and possibly rich flora and fauna, contributed to its intensive use.

Chipped stone assemblage of Darkveti rock shelter.

As previously mentioned, our study presents intriguing results from the interdisciplinary analysis of the stone and bone collection from the Mesolithic and Neolithic layers of the Darkveti rock shelter. Thus, we provide a brief description of the layers and the recovered inventory.

Layer V was found at a depth of 2.10 meters from the surface, beneath an approximately 1-meter-thick sterile gravel layer. This layer contained a significant number of flint and obsidian tools, production debris, and animal bones (Tables 1-2; Fig. 5). The tools were primarily manufactured using pressure flaking techniques, as evidenced by the presence of pencil-like cores (4 items), three of which are obsidian and one flint. These cores show traces of regular microblade detachments on their sides (Fig. 5: 1).

Among the tools, it forms an interesting group of burins (Fig. 5: 2-4). A total of 17 pieces. Most are made on blades. Burins are selected in various forms: simple, unifacial, bifacial, oblique, and others. In the burins, the second position after the scrapers is occupied by points (Fig. 5: 7, 28). Most are made on blades and flakes, they are chiefly represented by side-scrapers. Among the tools, numerous blades and microblades show signs of retouching. Several of these have undergone indirect retouching (Fig. 4: 24-27).

The collection also includes combined burins (scraper-burins), of which there are few (Fig. 5: 6, 15). There are a few perforators, denticulated tools, chisel, and others (Fig. 5: 5, 8-9).

Of particular interest are the microliths, which are made on blades and microblades (Fig. 5: 10-14, 16-23), some with two retouched edges (*Nebieridze 1978. 20-21*). These artefacts likely served as inserts for hunting tools. Among the pebble tools, a single stone sinker was found (Fig. 5: 34), featuring slight notches on both sides.

It is noteworthy that bone material is also present in the assemblage (Fig. 5: 29-33). According to specialists, the bones belong to various species of animals and birds, with some being used as tools (e.g., perforators). Additionally, a pendant made from bird bone was discovered (*Nebieridze 1978. 21*).

The lithic assemblage includes a large quantity of production debris, primarily consisting of blades, indicating that the inhabitants were proficient in blade production techniques, allowing them to produce blades and microblades of various sizes for toolmaking.

Layer IV is characterized by a diverse array of materials (Tables 1-2; Figs. 6-7). The number of cores is relatively high, with a total of 25 items, including prismatic, conical, and pencil-like examples (Fig. 6: 8-14). Both pressure flaking and direct percussion techniques appear to have been used in core processing. Some cores are double based, showing clear detachments from blade production. The pencil-like cores exhibit negatives from microblade removals.

Scrapers are less numerous in this layer (Fig. 7: 1-4), but several forms can be identified: endscrapers, round scrapers, and High-Edged Scrapers. There are also fewer burins, though they come in various shapes (Fig. 7: 8-16).

Compared to the Mesolithic layer, there are more perforators in this layer, made on blades and flakes with retouched working tips on both sides (Fig. 7: 5-7).

The microliths in this layer number 16 (Fig. 6: 16-19), made on the medial parts of bi- and trisided blades, with both edges finely retouched (*Nebieridze 1978. 22*).

In addition to the aforementioned tools, the collection includes a few unique items such as points, adzes, chisel, and others (Fig. 7: 17-22). The pebble tool collection features a polished axe and a fragment of an oval-shaped hand grinder (Fig. 6: 1).

In Layer IV, isolated items include a bird bone awl and a perforator (Fig. 6: 2-7), as well as a large, polished fragment of a deer antler (Fig. 6: 15). Smaller antler fragments, likely used as tools, were also found (*Nebieridze 1978. 24*).

Paleontological remains.

As previously noted, a substantial quantity of faunal remains was discovered in the Mesolithic and Neolithic layers (Table 2). Paleontologists I. Burchak-Abramovich and O. Bendukidze identified the following species: red deer (Cervus elaphus), roe deer (Capreolus capreolus), bear (Ursus spelaeus), wild boar (Sus scrofa), wild goat (Capra sp.), beaver (Castor fiber), among others (*Nebieridze 1978. 35*).

In the Early Neolithic (IV) layer, osteological remains of domesticated animals appear, including cattle (Bos taurus), pig (Sus domesticus), small ruminants (Ovis aut Capra), and dog (Canis familiaris) (*Nebieridze 1978. 91*).

It is noteworthy that the faunal material is typical of the Early Holocene faunal assemblages in western Georgia. The abundance of red deer, roe deer, wild boar, and wild goat bones suggests that these species were particularly significant to the ancient hunters. The Mesolithic layer at the nearby Kotias-Klde site provides valuable information for reconstructing the hunting practices and the broader faunal landscape (*Meshveliani et al. 2007*).

Materials and methods.

In the stone collection from the Darkveti rock shelter, obsidian is present in smaller quantities compared to flint. However, it is noteworthy for its high quality. The collection is dominated by artefacts made of black and translucent obsidian, which likely originate from various sources. To investigate this, obsidian artefacts from layers III-V of the Darkveti rock shelter were selected for analysis.

The goal of the geochemical analysis was to determine the chemical composition of the obsidian to ascertain its provenance. This research was conducted at the Archaeometry Laboratory of the University of Missouri Research Reactor Center.

The study was conducted by submitting 47 artefacts from Darkveti rock shelter samples to the Archaeometry Laboratory at the University of Missouri Reactor Research (MURR). Analysis was performed using a Thermo Quantx ARL lab-based XRF spectrometer. The instrument has a rhodium-based X-ray tube which was operated at 35 kV with a current to measure the emitted X-rays with a silicon diode detector. The instrument was specifically calibrated for obsidian by measuring a set of 40 very well-characterized obsidian source samples using data acquired by neutron activation analysis (NAA), inductively coupled plasma-mass spectrometry (ICP-MS), and XRF. For more information about this calibration see a publication by Glascock (*2020*).

The artefacts were non-destructively analyzed by XRF. Samples were counted for one minute each. The elements measured include K, Ca, Ti, Mn, Fe, Zn, As, Rb, Sr, Y, Zr, Nb and Th. However, due to the variation in sizes, shapes and thicknesses of the artefacts, the most reliable data is usually only possible for Rb, Sr, Y, Zr, and Nb. Sample size and thickness can be problematic for small artefacts which was solved by examining element ratios (Sr/Rb, Rb/Zr, etc.) as recommended by Hughes (2010). Multiple elements were used to determine differences between sources where ratio values would otherwise overlap.

To determine the absolute dates of the Mesolithic and Neolithic layers at the Darkveti rock shelter, bone material was selected for radiocarbon analysis. This research was conducted using the AMS (Accelerator Mass Spectrometry) method at the Vilnius Radiocarbon Laboratory.

Radiocarbon dates were calibrated using the online calibration program OxCal 4.4.4 (*Bronk Ramsey, Lee 2013*) using atmospheric data from Reimer et al. (*2020*). Samples comprise two fragments of bone Cervus elaphus. The selected samples come from the layer V and IV of Darkveti rock shelter. These layers yielded abundant lithic assemblages alongside notable archaeozoological collections.

Results

Results of XRF analysis were compared to a database of obsidian source samples which were also analysed at MURR using the same Thermo Quantx ARL lab-based XRF spectrometer. An overview of the data reveals two sources for the obsidian in this study. These are: Chikiani in Georgia, and Sarikamiş 2 (Hamamli) source in from layer III and V originated from the Chikiani source. For the samples from layer IV, two Turkiye (Fig. 8-9). All samples originated from the Sarikamiş source, and 20 samples from the Chikiani source. Data are available in Supplemental Table 3.

Radiocarbon analysis yielded a very interesting series of absolute dates, which significantly determined the age of the Mesolithic and Neolithic layers of the Darkveti site (see Table 4). It is noteworthy that Dr. Nebieridze, considering the data and methods available in the 1970s, accurately determined the age of the IV and V layers of the Darkveti epoch (6216-5929 BC and 7308-6826 BC).

Discussion

At the end of the Pleistocene, Southern Caucasus went through considerable floral turnovers, between 14 and 11 ka BP eastern and southern Georgia was dominated by glacial desert-steppe and the moist refugium of western Georgia by mixed forests. The Pleistocene–Holocene transition was characterized by a shift from desert-steppes to oak-xerophyte communities and mixed forests. This situation remained relatively stable until the early Holocene and became apparent by 9 ka BP, which changed during the mid-late Holocene when coniferous forests and mountain grasslands advanced (*Connor, Kvavadze 2009*). After Last Glacial Maximum (LGM) early Holocene witnessed repeated sea-level fluctuations in response to different climatic-environmental influences, altering coastal geomorphology (*Bruckner et al. 2010*), later about the beginning of the mid-Holocene, the Black Sea reached its present level with insignificant alterations (*Tskvitinidze et al. 2020*). These events were accompanied by increased aridity at the end of the Pleistocene, followed by a gradual increase in precipitation, culminating around mid-Holocene and retreating since then (*Connor, Kvavadze 2009*). All these events appear to have been more oscillatory in character but may have had significant impacts on humans (*Bruckner et al. 2010*). Increasing temperatures led to the formation of modern vegetation belts, creating fertile ground for new migrations.

Recent research demonstrates that the physical environment strongly shaped the cultural and genetic landscapes of the Caucasus since the Upper Paleolithic implying genetic continuity in the region and that Y-DNA haplogroups of the past populations were associated with particular biomes (*Tarkhnishvili et al. 2012*). According to those researches, Caucasian Hunter-gatherers (CHG) are the descendants of early anatomically modern humans dispersed from Africa into Eurasia and separated from western hunter-gatherers around 45 ka BP, shortly after their expansion into Europe and from the ancestors of Neolithic populations at 25 kya, around the Last Glacial Maximum (LGM) (*Jones et al. 2015*). As it seems CHG associated with the forested environment, during the LGM, survived in the Colchic refugium of western Georgia (*Tarkhnishvili et al. 2012*), but in the early post-glacial period the migration of hunter-gatherers from elsewhere into the Caucasus intensified (*Gavashelishvili et al. 2021*). Around 9 ka BP Neolithic societies at a greater rate initiated expansion and gradually displaced hunter-gatherer communities in regions with lower forest density and drove hunter-gatherers towards more densely forested areas. Research confirms that during this period hunter-gatherers dominated in western Georgia, while farming societies developed in eastern Georgia, taking more time to colonize the dense forests of western Georgia (*Gavashelishvili et al. 2023, Tarkhnishvili et al. 2014*). The archaeological sites of western Georgia echo these climatic/environmental events and cultural turnovers, especially the cavernous sites of the Upper Imereti, which are on the frontline of some important changes.

The inhabitants of the Darkveti rock shelter mostly preferred flint for making stone tools. Geological surveys indicate numerous sources of flint in the Imereti region. The region is especially rich in Turonian-Cenomanian type flint, which is distinguished by its high quality. It appears that the ancient inhabitants of the rock shelter were well acquainted with different types of flint and preferred it. Obsidian was used less frequently, although high-quality raw materials are also noted here. Geochemical analysis has given us a very interesting picture (Table 5). It is quite reasonable that humans preferred using flint, a readily available raw material in the region, over obsidian, which had sources located at a far distance.

Chikiani Mountain, located in the Javakheti region of southern Georgia near Paravani Lake, is the only source of high-quality obsidian in Georgia. This obsidian is found in the stone collections of archaeological sites from many eras (*Badalyan et al. 2004; Biagi, Nisbet 2018; Biagi et al. 2017; Gratuze, Rova 2022*).

The Darkveti rock shelter is 102 km away from Chikiani in a straight line. For ancient humans, covering such a great distance to obtain obsidian was not a significant challenge. Numerous examples of this practice are well-documented (*Blegen 2017; Doronicheva 2015. 221, 227; Chkhatarashvili, Glascock 2022; Chkhatarashvili et al. 2024*).

The Sarıkamış obsidian source is located in eastern Turkiye, in the modern province of Kars. This region is characterized by a highly mountainous terrain, including volcanic mountains. The obsidian from this area is of high quality, predominantly black and brownish in color. The Sarıkamış obsidian deposit is approximately 227 km away from the Darkveti rock shelter in a straight line.

It is noteworthy that geochemists distinguish between the so-called „Northern" and „Southern" groups in Sarıkamış obsidian (*Chataigner et al. 2014; Bigazzi et al. 1998*). Within the „Northern Group", there are three subgroups: Kızıl Kilise, Handere, and Hamamlı. In the Darkveti obsidian collection, obsidian from the Hamamlı subgroup of the „Northern Group" has been identified.

It is noteworthy that Sarıkamış obsidian has been repeatedly discovered in Stone Age archaeological sites in Western Georgia (*Le Bourdonnec et al. 2012; Chkhatarashvili, Glascock 2022; Chkhatarashvili et al. 2024*). This indicates that ancient humans were well acquainted with these obsidian sources and exhibited a discernible preference for them. This finding serves as further evidence of the mobility and extensive contacts among ancient human populations.

In connection with the chronology of cultural layers of the Darkveti rock shelter discussed in L. Nebieridze's work, substantial information has been provided. Thus, with the use of new dates, we further refine the ages of cultural layers.

The distinguishing feature of the Mesolithic layer at Darkveti rock shelter is the manual pressure technique, used to produce straight, knife-like blades and microblades from pencil-shaped and conical cores. Additionally, this layer contains a significant quantity of lateral microblades, asymmetric triangles, burins of various shapes, end-scrapers, and other tools. As a direct parallel to this layer, notable examples include Kobuleti (*Gogitidze 1978; 2008; Chkhatarashvili, Manko 2020; Chkhatarashvili et al. 2020*), Khutsubani (*Gogitidze 1978; Chkhatarashvili et al. 2024*), Bavra, Bavra I, Bavra II (*Gabunia 2001; Gabunia, Tsereteli 200*3), Bavra-Ablari (*Varoutsikos et al. 2017*), Kvirike (*Gogitidze 1978; Manko, Chkhatarashvili 2022*), Sosruko (M1-M2) (*Zamiyatnin, Akritas 1957; Leonova 2021; Manko, Chkhatarashvili 2021*), etc.

To establish the date of the Mesolithic layer, it is crucial to examine the faunal remains. Paleontological data from Darkveti rock shelter confirm that the presence of fragmented animal bones, often interpreted as food remnants, is characteristic of the Mesolithic fauna.

To determine the age of the Mesolithic layer, the stratigraphic data from Darkveti rock shelter are crucial. Layer V (7308-6826 BC) was deposited directly on sterile, alluvial yellowish loam, and is separated from the Neolithic layer above it by another sterile layer.

The Neolithic layer of Darkveti rock shelter represents the non-ceramic Neolithic period. The primary characteristic of this layer is the use of the hand pressure technique, along with the direct percussion method, evidenced by the presence of prismatic, conical, and pencil-shaped cores. Numerous microliths, including trapezoidal chips from two phases, are abundant in this stratum. Unlike the Mesolithic period, asymmetric triangles are absent in this layer, as anticipated.

Comparable to Layer IV of Darkveti Rock Shelter, we should highlight the complexes of „Cold Cave" („Tsivi Mgvime"), Apiancha, and Melouri (*Kalandadze 1986*), as well as Anaseuli I (*Nebieridze 1972*) and Jvartskvma (*Manko, Chkhatarashvili 2020*). These complexes are characterized by a notable presence of polished stone axes, with ceramics absent in these contexts.

One of the key defining factors of Layer IV is its stratigraphic context with newly quivered absolute date (6216-5929 B.C.). This layer directly overlays the Mesolithic layer, with a sterile gravel layer measuring 1 meter thick separating the two. Therefore, the stratigraphy of Darkveti rock shelter provides compelling evidence for distinguishing between the Neolithic and Mesolithic periods.

Conclusion

The Darkveti Rock Shelter is a significant archaeological site that holds a prominent position in the study of ancient history.

As we saw above, the rock shelter had a very good strategic location, which attracted the attention of the ancient humans of the region. Of course, the intensive use of the site is indicated not only by its good location, but also, apparently, by the favorable paleo-climatic environment and the corresponding abundance of flora/fauna. The study of the cultural layers of rock shelter showed that the site was intensively, however, intermittently used for a number of reasons, from the Mesolithic to the Early Bronze Age.

Recent collaborative laboratory work by Georgian and international scientists has provided crucial insights into the mobility and interactions of the inhabitants of the Darkveti rock shelter. It appears that the selection of raw materials for tool manufacture was of significant importance to the ancient people of Darkveti, who employed specific strategies for this purpose. They were likely well-versed in the available resources and made informed decisions on which materials to prioritize. The fact that these ancient people did not rely solely on the abundant flint deposits in the Imereti region but traveled several hundred kilometers to obtain obsidian is particularly noteworthy. This highlights the need for further study of flint deposits, which could offer a unique perspective on the movement and behavior of ancient populations.

As part of the interdisciplinary research, determining the precise age of the Mesolithic and Neolithic layers at the Darkveti rock shelter using the radiocarbon method was of utmost importance. We must, however, acknowledge the contributions of the site's first researcher, archaeologist Lamara Nebieridze, who approximately 50 years ago, based on the available information at the time, provided us with an estimated age of the layers. Recent research has validated her earlier hypothesis, indicating that life in the Darkveti rock shelter began around the 8th millennium BC and resumed again towards the end of the 7th millennium BC.

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Table 1. Darkveti rock shelter. Stone complexes.

Types of artefacts	Total Number		
Cores and products of knapping	**V layer**	**IV layer**	**Total**
Pencil-like core	4	7	11
Prismatic core	-	2	2
Conic-like core	-	10	10
Flakes (primary, seconday)	616	749	1 365
Blade, Bladelet	219	214	433
Microblade	14	-	14
Tools	**70**	**41**	**111**
Scrapers	29	6	35
Burins	17	5	22
Asimetrical triangles	8	-	8
Trapeze	2	16	18
Segments	-	2	2
Microblades with abrubp retouched	4	-	4
Borers	3	6	9
Denticulate tools	4	2	6
Combined tools	1	-	1
Axe	-	1	1
Millstone	-	1	1
Sinker	1	-	1
Points	-	2	2
Slingstone	1	-	1
Total	**923**	**1 023**	**1 946**

Table 2. Osteological remains of Darkveti rock shelter.

№	Species	Layer IV	Layer V
1	Bos taurus	5/2	-
2	Sus domesticus	47/5	-
3	Ovis aut capra	17/3	-
4	Canis familiaris	1/1	-
5	Capreolu capreolus	179/8	4/1
6	Cervus elaphu	66/2	7/1
7	Sus scrofa	53/1	1/1

8	Rupicarpa rupicapra	3/1	-
9	Capre sp.	1/1	1/1
10	Ursus arctos	8/2	1/1
11	Felis silvestris	2/1	-
12	Males meles	2/1	-
13	Microtus sp.	1/1	-
14	Lutra lutra	4/1	-
15	Martes sp.	14/3	-
16	Erinaceus curopaeus	3/2	1/1
17	Castor fiber	1/1	1/1
18	Glis glis	3/1	-
19	Duromus nitedula	2/1	-
20	Querquedula querquldula	1/1	-
21	Authia ferina	1/1	-
22	Alectorisg raeca	1/1	-
23	Grus grus	1/1	-
24	Pica pica	2/1	-
25	Corvus corone	1/1	-

∗ The numerator of the fraction represents the number of bones, and the denominator represents the number of individuals.

Table 4. Radiocarbon dates of layers of Darkveti rock shelter.

№	Layer	Dates (BP)	Dates 95.4 % (BC)	Dates 68.3 % (BC)	Lab. Index	Sample	Reference
1.	V	8085±47	7308-6826	7174-6863	FTMC-JU83-8	Bone	First published
2.	IV	7190±42	6216-5929	6076-6012	FTMC-JU83-9	Bone	First published

Table 5. Summary of obsidian sources in this samples listed by Darkveti rock shelter.

Layer	Chikiani	Sarıkamış 2 (Hamamlı)
Layer III	18	—
Layer IV	20	2
Layer V	7	—