

THE OLDEST HARVESTING TOOLS OF AZERBAIJAN (ACCORDING TO EXPERIMENTAL- TRACEOLOGICAL RESEARCH)

Los útiles de siega más antiguos de Azerbaiyán de acuerdo con la investigación experimental-traceológica

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ABSTRACT The article represents results of traceological analysis of obsidian and flint inserts from sickles found in early agricultural settlements in Azerbaijan. The diversity of inserts, their position in the slot of the handle, secondary treatment of the working edge allows reconstructing technical traditions of sickles' production. Sickles with blades inserted at an angle into the arched handle, which formed large-denticulated working edges, were the oldest. Sickles with a straight cutting edge formed by blades were used as well. Sickles with macroblades were more often used at the late stages of this early agrarian culture. Besides these three types of arched sickles, the forth type can be found in settlements in Azerbaijan – an archaic harvesting knife with a straight handle. A unique find of bone sickles made of a scapula of large animals from Alikemektepe stand out from other ancient sickles of the agricultural communities of Azerbaijan. Also the results of experimental research of harvesting tools are represented in the article. Productivity and efficiency of various types of sickle as well as durability and ways of inserts fastening in the sickles' slots with bitumen were studied.

Key words: The South Caucasus, Shomutepe-Shulaver Culture, Obsidian and Flint Sickle Blades, Sickle with Curved Handle, Bone Sickles Made from a Scapula, Technical-morphological and Experimental-traceological Methods, Polish, Bitumen, Reconstruction.

RESUMEN El artículo presenta los resultados del análisis traceológico de piezas de obsidiana y pedernal procedentes de hoces halladas en los primeros asentamientos agrícolas de Azerbaiyán. La diversidad de inserciones, su posición en la ranura del mango, el tratamiento secundario del borde de trabajo permiten reconstruir las tradiciones técnicas

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Fecha de recepción: 07-10-2016. Fecha de aceptación: 01-06-2017.

de la elaboración de las hoces. Las hoces con fragmentos de hojas insertados en ángulo en un mango arqueado, que formaban bordes de trabajo con grandes denticulaciones, son las más antiguas. También se usaron hoces con un filo recto constituido por hojas líticas. Las hoces con macrohojas se usaban más a menudo durante las últimas fases de esta antigua cultura agraria. Además de estos tres tipos de hoces arqueadas, se puede encontrar un cuarto tipo en los asentamientos en Azerbaiyán: un cuchillo de cosecha con mango recto. Un hallazgo único de hoces de hueso hechas con escápulas de grandes animales de Alikemektepe se destaca de otras hoces antiguas de las comunidades agrícolas de Azerbaiyán. También se presentan en el artículo los resultados de la investigación experimental sobre útiles de cosecha. Se han estudiado la productividad y la eficiencia de los diferentes tipos de hoces, así como la durabilidad y las formas de realizar las inserciones con betún en las ranuras de las hoces.

Palabras clave: Sur del Cáucaso, Cultura Shomutepe-Shulaver, Hojas de hoz de sílex y obsidiana, Hoz con mango curvo, Hoces de hueso sobre escápula, Métodos técnico-morfológicos y experimental-traceológicos, Pulido, Betún, Reconstrucción.

INTRODUCTION

In archaeological literature and special works devoted to the peculiarities of ancient agricultural cultures, special attention is paid to the characterization of harvesting tools —sickles, while types of inserts, ways of fixing them in handles, features of the traces of utilization of their working blades are considered (Anderson, 2000; Arazova, 2008; Bibikov, 1962; Clemente and Gibaja, 1998; Curwen, 1935; Gurova, 2016; Ibáñez *et al.*, 2008; Korobkova, 1978, 1987; Osipowicz, 2010; Anderson 1999; Semenov, 1949, 1974; Skakun, 1993, 1999; 2008; Spurrel, 1892; Anderson *et al.*, 1993). In this connection, the materials of the agricultural sites of the North Caucasus, which are particularly diverse, are of great interest.

The oldest agricultural archaeological culture, Shomutepe-Shulaver, was formed and located in the territory of Caucasus during VI-V millennia BC (Narimanov, 1966, 1987; Kiguradze, 1976). Wattle-and daub constructions, a large variety of cereal crops, faunal remains of domesticated animals, stone tools, etc. evidence the sedentary and agricultural character of the settlements attributed to this culture. Nowadays a large amount of archaeological material has been accumulated, showing the development of the oldest agricultural economy, which has its origins in the Neolithic-Eneolithic epoch in the territory of Azerbaijan. A wide range of agricultural tools serve as evidence that a toolkit for this activity existed. Bone and stone hoes, grinding stones, pestles and inserts from composite sickles are widely spread across the sites linked to this society. Flint and obsidian inserts from sickles are numerous and account for 20 to 40% of the whole stone industry of the sites. They were found on all of the settlements located in the middle reaches of the Kura River on Ganja-Qazakh plain (Shomutepe, Gargalartepe, Toyretepe, Goytepe, Hasansu, etc.), on Karabakh plain (Ilanlytepe, Chalagantepe), on Mugan' (Polutepe, Alikemektepe), in the valley of the middle reaches of the Araks River, particularly on the territory of Nakhchivan Autonomous Republic (Kul'tepe I) (fig. 1). These finds have since been presented in a range of scientific articles (Narimanov, 1964; Arazova, 1974, 1986).



Fig. 1.—Map of the earliest settlements of Azerbaijan (VI-IV mill BC).

Complex technical-morphological and traceological-experimental studies of the tools from the early agricultural-stock raising sites of Azerbaijan gave new evidence about the oldest agricultural tools and broaden the essential understanding of their function. The precise function of every tool, range of its use, productivity, efficiency and how it was constructed were all identified as a result of this investigation.

Using technical-morphological and experimental-traceological methods, this article will examine the study of one of the leading categories of agricultural tools directly related to harvesting sickles.

RESULTS OF TECHNICAL AND MORPHOLOGICAL ANALYSIS

Flint and obsidian blades and, less commonly, flakes of different shapes and sizes were commonly used as inserts of sickles on ancient sites of Azerbaijan (fig. 2). Wide crescentic backed or rectangular, large and medium sized blades made of greenish-grey argillite, marl and, occasionally, of flint were all used as preforms

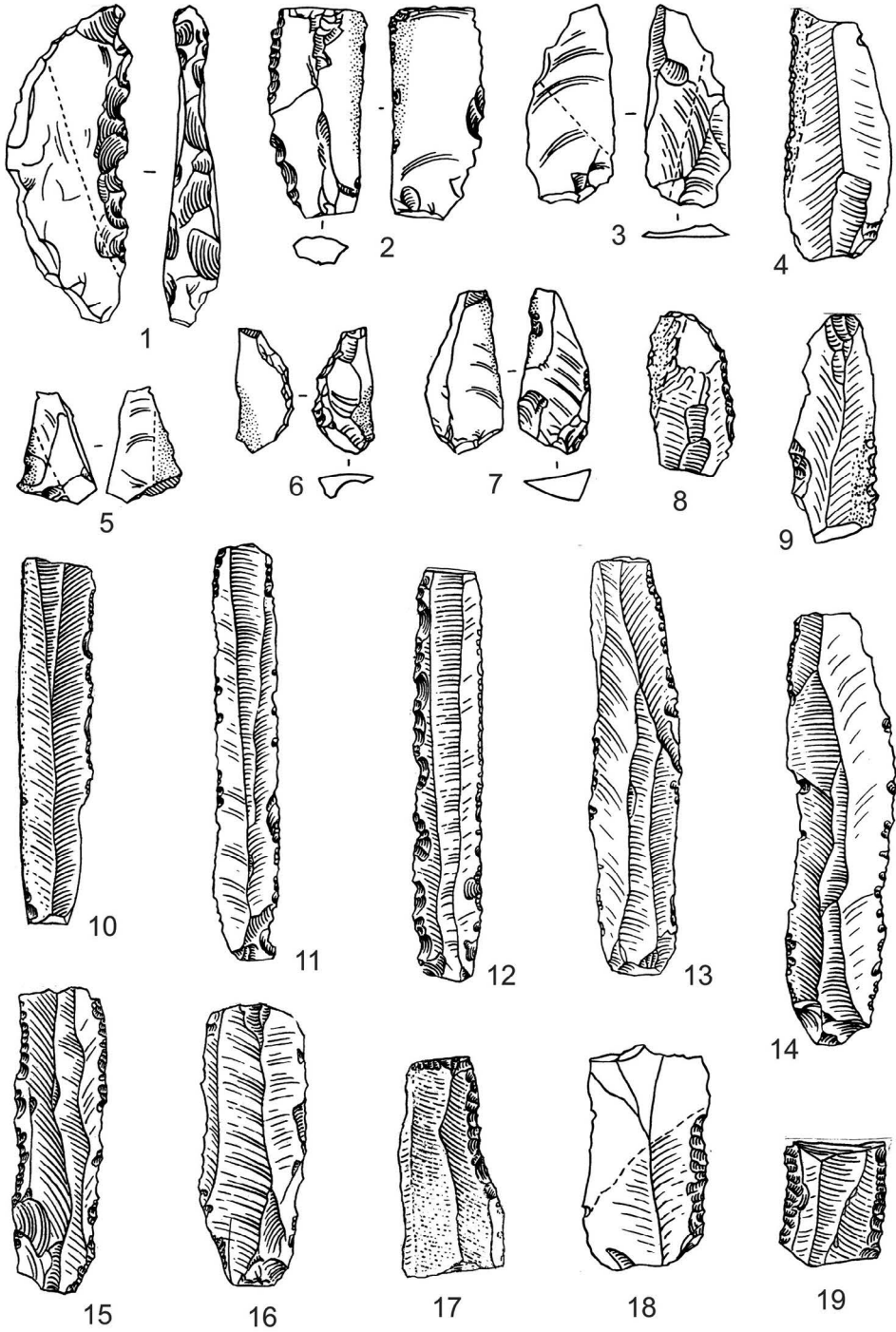


Fig. 2.—Flint (1-9) and obsidian (10-19) sickle blades.

in the settlements located in the valley of the Kura River. Their working edges were thin and sharp and were not generally additionally treated, with the exception of individual tools. Blunted and sharp retouch was more often applied from the dorsal side along the whole lateral side, or alternatively only on the working part outstanding from the handle. These differed from the flint inserts from the settlements in southern districts such as Chalagantepe, Polutepe and Alikemektepe. Here blades made of light, transparent, good quality flint and quartzite were used. They were predominantly prismatic, regularly or irregularly shaped, big and elongated blades, although segments have since almost disappeared. The presence of a retouched working edge became more common, but retouch was frequently careless, heavy and sharp, applied on a lateral edge from the ventral part. There are also inserts with a fine-denticulated and elaborately treated cutting edge.

Numerous obsidian inserts were discovered among prismatic retouched blades and so called “chipped blades”.

RESULTS OF TRACEOLOGICAL ANALYSIS

Use-wear analysis shows that traces of smoothing and a matte surface are presented on many of obsidian inserts as a result of their regular use; and flint sickles' inserts also show that a high luster is located on different parts of the working edges (fig. 3).

The surface on the corner of the blade on the inserts from the settlements of the Ganja-Qazakh plain is polished, whereas the blades from the sites of Alikemektepe and Chalagantepe have the same traces of use, but also show a high luster located along the long edges of the blades. Consequently, these differences that are evidenced by microanalysis show varying positions of inserts in the handle of the sickle. Thus two different types of insert can be seen: those with angular and those with marginal polishing. A similar range of features are typical for a large number of blades, as revealed in certain synchronous stone industries of Caucasus (Korobkova, 1987).

DISCUSSION OF ARCHAEOLOGICAL MATERIAL

Consequently, we might suppose that the following types of sickles were known among early agricultural communities of Azerbaijan. Sickles with blades inserted at an angle into the arched handle, which formed large-denticulated working edges, were the oldest and most widespread among them (fig. 4:2). This is shown by the discovery of a bone sickle on the site Shomutepe (fig. 4:5) along with five wooden sickles from Shomutepe and Toyretepe (Narimanov, 1987). Obsidian and flint inserts were found in the residue left on the wooden handles. Bone sickle with preserved inserts-barbs from Neolithic site Goytepe is of a particular interest (Guliev and Nishaiki, 2012; (Nishaiki and Guliev, i.p.).

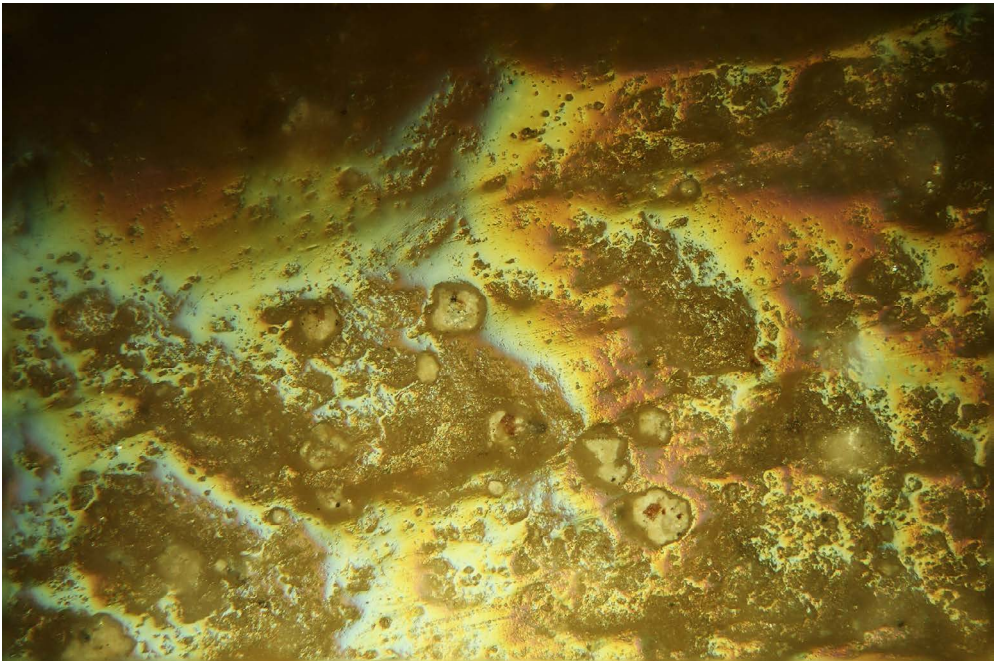
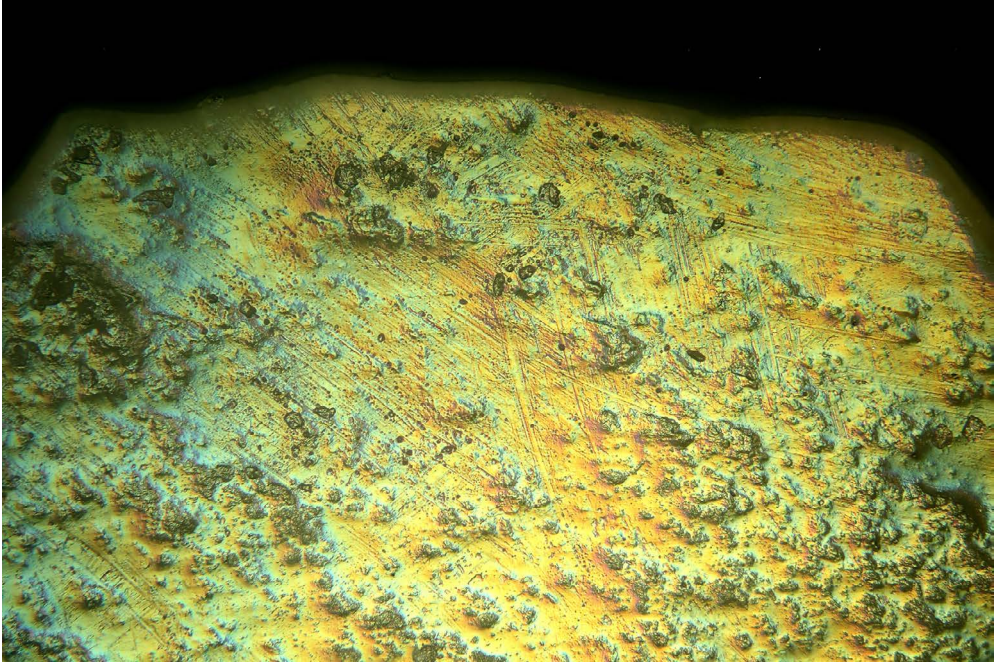


Fig. 3.—Microphotos of traces on flint sickles' inserts (a, $\times 100$ and b, $\times 200$).

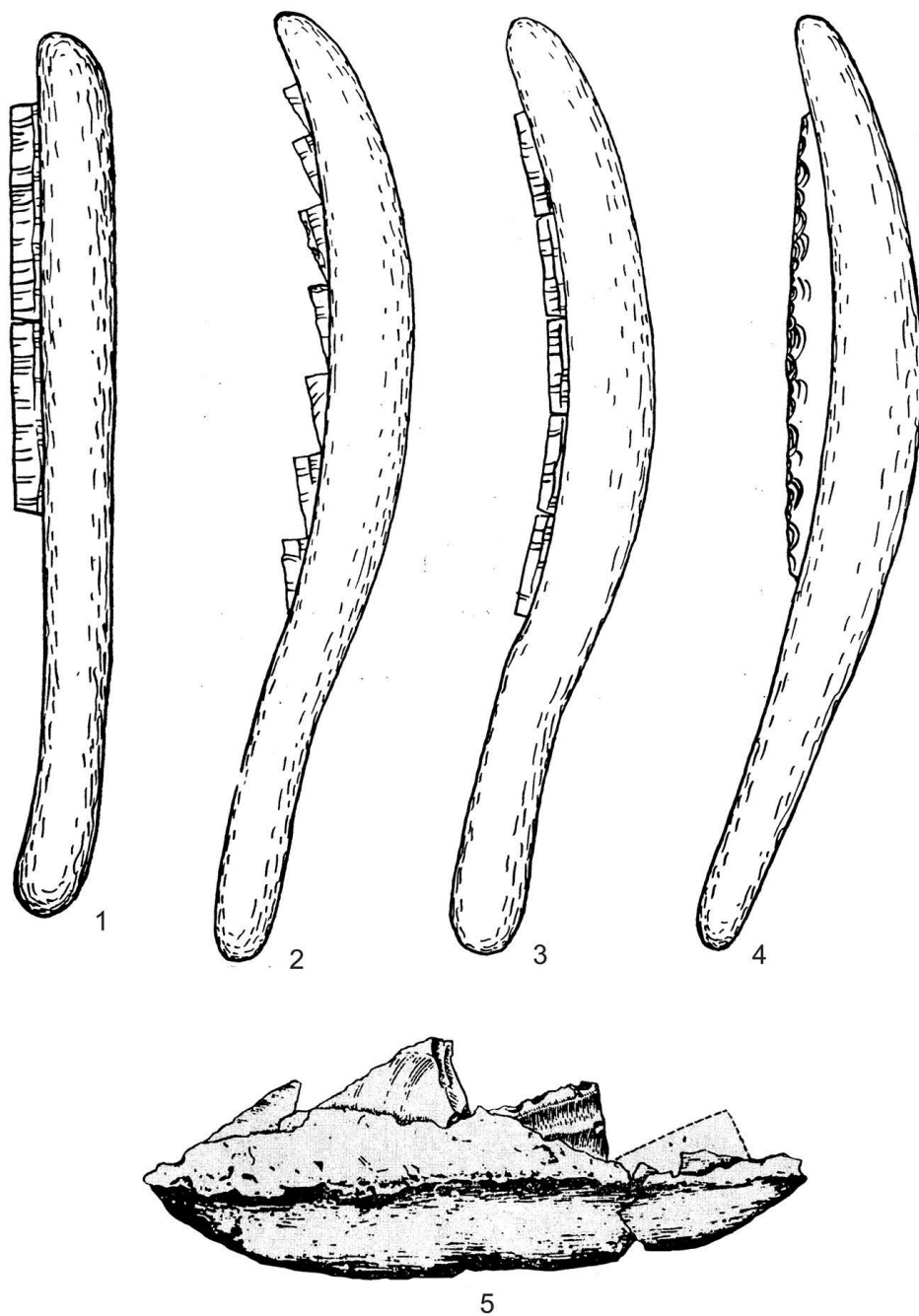


Fig. 4.—1-4) The reconstruction of the sickles from the earliest settlements of Azerbaijan.
5) Shomutepe sickles on bone basis.

Apparently sickles of this type were widespread in early agricultural sites of the Ganja-Qazakh plain in western Azerbaijan. They were also found in the neighboring Marneulskaya plain in south-eastern Georgia (Esakiya, 1984) and the sites Chalagantepe and Alikemektepe. As it is well established, blade-denticulated composite sickles are characteristic of the harvesting tools of early agricultural communities of Eastern and Central Europe (Bibikov, 1962; Kunchev, 1967). However, in contrast to the Shomutepe sickles, rectangular and regularly shaped blades were inserted into their sickles, which were then set in the seat of the handle by a plant gum. Sickles from Yarymtepe II in Northern Mesopotamia are identical to those in Shomutepe. Almost an entire sickle with a slightly bent bone handle and obsidian and flint oblique blades were all found in upper horizons of this site (Munchajev and Merpert, 1981).

The second type of sickle could be reconstructed on the basis of inserts found in Alikemektepe and Chalagantepe, where blades with a high luster along long edges were predominantly found (fig. 4:3). Such traces of use show another insert's position in the sickle's handle: the blades were placed close to one another in the sets, not obliquely but horizontally, and a straight cutting edge was consequently formed. Such use traces and methods of inserting in the handle are also typical for large obsidian blades found in Kul'tepe I, located in Nakhchivan AR. However, as distinguished from flint blades with a high luster on a working edge, a narrow matte line along the very edge could be traced on obsidian blades.

It can be seen by the particularities of their construction and the methods of fastening the inserts that these harvest tools are very similar to Near Eastern sickles. Six sickles made from antler were found in the VI horizon of the site Hajilar and inserts made from siliceous limestone located parallel to the set had been preserved in just two of them. The cutting edge of one of these sickles measured 20 cm in length and was made of 7 blades' sections (Mellart, 1970). Two arched sickles were found on the site Tell es-Sawwan. One of them consisted of flint inserts and another one of three flint blades and one of obsidian, placed parallel to the set and fastened with bitumen (El-Wailly and Abu es-Soof, 1965). Sickles with a straight cutting edge along with sickles with large-denticulated working blades were used on the sites Yrymtepe II, Alikemektepe and Chalagantepe (Munchajev and Merpert, 1981).

Entirely different constructive features were identified for the third type of sickle. Despite the sickle with curved handle, the cutting edge was made of a single, very large, elongated blade, placed into the set horizontally (fig. 4:4). Such inserts, more often made of flint, could be found on the settlements of Alikemektepe and Chalagantepe. Similar inserts were also uncovered on the site Kul'tepe, where obsidian microblades were a typical preform (Arazova, 2012). According to reconstructions made by G. F. Korobkova, ancient societies of neighboring areas of the Caucasus—Ginchi and Hatunarh—preferred these sickles (Korobkova, 1978), whereas only these harvesting tools are typical for the late Trypillian sites (Bibikov, 1962).

A unique find of bone sickle made of a scapula of large animal from Alikemektepe stand out from other ancient sickles of the agricultural communities of Azerbaijan. The upper part of the scapula, ergonomic in its handling, remained

unchanged, whereas a thin edge that served as a working edge was denticulated and retouched along the edge. The cutting edge was smoothed and polished by the work. Its length is 40 cm. Such harvesting tools have not been found in other ancient sites in Caucasus. It was attributed to a stand-alone type of the most ancient sickles by F. Mahmudov (Mahmudov, 1984).

The fourth type of archaic harvesting knives with a straight handle could also be found on certain settlements, along with the three aforementioned more advanced types of arched sickle (fig. 4:4). Individual discoveries of flint inserts have been found on the sites Shomutepe and Toyretepe, as well as in Alikemektepe and Kultepe. Harvesting knives are a well-known, commonplace type of tool in the sites of Djeitun culture, and they survived in the southern Turkmenistan through to Eneolithic time (Korobkova, 1969).

Thus it might be supposed that sickles with curved handle made of wood, antler or large animals' jaws, regardless of the inserts' position in the base, were widespread across the early agricultural sites of Azerbaijan. They remained unchanged throughout the duration of the Shomutepe society. However, some constructive details, for example the inserts' treatment, their position in the sickle etc., evolved. According to G. F. Korobkova, "the development of harvesting tools within one cultural entity does not consist of changes in handle form, which remained the same, but becomes apparent in the treatment of the inserts" (Korobkova, 1978). Such changes could be explained by local and chronological differences in the evolution of harvesting tools. Inserts without any cutting edge treatment were predominantly used on the sites of the Ganja-Qazakh plain. Blade-denticulated composite sickles account for the main type of sickles in this area. Retouched blades were more often recorded on the sites located in the Mil-Karabakh steppe and Mugan, and are generally attributed to the late Eneolithic. Sickles with a straight cutting edge are dominant. Other sickles with one large blade could also be recorded on the sites Alikemektepe and Kultepe. Thus, it could be supposed that the transition from sickles with an oblique cutting edge to those with a straight one can be traced throughout the early stages of agricultural communities in Azerbaijan. The latter were widespread in Caucasus during the Bronze Age. However, their cutting edge was made of bifacial flint blades with denticulated working edge. It was during this period that metallic sickles appeared (Kushnareva and Chubinshvili, 1970; Munchaev, 1975).

EXPERIMENTAL DATA

In addition to this, interesting data was collected by an experimental-traceological expedition with the study of harvesting tools of ancient agricultural societies. It identified the productivity and efficiency of various types of sickle made as ancient harvesting tools of the VI-V mill BC. Late Trypillian sickle appeared to be 1,5 times less efficient than a modern one. The sickles of Alikemektepe and Kultepe, with one large blade in a base, also show a high level of productivity, followed by

the Shomutepe sickle with an obsidian blade and a sickle of the alikemektepe type, made from close-fitted inserts. They are 1,7 times less efficient than a modern one. This means that productivity ratio of abovementioned sickles is equal to 0,9–1,1 (Korobkova, 1978).

The experiments also showed a significant durability of the flint sickles. It was identified that the Shomutepe sickle could be used for two working seasons. During this time, it was only slightly refreshed (Korobkova, 1978).

Interesting data concerning the ways of fastening the inserts was also collected. Traces of a black residue inserted into the set, clearly delimiting a working edge from the part, could be found on almost all flint inserts of sickles. The discovery of gum material, preserved in the sickle remains and inserts, shows that residue was used to fasten the inserts into the set. The analysis of these gum samples from Alikemektepe and Toyretepe showed them to be of cutback bitumen origin from Azerbaijan, widely used in the households during the Prehistoric and Middle ages (Arazova, 1981). Experiments conducted by Lithuanian experimental expeditions showed that sickles fastened by bitumen survived high tensions of up to 100 kg (Semenov, 1974).

CONCLUSION

The technical-morphological and experimental-traceological study of the oldest harvesting sickles, their great diversity suggests the existence of local technical traditions in the sickles' performance, a high level of agriculture and characteristics of the paleoeconomy of ancient societies of Azerbaijan. With the development of agricultural economy, the toolkit was improved, allowing for the improvement of harvesting tools. This is also clearly demonstrated by a unique rock carving from Gobustan near Baku, depicting an ancient farmer standing upright with a sickle with curved handle in his right hand (Djafarzade, 1973).

ACKNOWLEDGMENTS

The research was carried out within the framework of the program of fundamental scientific research of state academies of sciences on the topic of state work: No. 0184-2018-0006 "Production and use of tools in the Paleolithic, Neolithic and Bronze Age (technological, traceological and experimental study of archaeological materials" and partly RFBR grant No. 16-06-00546.

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