The Middle to Upper Paleolithic Transition in the Zagros: The Appearance and Evolution of the Baradostian

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Abstract

During oxygen isotope stage 3, the widespread emergence of Early Upper Paleolithic technologies signals significant changes in human behaviors. These profound changes are usually attributed to new major dispersals of Anatomically Modern Humans in Western Eurasia and the process of Neanderthals extinction and their replacement by Anatomically Modern humans. New lines of evidence and studies from pertinent geographical regions are essential to improve current explanatory models and hypotheses. The Zagros Mountain range in the west of Iran with its Intermountain eco-cultural niches is one of the areas that increasingly contribute to our knowledge of the transitional period from Middle to Upper Paleolithic in Southwestern Asia. This paper examines the lithic-based dominant hypothesis of continuity in Zagros through a more technology oriented view and put together all the evidence to build a broader overview of the Baradostian or the Early Upper Paleolithic of Zagros and its industrial evolution.

Keywords

MP-UP Transition • Early Upper Paleolithic • Baradostian • Zagros Aurignacian • Zagros • Iran

10.1 Introduction

The interval between 50,000 and 40,000 years ago (roughly) is a crucial time span during which Western Eurasia went through important population changes in the records of human evolution. Why and how and when this shift or, as it is commonly called, the Middle to Upper Paleolithic transition, happened is the subject of a fast-growing filed of research today. The important transitional events of this period eventually lead our ancestors to spread broadly across West Eurasia by 35,000 years ago. The probable responsible factors, whether biological, socio-cultural, environmental or an intertwined process of multiple factors, are not completely known. This wide dispersal of anatomically modern humans, directly or indirectly contributed to the demise of Neanderthals and disappearance of their long-lasting material cultures. The development of DNA sequencing technologies over the past decade, particularly the interesting advancement of Neanderthal genome sequencing, assured us of the contact scenario and confirmed the previous fragmentary palaeontological evidence. Based on these analyses, now we know that Neanderthals contributed approximately 1–3% of the genomes of current Eurasian populations and significantly higher in some available anatomically modern human specimen genomes (e.g. Green et al. 2010; Reich et al. 2010; Prüfer et al. 2014; Sankararaman et al. 2012; Meyer et al. 2012; Fu et al. 2014, 2015). These studies provided evidence for the admixture model or, more specifically, the interbreeding model and estimated that the last gene flow from Neandertals into Europeans occurred between 37,000–

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86,000 years ago, and most likely 47,000–65,000 years ago (Sankararaman et al. 2012). Also more recent confirmation for the interactions between moderns and Neanderthals came from the study of genomes from the Oase 1 modern human, dating back to 37,000–42,000 year ago (Fu et al. 2015). However, new comparative evidence from the Altai Mountains, Spain and Croatia suggests that the genetic contribution of modern humans to Neanderthals seems to go back thousands of years earlier (to roughly 100,000 years ago) than previously thought (Kuhlwilm et al. 2016).

Compared to Europe and the Levant, very little information is available to study the dispersal of anatomically modern humans into other parts of southwest Asia. In order to explain the related localized events in the geographical regions where fossil records and biological evidence are unavailable, we mainly rely on studies of archaeological sequences and their material cultures. For instance, in a geographically strategic region like Iran, it is the emergence of Early Upper Paleolithic technologies that signals significant changes in human behaviors at the interface of Middle to Upper Paleolithic, rather than fossil records. In Europe, the transitional lithic industries and then Aurignacian technocomplexes signal significant changes in human behaviors, and in the Levant and central Asia, Initial Upper Paleolithic industries followed by bladelet industries like early Ahmarian document such changes between 50 and 35 ka cal BP. In the Zagros, the Baradostian, which also is called Zagros Aurignacian, is one of the EUP cultures that increasingly contribute to our knowledge of the transition from Middle to Upper Paleolithic in Southwestern Asia. Despite more than a decade of renewed research in Iran, still the major part of the information on the Iranian Early Upper Paleolithic comes from Zagros region or, in other words, from several cave and rockshelter sites in the intermountain valleys of Kermanshah and Khorramabad and a few sites in Fars province in the southern Zagros (Fig. 10.1). The resemblance of Zagros Baradostian lithic industries with Aurignacian technocomplexes of Europe and the Levant and also the hypothesis that it evolved out of underlying Zagros Mousterian promoted the Baradostian as one of the potential candidates for ambiguous origin of Aurignacian.

This paper examines the lithic-based dominant hypothesis of continuity in the Zagros through a more technology oriented view and puts together the available information and evidence to build a broader overview of the Early Upper Paleolithic in Zagros and its industrial evolution. The main objective of the paper is the nature and extent of behavioral change in the beginning of the Early Upper Paleolithic in the Zagros and implications for a significant increase of behavioral complexity. For this purpose, a critical review of existing hypotheses of the Zagros Middle to Upper Paleolithic transition is provided and new data from a recent technological study of the rich and well-preserved Yafteh lithic assemblages opens up new perspectives on the subject.

10.2 The Formation of Middle to Upper Paleolithic Research in Iran

10.2.1 Initial Quests for the Origin of the Earliest European Upper Paleolithic in Southwest Asia

In the beginning of the twentieth century, the search for the origin of the Aurignacian in Europe led some researchers, who were mainly the supporters of the diffusion theory, to turn their attention toward the Levant and further east to the Zagros Mountains. As the divisions of Upper Paleolithic sequence, particularly the Aurignacian, were being formed in France (e.g. Peyrony 1933; de Sonneville-Bordes 1958; Delporte 1968), Dorothy Garrod, who proposed the subdivisions of Chatelperronian, Aurignacian and Gravettian (Garrod 1937, 1938), also attempted to find an outer origin for the first European Upper Paleolithic. Garrod was the pioneer of such research in Zagros (Garrod 1930) but the results of excavation in Zarzi rock shelter revealed a very late Upper Paleolithic (today called the Epipaleolithic tradition of Zarzian) that changed her idea (Garrod 1953). By 1953, she believed that the Aurignacian arrived in the Levant after the same culture had already been established in Europe and the direction of diffusion seemed to be more likely from the West to the East rather than reverse (Garrod 1953; Olszewski 1999).

However, the excavation of Shanidar cave in Iraq revealed an early Upper Paleolithic industry in the Northern Zagros (Solecki 1952, 1953). The unknown lithic industry of Layer C in Shanidar was presented as a new Upper Paleolithic blade and burin industry by Solecki and given a local name of "Baradostian" after consulting with Dorothy Garrod on its distinguishable character from Aurignacian (Solecki 1958). However, Solecki still could not ignore the similarities of the two industries and stated that the Baradostian is an Upper Paleolithic blade and burin industry with many characteristic indicators of Aurignacian in Europe. He even went further and hypothesized that the Baradostian was the earliest Aurignacian in the Near East and entered Southwest Asia from Eurasia via Transcaucasia following the Wurm II glaciations (Solecki 1958).

In the early years of the radiocarbon application, layer C of Shanidar cave dated to more than 34,000 BP in its lower part and 29,500 BP in the top (Table10.1). These dates and stratigraphical observations convinced Solecki of a stronger probability of discontinuity between the Baradostian and the underlying Mousterian in Shanidar cave (Solecki 1958).

Fig. 10.1 The location of main known Early Upper Paleolithic sites of Iran (Basemap courtesy of NASA's Visible Earth http://visibleearth.nasa.gov/)

10.2.2 Tendency toward "Continuity"

About 10 years after the Iraqi-Jarmo project, Robert J. Braidwood conducted his Iranian Prehistoric Project in Kermanshah, central western Iran. During these expeditions that began in late 1959, they excavated several sites near Kermanshah; Warwasi rockshelter was among these sites (Braidwood 1951, 1960; Braidwood et al. 1960, 1961). The excavators of Warwasi, assigned the blade industry found in the intermediate horizon between the Mousterian and Upper Zarzian layers, to the Baradostian and described it briefly at the time of excavation.

According to Braidwood's report, the Baradostian industry consisted of high frequency of burins (as Solecki also noted in Shanidar) following by different types of scrapers and blade tools. In the same report, they suggested that the succession of cultural layers proceeded without a visible interruption between the Mousterian and Baradostian at Warwasi (Braidwood 1960).

In the 1980s and early 1990s, after the politically caused termination of foreign archaeological projects in Iran, publication of excavations results turned attentions toward Iran. No doubt one of the most influential studies of these materials was the work of Deborah Olszewski and Harold Dibble on the lithic assemblage of Warwasi rockshelter. In 1994 Olszewski and Dibble emphasized the close similarities of the Baradostian to the Aurignacian and even went further to rename it as the "Zagros Aurignacian" (Olszewski and Dibble 1994). Presence of Mousterian elements in the early Baradostian layers of Warwasi led them to raise the hypothesis of the continuity between the Zagros Mousterian and Baradostian at Warwasi. The assemblages resulted from the 2.2 m of deposits of the Baradostian at Warwasi being divided into two phases of the Early Zagros Aurignacian (Levels AA-LL) and the Late Zagros Aurignacian (Levels P-Z). The main typological characteristics of these assemblages have been described as burins and end scrapers including carinated forms (Fig. 10.2), retouched blades and bladelets which usually are equivalent to Dufour bladelets and Font-Yves points (Arjeneh points) and finally some notches and denticulates, borers and retouched pieces (Olszewski and Dibble 1994, 2006).

From a technological point of view, the Early Zagros Aurignacian assemblage is dominated by flake debitage but

Table 10.1 Table summarizing 14C dates (Uncalibrated) obtained for the Upper Paleolithic sequences cited in this paper

Site	Depth (−cm)	Archaeological context	Collected Year	Age	Lab. Num ber	References
Shanidar Cave		Layer C	1953	28,700 ⊥: 700	W-654	Hole and Flannery (1967)
Shanidar Cave	ca.300	Layer C (Upper part- S3Wl)	1953	29,500 ⊥: 1500	W-178	Hole and Flannery (1967), and Solecki (1958)
Shanidar Cave	ca.460	Layer C (Lower part- 52 W4)	1953	>34,000	W-180	Hole and Flannery (1967), and Solecki (1958)
Shanidar Cave		Layer C	1953	33,300 ⊥: 1000	W-650	Hole and Flannery (1967)
Shanidar Cave		Layer C	1953	33,900 ⊥: 900	GrN-1830	Hole and Flannery (1967)
Shanidar Cave		Layer C	1953	34,000 ⊥: 4 20	Grn-1494	Hole and Flannery (1967)
Shanidar Cave		Layer C	1953	35,440 ⊥: 600	GrN-2016	Hole and Flannery (1967)
Shanidar Cave		Layer C	1953	34,540 ⊥: 500	GrN-2015	Hole and Flannery (1967)
Yafteh Cave	125	Stratum 5	2005	24,470 ⊥: 280	Beta-206,711	Otte et al. (2007, 2011)
Yafteh Cave	150	Stratum 13	2005	33,400 ⊥: 840	Beta-206,712	Otte et al. (2007, 2011)
Yafteh Cave	200	Y6e -Ash bed	1965	34,800 + 2900/−4500	GX-711	Hole and Flannery (1967)
Yafteh Cave	201	Y4e- Ash bed	1965	32,500 + 2400/−3400	GX-710	Hole and Flannery (1967)
Yafteh Cave	201	Y4e -Ash bed	1965	29,410 ⊥: 11 50	Sl-332	Hole and Flannery (1967)
Yafteh Cave	210.5	Stratum 15	2008	33,800 ⊥: 330	Beta-245,910	Otte et al. (2011)
Yafteh Cave	212	Y6e -Ash bed	1965	30,860 ⊥: 3000	51–333	Hole and Flannery (1967)
Yafteh Cave	213	Stratum 16	2008	32,190 ± 290	Beta-251,058	Otte et al. (2011)
Yafteh Cave	213 5	Stratum 16	2008	33,160 ⊥: 240	Beta-251,062	Otte et al. (2011)
Yafteh Cave	226.5	Stratum 17	2008	32,900 ⊥: 290	Beta-251,059	Otte et al. (2011)
Yafteh Cave	234	Stratum 17	2008	33,260 ⊥: 300	Beta-251,060	Otte et al. (2011)
Yafteh Cave	236	Stratum 17	2008	33,430 ⊥: 310	Beta-245,908	Otte et al. (2011)
Yafteh Cave	240	Stratum 17	2005	35,450 ⊥: 600	Beta-205,844	Otte et al. (2007, 2011)
Yafteh Cave	245	Stratum 17	2008	33,330 ⊥: 310	Beta-245,909	Otte et al. (2011)
Yafteh Cave	250	Y4e -Ash bed	1965	21,000 ⊥: 800	51–336	Hole and Flannery (1967)
Yafteh Cave	251	Stratum 17	2008	31,120 ⊥: 240	Beta-251,061	Otte et al. (2011)
Yafteh Cave	258 5	Stratum 18	2008	34,360 ⊥: 340	Beta-245,913	Otte et al. (2011)
Yafteh Cave	260	Stratum 18	2008	32,770 ⊥: 290	Beta-245,907	Otte et al. (2011)
Yafteh Cave	260	Y6e -Ash bed	1965	38,000 ⊥: 3400/ -7500	GX-709	Hole and Flannery (1967)
Yafteh Cave	266.5	Stratum 18	2008	33,520 ⊥: 330	Beta-245,911	Otte et al. (2011)
Yafteh Cave	273	Stratum 19	2008	34,160 ⊥: 360	Beta-245,912	Otte et al. (2011)
Yafteh Cave	278	Y4e - Ash Bed (Upper)	1965	>36,000	GX-708	Hole and Flannery (1967)
Yafteh Cave	280	Y6e -Ash bed	1965	31,760 ⊥: 3000	51–334	Hole and Flannery (1967)
Yafteh Cave	280	Y4e - Ash bed (Upper)	1965	34,300 ⊥: 2100/ -3500	GX-707	Hole and Flannery (1967)
Yafteh Cave	285	Y4e - Ash Bed (Lower)	1965	>40,000	Sl-335	Hole and Flannery (1967)
Yafteh Cave	290	Y4e - Ash Bed (Lower)	1965	>35,600	GX-706	Hole and Flannery (1967)
Eshkaft-E Gavi Cave	80	Operation B	1978	>27,640	P-2861	Rosenberg (1985)
Eshkaft-E Gavi Cave	90	Operation B	1978	>28,000	P-2862	Rosenberg (1985)
Eshkaft-E Gavi Cave	90	Operation B	1978	24,240 + 3010/−2180	P-2863	Rosenberg (1985)

(continued)

Table 10.1 (continued)

Site	Depth (−cm)	Archaeological context	Collected Year	Age	Lab. Num ber	References
Eshkaft-E Gavi Cave	110	Operation B	1978	18,150 ± 1500	P-2864	Rosenberg (1985)
Eshkaft-E Gavi Cave	115	Operation B	1978	19,230 + 4310/ -1340	P-2865	Rosenberg (1985)
Eshkaft-E Gavi Cave	130	Operation B	1978	>27,300	P-2866	Rosenberg (1985)
Ghar-e Boof	ca.120	AH-Ill	2007	31,150 + 250/−240	KIA32761	Conard and Ghasidian (2011)
Ghar- e Boof	ca.150	AH-IV	2007	33,060 + 270/−260	KIA32763	Conard and Ghasidian (2011)
Ghar-e Boof	ca.160	AH-JV	2007	36,030 + 390/−370	KIA32765	Conard and Ghasidian (2011)
Ghar-e Boot	ca.130	AH-lllb	2007	33,850 ± 360	OxA-25,783	Ghasidian et al. (2017)
Ghar-e Boof	ca.130	AH-lllb	2007	34,900 ± 650	OxA-25,785	Ghasidian et al. (2017)
Kaldar Cave	110	Tl; L4; SLS; SQ E6	2014–2015	33,480 ± 320	OxA-32,238	Bazgir et al. (2017)
Kaldar Cave	85	Tl; L4; SLS; SQ E7	2014–2015	39,300 ± 550	OxA-X-2645-11	Bazgir et al. (2017)
Kaldar Cave	125	Tl; L4; SLSII; SQ E6	2014–2015	49,200 ± 1800	OxA-X-2645-12	Bazgir et al. (2017)
Garm Roud	1010	Unit 8	2005–2006	23,920+/−160	Beta-206,996	Berillon et al. (2007)
Garm Roud	1010	Unit 8	2005–2006	27,100+/− 270	Beta	Antoine et al. (2016)
Garm Roud	1010	Unit 8	2005–2006	28,180 +/−300	Beta	Antoine et al. (2016)
Garm Roud	1010	Unit 8	2005–2006	29,530 +/− 220	Beta	Antoine et al. (2016)

also contained a modest frequency of prismatic blade and bladelet debitage as well as almost the same frequency of tools manufactured on prismatic blade or bladelets. It also contained laminar flakes of the Middle Paleolithic technological strategy. The tools of the Early Zagros Aurignacian consisted of both Middle and Upper Paleolithic elements (Olszewski and Dibble 1994, 2006). However, the Late Zagros Aurignacian of Warwasi is described as an industry with a high frequency of blades and bladelets (in particular bladelets). Tools were manufactured mainly on blades and bladelets and cores were mainly single platform blade/bladelet forms with some blade and bladelet opposed platforms cores and carinated burins and endscrapers which were frequently found in this later phase. Lack of an abrupt break between the Mousterian and Baradostian at Warwasi and presence of Middle Paleolithic techno- typological elements like sidescrapers, truncated-facetted pieces and small radial cores in the beginning of the Baradostian led Olszewski and Dibble to purpose the probability of continuity in this site (Dibble 1984; Dibble and Holdaway 1990, 1993). However, despite their tendency toward cultural continuity and hypothesizing about the origin of Aurignacian in Zagros, they expressed their doubts over the current state of data and its sufficiency to enlighten the issue of a transition from the Zagros Mousterian to Zagros Aurignacian (Olszewski 2001; Olszewski and Dibble 1994, 2006). In addition to the previous studies, a recent taphonomical analysis of the Warwasi assemblage did not find convincing evidence of direct refits between the Mousterian and the Early Baradostian nor a technological connection between the Mousterian and the Early Upper Paleolithic of Zagros (Tsanova 2013).

Back in 1963, the sequence of Warwasi rockshelter inspired Frank Hole and Kent Flannery to begin a research project with similar goals, to clarify the Paleolithic sequence successions in "Khorramabad," another major valley of Zagros (Hole and Flannery 1967). The abundance of materials discovered during the Khorramabad excavations permitted Hole and Flannery to study the diachronic changes of the lithic artifacts from the Late Mousterian to the Zarzian and as a result, they defined two subdivisions for the Baradostian. Based on artifact typology, Hole and Flannery also suggested the possibility of gradual development of Baradostian lithic industries out of the Late Mousterian in this region. However, the only site with a sequence containing superposition of both Middle and Upper Paleolithic layers was Gar Arjeneh rockshelter but its MP-UP intermediate layers were severely disturbed. According to Hole and Flannery, the Baradostian displayed an increase in tool types and emphasis on blade production but the subsistence pattern did not show a great difference between the two periods (Hole and Flannery 1967). One of the significant results of this project was 13 radiocarbon dates (Table 10.1); most of them fell between 29,000 and 38,000 B.P for the two meters of Baradostian deposits of Yafteh cave (Hole and Flannery 1967).

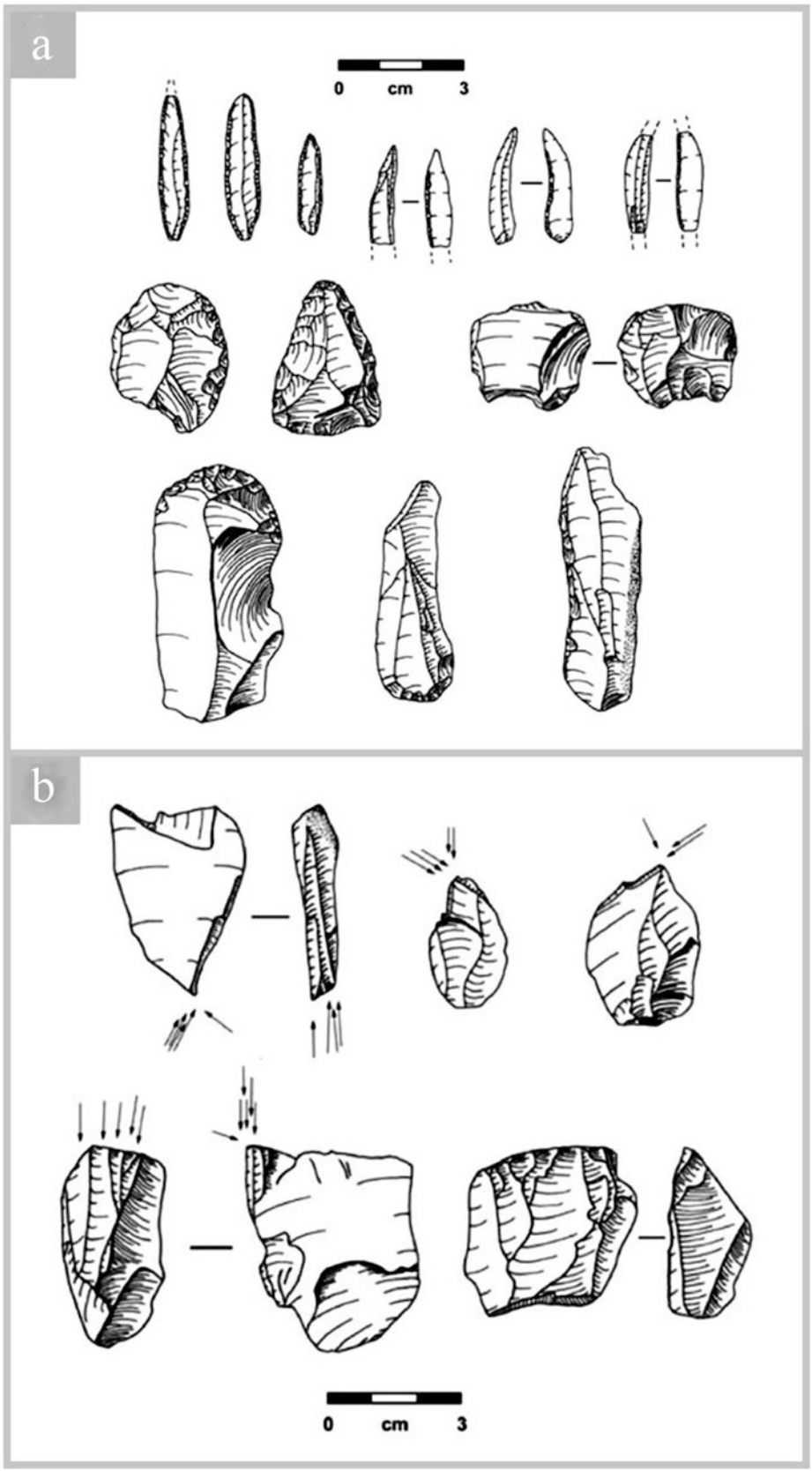

Fig. 10.2 Example of Early Zagros Aurignacian lithic artifacts (**a**) and example of Late Zagros Aurignacian lithic artifacts (**b**) at Warwasi (Olszewski and Dibble 2006)

10.2.3 The Lack of Evidence for Continuity Persists

In 1965, the same year of Khorramabad excavations, Philip Smith and Cuyler Young conducted a research project in the Kangavar-Bisitun area. Their test excavation in Ghare Khar did not reach bedrock but revealed a 5-meter deposit encompassing Middle, Upper and Epi-Paleolithic cultural layers. Smith and Young described the artifacts found in the Upper Paleolithic deposits as a blade tools industry with a frequency of burins including multiple blow burins. This industry was described as having end scrapers, round scrapers, backed blade/bladelets which were found in low frequency and also some notches and strangulated blades. In their report, Young and Smith doubted the continuity between the Upper Paleolithic lithic industries and the underlying Mousterian, an assumption confirmed by a recent study of the materials (Fig. 10.3) (Young and Smith 1966; Shidrang et al. 2016).

Following Garrod who initiated the quest for the origin of the EUP in the Middle East, the first investigation with a primary objective of an eastern origin for the European Upper Paleolithic in Iran was conducted by C.B.M McBurney in 1963. It also resulted in doubts and uncertainties.

In his report on the Cambridge University expedition in north-eastern Iran, McBurney described that the primary objective was to explore the area for traces of local Upper Pleistocene cultural sequences and particularly the establishment of the chronology and nature of the Upper Paleolithic in this region.

McBurney believed that the Upper Paleolithic blade and burin industries of Europe should have a single centre of origin in Southwest Asia. He also proposed that one should detect the traces of this diffusion along the principal geographical routes into Southeast Europe, maybe from Anatolia or northwards over the Caucasus Mountains or northeastward through Kurdistan into the Caspian shore and then northwards into the Turkmen Plain (McBurney 1964). Unable to continue their research in the east of Iran, in 1969 the Cambridge team turned to Central Zagros and continued the research in Kuh-i-Dasht (McBurney 1970). Among the excavated rockshelter sites in Kuh-i-Dasht, only Barde Spid I yielded a probable Upper Paleolithic industry underlying Neolithic deposits and underlain by Mousterian material. The identity of the so-called Upper Paleolithic materials from Barde Spid I still remains ambiguous, even after the final study of all excavation materials (Bewley 1984). At the time of all these expeditions, southern Zagros remained almost unknown from a Paleolithic research point of view. In 1972 Marcello Piperno and M.G. Bulgarelli carried out a survey in Fars province to find and evaluate the potential of a few sites reported by H. Field near the north-west shore of the Lake Maharlu in southern Zagros (Piperno 1974). During the survey, 287 lithic artifacts were collected from the surface of Shekaft-I Ghadi Barmi Shur, one of the caves reported by H. Field. Most of the implements were made on small flintpebbles and the industry seemed to be related to the final phase of Baradostian (Piperno 1974). The characteristics which led Piperno to assign the collection to Late Baradostian were the presence of different types of burins, particularly polyhedral burins, Dufour bladelets, end scrapers on blades, retouched blades and absence of Zarzian index fossils like geometric microliths and microburins. Back in the central Zagros, where Peder Mortensen was working on Tepe Guran materials, he planned an intensive survey in 1973 (Mortensen 1993) to provide a data base for the detailed study of changes that accompanied the origin and early development of agriculture in the Zagros. After describing Lower and Middle Paleolithic finds separately, Mortensen grouped Upper and Epi-Paleolithic materials together due to the difficulty of distinguishing Baradostian from Epi-Paleolithic materials. In the test excavation at Mar Gurgalan Sarab cave, two layers (D-E) found at the base of the Zarzian layers with an indistinctive Upper Paleolithic character were identified as probable Baradostian. Apparently the industry found in these layers was dominated by burins and unretouched blades. A few years later in 1978, in the southern Zagros again, Michael Rosenberg excavated a cave called Eshkaft-e Gavi in Marv Dasht plain, situated at the lower part of the Kur River Valley. The excavation revealed a relatively rich Upper Paleolithic layer containing charcoal lenses located just under the 15 cm of post Pleistocene deposits. Six C14 dates, ranging from 30,000 to 18,000 B.P. were obtained for the lower part of the deposits. The dates were stratigraphically inconsistent and many of them derived from very small samples (Table 10.1). Apparently, the Upper Paleolithic layer ended at a depth of about 125 cm and in the underlying 50 cm of deposits, the density of artifacts decreased significantly, which Rosenberg assigned to a probable transitional phase between the Middle and Upper Paleolithic. He also found the assemblages of Eshkaft-e Gavi to be consistent with the Khorramabad Middle and Upper Paleolithic sites. However, the Middle Paleolithic elements at the base of the Eshkaft-e Gavi sequence were very typical and free of accompanying Upper Paleolithic elements. This was contrary to the Khorramabad sites where Middle Paleolithic side scrapers persisted into Early Upper Paleolithic industries. A few Middle Paleolithic side and convergent scrapers found in Eshkaft-e Gavi were considered as being typical Zagros Mousterian and the Upper Paleolithic materials were assigned to the Baradostian. The Baradostian in Eshkaft-e Gavi was characterized by backed blades, notched blades, burins, carinated scrapers and Baradostian points (Rosenberg 1985). The lack of evidence for continuity still continues in newly excavated sequences such as Kaldar Cave that yielded Baradostian and Mousterian archaeological assemblages in stratigraphic superposition (Bazgir et al. 2014, 2017). The

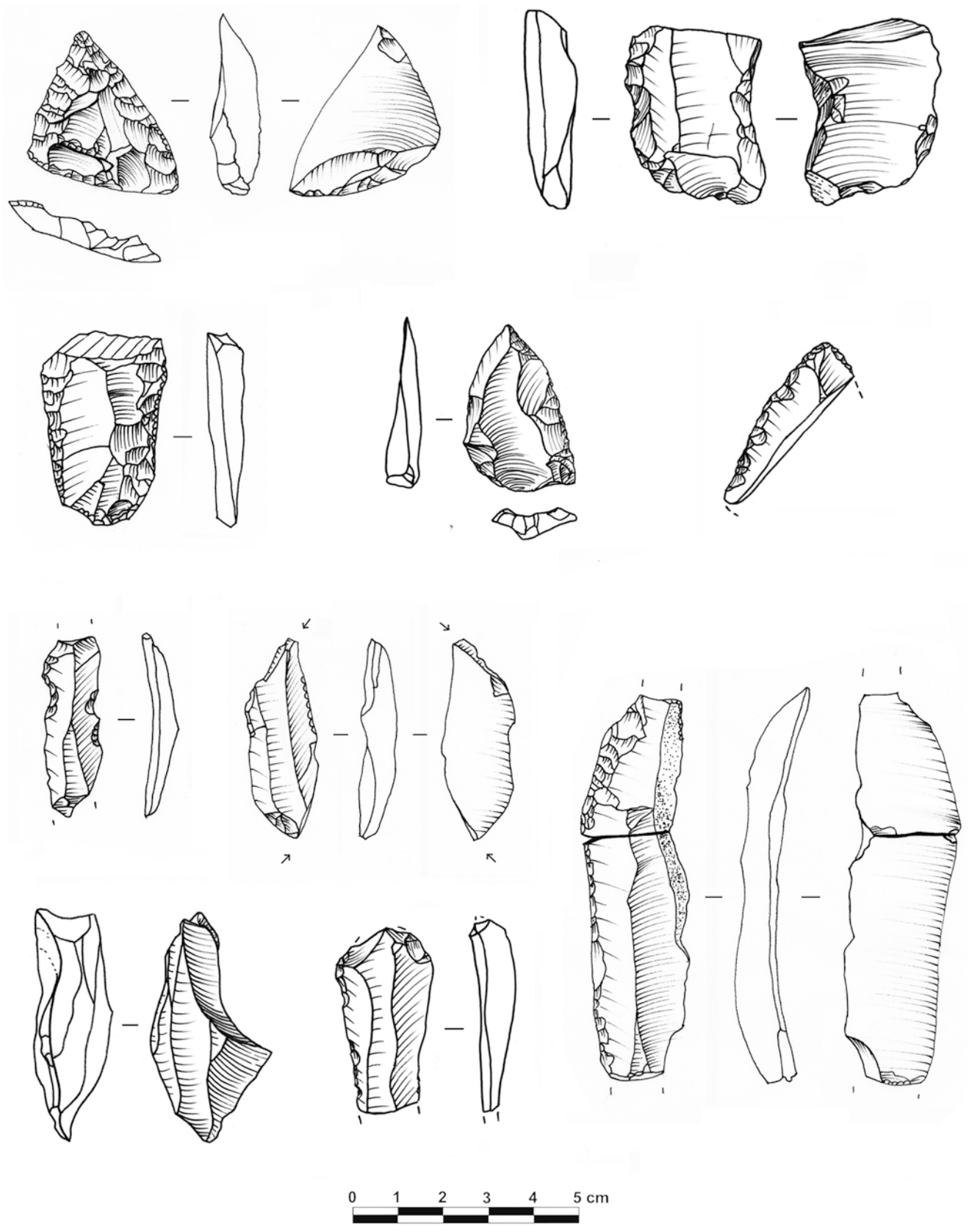

Fig. 10.3 Lithic artifacts from Khar cave intermediate phase of Mousterian-Baradostian or the transitional phase (Shidrang et al. 2016)

technological study of Kaldar lithic assemblages has shown a clear shift from Mousterian flake production to Baradostian blade and bladelet technology along with other quantitative differences between Middle and Upper Paleolithic layers. The Kaldar Cave excavation has provided new chronometric data including four TL dates for upper layers that ranged from 23,100 ± 3300 to 29,400 ± 2300 BP and three C14 dates from the main Baradostians layers and below which resulted in ranges of 38,650–36,750 cal BP, 44,200–42,350 cal BP, and 54,400–46,050 cal BP (Table 10.1) (Bazgir et al. 2017).

10.2.4 Emphasis on the Broader Identity of the Baradostian and Its Nature

After the introduction of the "Zagros Aurignacian" by Olszewski and Dibble, the issues of similarities between the Baradostian and Aurignacian as well as cultural continuity between the Middle and Upper Paleolithic in Zagros were highlighted and emphasized by other researchers such as Marcel Otte who was looking for an eastern origin of Aurignacian in the late 1990s and early 2000s (Otte and Kozłowskĭ 2004). Otte and Kozlowski (Otte and Kozłowskĭ 2004, 2009, 2011) hypothesized the formation of Aurignacian culture in the frame of population movement from east to west and more precisely beginning from Central Asia along the Zagros and Taurus ranges to the Balkans and the Levant and then ultimately to Europe. In their view, the diffusion then expanded from the Balkans to the Danube basin or the Mediterranean coast and all the sophisticated inventions were created step by step during their adaptations to new environments. They also suggested that this diffusion should not be considered as a single and straightforward movement; rather it would have been in different waves with changing limits in tempo-spatial aspects (Otte and Kozłowskĭ 2004). In this scenario, the radical demographic expansion which caused the disappearance of the Neanderthals and establishment of Anatomically Modern Human began somewhere in Central Asia, including Iran, that in their opinion is the most probable origin of anatomical and cultural modernity expansion (Otte and Kozłowskĭ 2004). However, the new chronological data from the Yafteh sequence does not predate but overlaps with similar industries like early Ahmarian and marks an intermediate chronological position for the Baradostian in the Southwest Asian Early Upper Paleolithic sequence (Otte et al. 2011). The dates suggest the attribution of the sequence interval to between 24,500 and 36,000 14C BP (Table 10.1). The study of the 1965s Yafteh collection by Bordes and Shidrang updated the recognition of the Baradostian as a facies of Aurignacian technocomplexes and the identification of its characteristics and industrial changes throughout the sequence. This study, carried out in 2004, placed the Baradostian in an updated classification of Aurignacian (Bordes and Shidrang 2009) and revealed its resemblance to newly accepted Proto-Aurignacian of Europe and in part to the early Ahmarian in the Levant. Bordes and Shidrang's study was inspired by the late 1990s and early 2000s ongoing research on the appearance of the Aurignacian culture and dispersal of Anatomically Modern Humans in Europe and focused on the two earlier industries of the Aurignacian classification (e.g. Bon 2002, 2006; Bordes 2002, 2006; Le Brun-Ricalens and Bordes 2007; Bazile 2006; Bazile and Sicard 1999). The first industry or Proto-Aurignacian (Archaic Aurignacian or Aurignacian 0) known as the earliest manifestation of the Aurignacian was discovered mostly in the Mediterranean region, the south-west of France and the north of Spain. The more evolved facies of the Aurignacian (particularly from the bone industry and artistic materials point of view) or Early Aurignacian appears to be later and richly present in the Danube river basin and also the southwest of France. The Proto-Aurignacian lithic industry is characterized by the production of relatively large straight bladelets from prismatic cores in a single continuous form of reduction sequence from blade to bladelet, that are retouched into Font-Yves points or Dufour bladelets of Dufour subtype. As in the Baradostian of Yafteh cave, the lower part of the deposit is associated with an assemblage mainly oriented toward the production of Arjeneh points and relatively large, straight or slightly curved Dufour bladelets. The bladelets or blanks of these tools were removed from prismatic cores or sometimes from narrow flake ridges. There are also a number of end-scrapers on blades which in some cases have Aurignacian retouch on their lateral edges. It is also noted that the later phase of the Baradostian sequence in Yafteh cave is characterized by production of small twisted bladelets (Fig. 10.4) produced from carinated burins and nosed scrapers made mostly on cherty nodules and having fine and semi abrupt inverse or alternate retouch (Roc-de-Combe sub-type Dufour bladelets), are more likely to be similar to later phases of Aurignacian or recent Aurignacian (Bordes and Shidrang 2009; Shidrang 2015).

A recent analysis of 2005–2008 Yafteh lithic assemblages combined with stratigraphical information and information derived from other archaeological materials, suggested a three cultural phase model for the Yafteh sequence (Fig. 10.5) (Shidrang 2015). The oldest phase contains a lower frequency of artifacts and the main characteristic of the assemblage is standard flat prismatic cores. These cores correspond to bladelets with a very straight profile and most probably moderate size blades from the initial stage of the reduction sequence. The toolkit is relatively simple including Baradostian bladelets type A (Dufour bladelets of Dufour subtype), Arjeneh points and retouched bladelets with a few retouched blades (Fig. 10.6). Despite the limited number of artifacts in this phase, the tools percentage ratio to debitage is fairly high

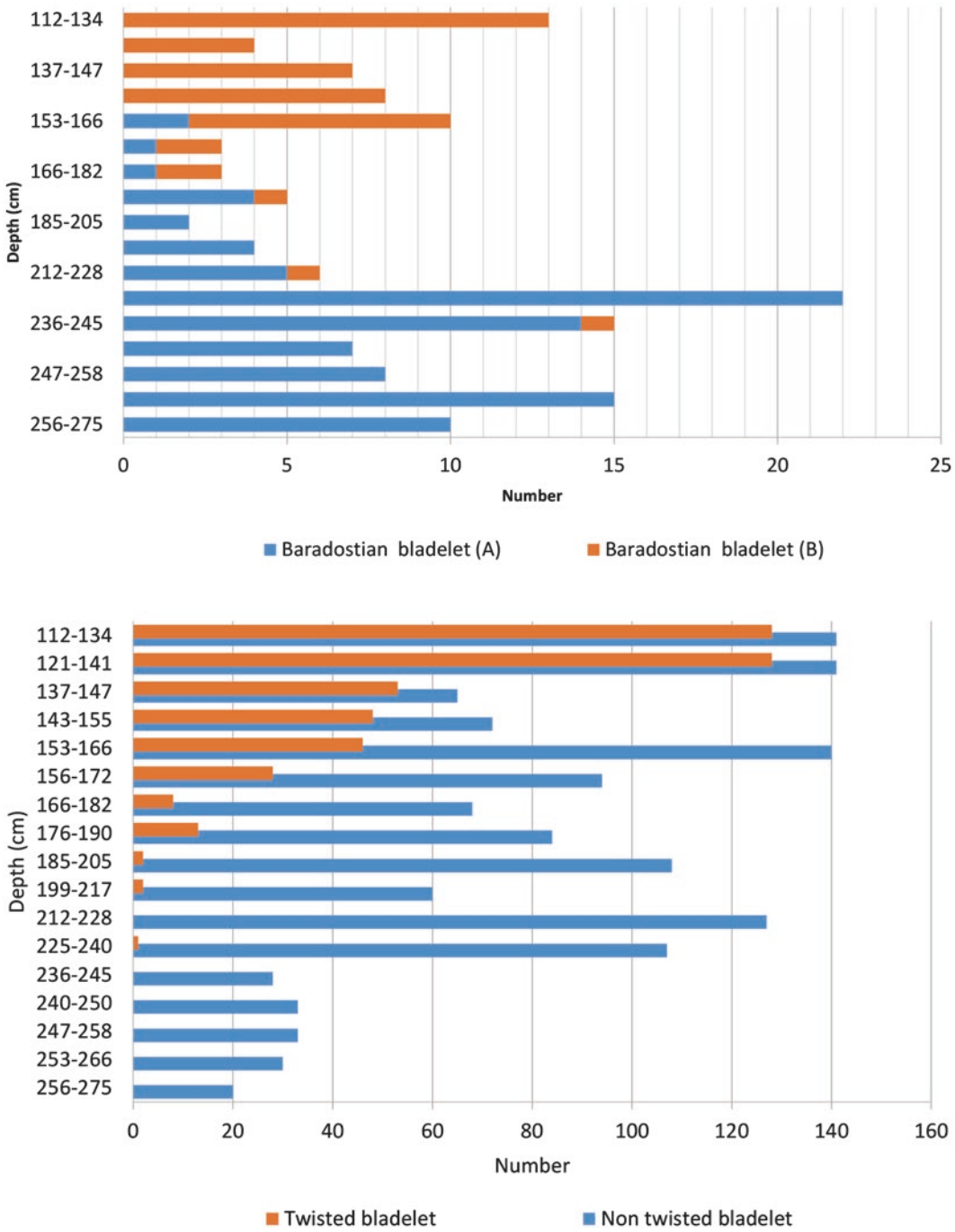

Fig. 10.4 Graph showing the distribution of Baradostian bladelets type A or Dufour bladelets of "Dufour" subtype & Baradostian bladelets type B or counterparts to "Roc de Combe" subtype) and their blanks throughout the sequence (Shidrang 2015)

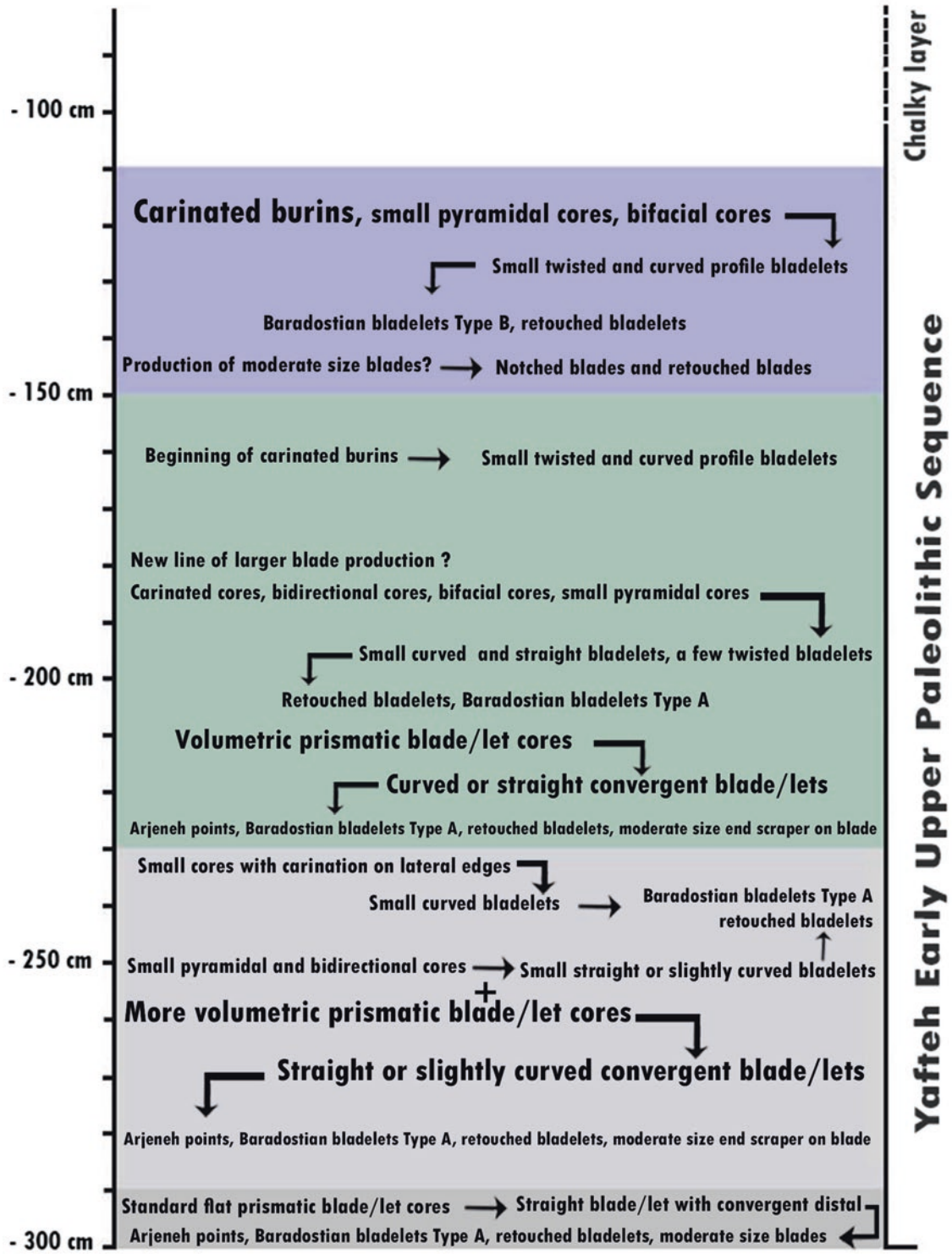

Fig. 10.5 The main lines of lithic reduction sequence in Yafteh cave EUP layers (Shidrang 2015)

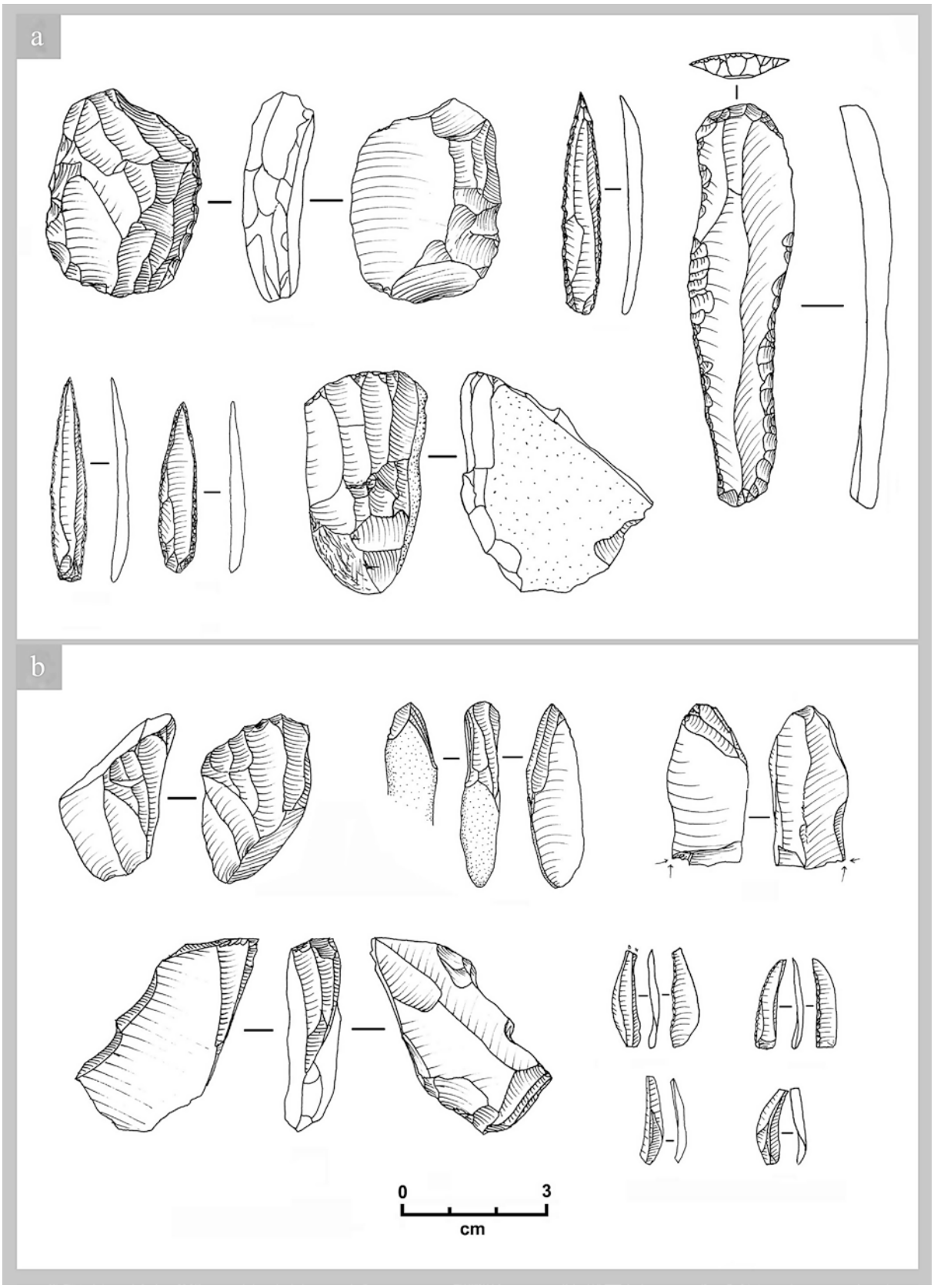

Fig. 10.6 Example of lithic artifacts from middle phase of the Baradostian (**a**) and example of lithic artifacts from late phase of Baradostian (**b**) at Yafteh cave (Shidrang 2015)

which may suggest the earliest phase of the sequence corresponds to short term visits of EUP hunter gathers to the site rather than a long seasonal occupation (Shidrang 2015).

The central phase of the Yafteh sequence is the main and the most intense occupation of the site. This is a rich layer which contains many cultural materials and has a light gray color and ashy texture with charcoal, visible fire place and frequent traces of ocher. In the middle phase, blades become more important and (a separate line of blade production?) were used as blank for end scrapers, notches or typical retouched blades.

There is a diversity of bladelet cores which display some degree of specialization for production of different bladelet types (Fig. 10.7). Despite the preference for natural ridges and convexity, cresting increases and can be observed for the very small bladelet cores as well. Carinated burins that are an important characteristic of the Upper phase or the last EUP occupation of the cave appear in the upper part of the middle phase.

Among other elements, a considerable number of Arjeneh points as well as end scrapers on blades, might indicate a base camp occupation specialized in hide working and piercing hides and ornaments in the middle phase of the sequence. The middle phase of Yafteh cave and possibly a major part of its early phase seems to present several technological and also typological characteristics similar to those found in later part of the Early Zagros Aurignacian and also probably the early phase of Late Zagros Aurignacian at Warwasi. This work suggests that Levels AA-EE (the upper part of Early Zagros Aurignacian) and Levels "X, Y, and Z" of late Zagros Aurignacian of Warwasi might be contemporaneous or similar to the early and middle phases of Yafteh cave (Fig. 10.8) (Shidrang 2015).

The small bladelets with twisted profile which were usually produced from carinated burins also increase from the middle phase. The small twisted bladelets mainly had no retouch but some were retouched into Type "B" Baradostian Bladelets or Dufour bladelets "Roc de Combe" subtype (Fig.10.9). Contrary to bladelets which are frequent in the late phase, blades are less standard and lose their importance as the primary choice for end scrapers, being replaced by flakes.

An analysis of the Pa Sangar rock shelter lithic assemblage also confirmed the reliability of the recent results of the Yafteh sequence (Shidrang 2015). Contrary to what was previously thought, the Pa-Sangar lithic collection revealed the attribution of a major part of the sequence to the Baradostian rather than just a limited part on bedrock.

Comparison of the two sequences of Yafteh and Pa Sangar enabled us to correlate the late phase of the Yafteh sequence to the main part of the central phase of the Pa Sangar sequence (Fig. 10.8). The absence of Arjeneh points at Pa Sangar may also challenge the hypothesis of in-situ presence of Arjeneh points in the later phase of Yafteh.

The final phase of the Baradostian in the Pa Sangar sequence presents a gradual change in the technological organization of carinated pieces. It is probable that the initial attempts to create pyramidal bladelet cores might have begun from carinated pieces. There is a change in economy of cores exploitation which involves a greater surface of cores to produce more blanks. The negative of twisted removals decreases and carinated cores bear mostly curved and sometimes straight negative of removals. Their debitage surface expands to sides of core for more bladelet production and become pre-pyramidal in their morphology (Shidrang 2015).

10.2.5 The Baradostian beyond Zagros

The early attempts to find Upper Paleolithic localities outside the Zagros yielded no results and a vast area, particularly the high Iranian Plateau, remained unknown until recently. Discovery of "Sefid-Ab" an open air site associated with a travertine formation near Kashan provided the first opportunity to study a new Upper Paleolithic assemblage from a different site type and in a different environmental context from the Zagros (Biglari 2004; Shidrang 2009).

General typological comparison of the surface lithic assemblage from Sefid-Ab with the well-known EUP sites of the Zagros indicated similarities between the two industries.

The Sefid-Ab assemblage contains a high percentage of single platform blade/let cores with their removals along a single face. The large number of burins at Sefid-Ab, which mostly are carinated forms, resembles the late phase of the EUP assemblage of Warwasi and Yafteh. While the Sefid-Ab lithic assemblage appears to be mainly similar to the late phase of Baradostian, it also might contain the remains of earlier periods as the survey of the site led to identification of an early eroded travertine in the vicinity of the site that yielded small number of patinated Mousterian artifacts, including Levallois elements.

In 2005, another Upper Paleolithic open air site was found near Baliran in Central Alborz, Northern Iran (Berillon et al. 2007). Garm Roud 2 yielded a single archaeological layer underlying more than ten meters of fluvial deposits observable in a terrace along the eastern side of the Garm Roud valley and yielded materials dating to ranges of 28,486 +/− 190 to 34,951 +/− 256 cal BP (Antoine et al. 2016; Table 10.1).

The assemblage consists of 113 lithic artifacts and 22 fossilized bones collected from a 3.5 m horizontal distribution of archaeological remains. The lithic assemblage is dominated by bladelet production including twisted bladelets and also multiple burins, unipolar and bipolar bladelet cores. The cores are mainly prepared from flakes but also on pebbles and blocks too. Retouched bladelets are the main tool category and there were very few burins and scrapers (Berillon et al. 2009). On the basis of the characteristics and C14 dat-

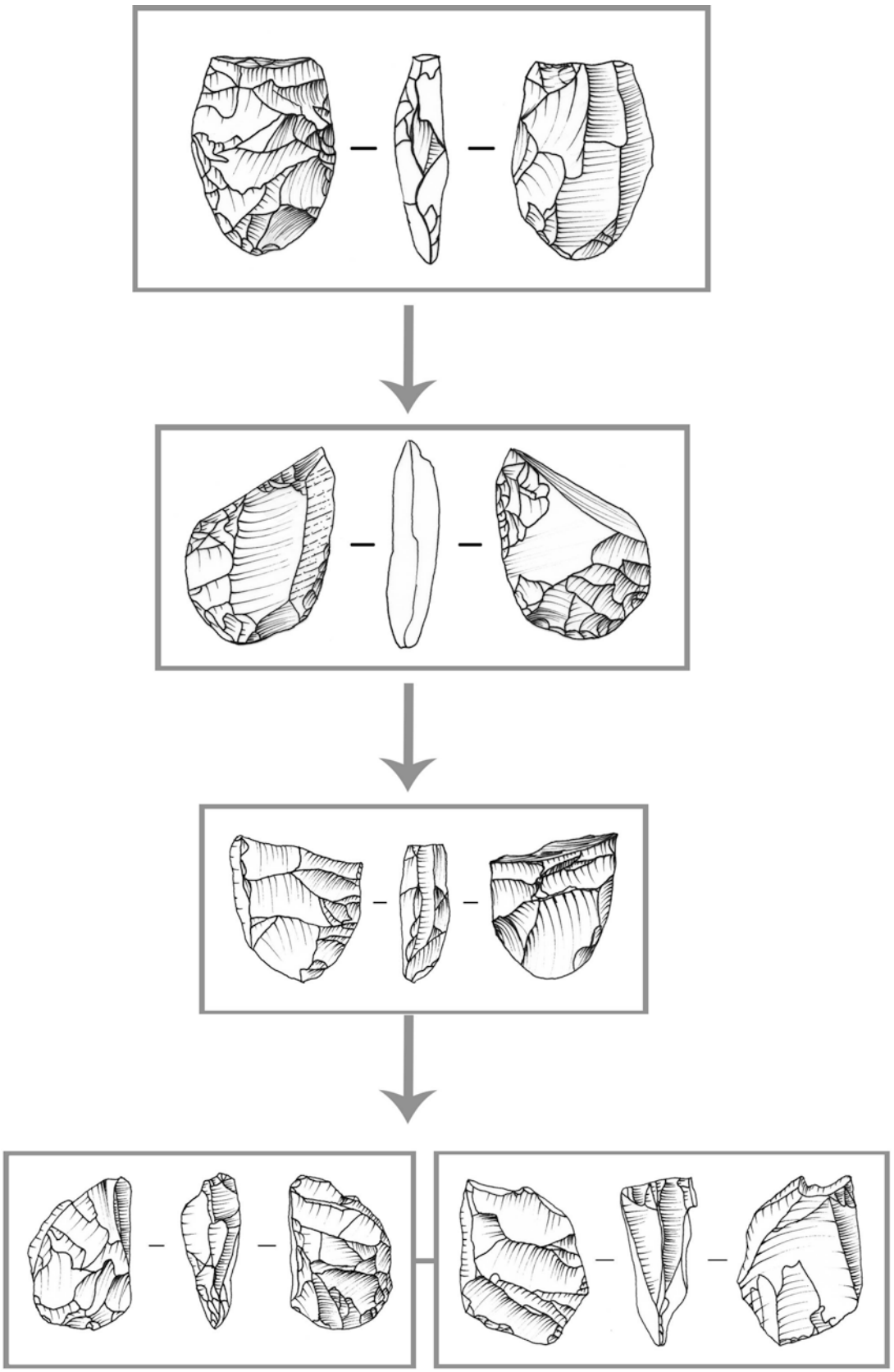

Fig. 10.7 The main part of bifacial bladelet cores reduction sequence in Yafteh cave assemblages (Drawings: S.Shidrang)

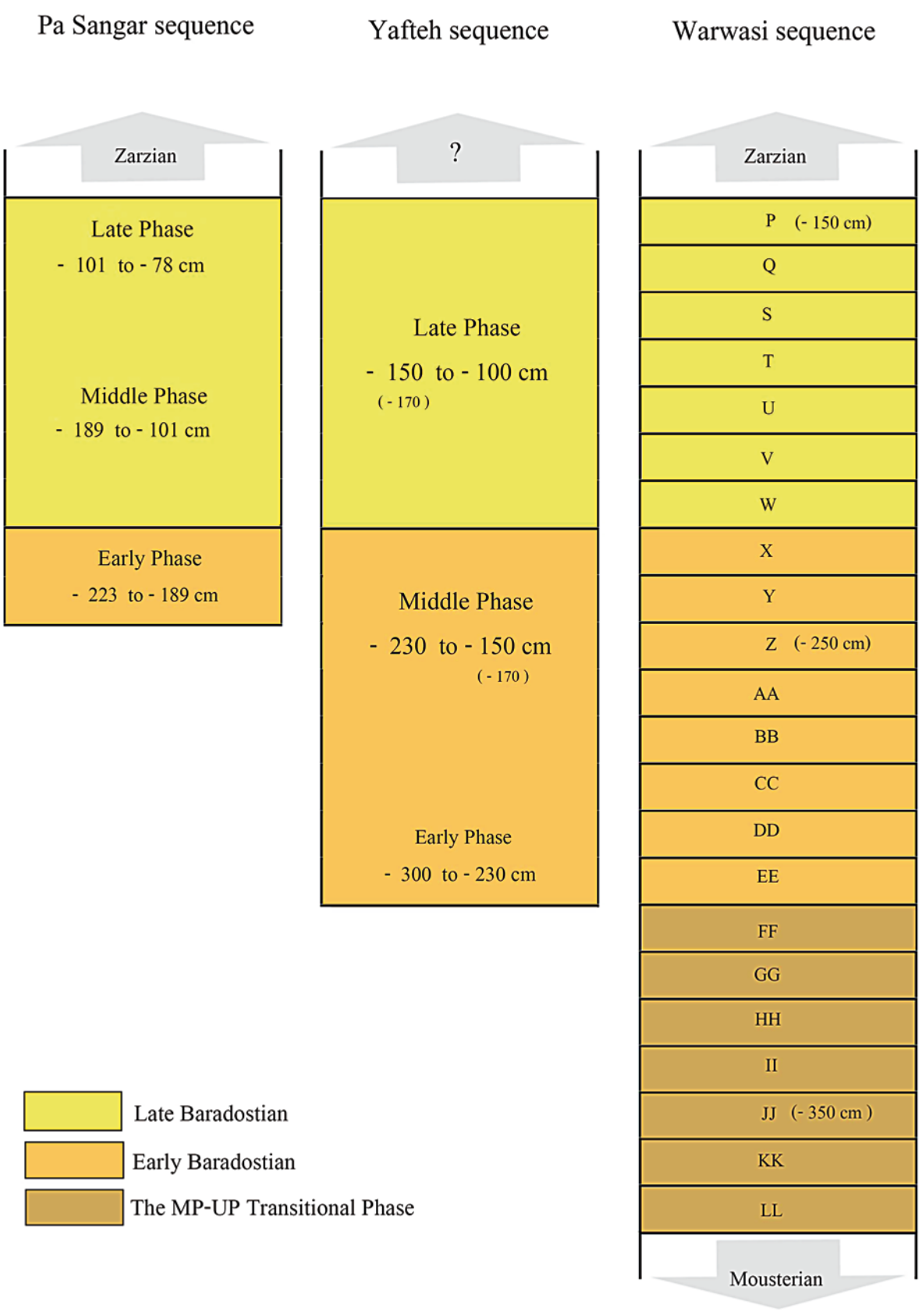

Fig. 10.8 Reconstruction of whole Baradostian sequence of Central Zagros based on the adjustment of new information from the sites of Yafteh, Pa Sangar and Warwasi (Shidrang 2015)

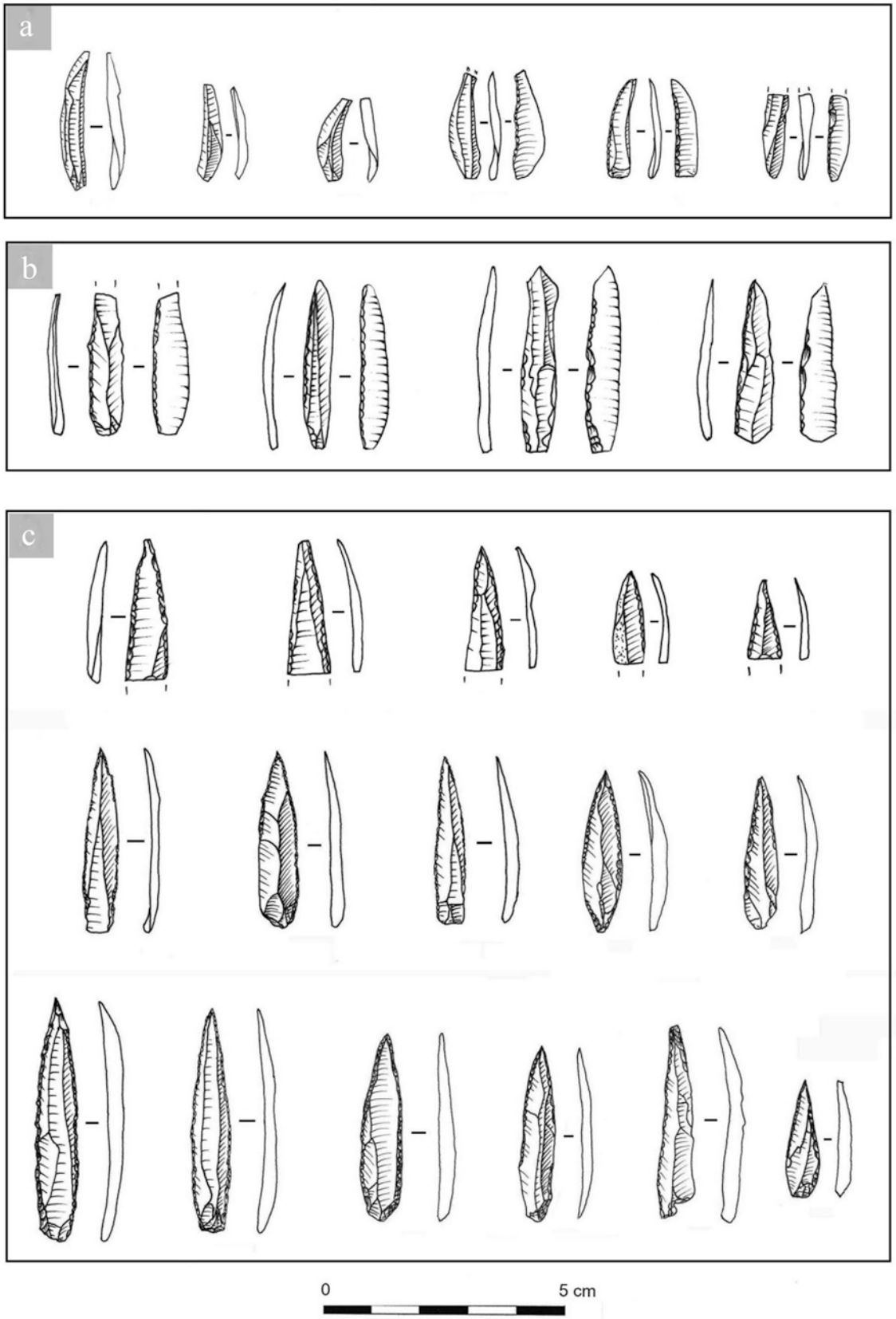

Fig. 10.9 (**a**) Baradostian bladelets (Type B); (**b**) Baradostian bladelets (Type A); (**c**) Arjeneh points (Drawings: S.Shidrang)

ing, the assemblage was assigned to the Late Baradostian (Berillon et al. 2007). Another organic sample collected from the 2006 excavation revealed a minimum age of 29,540 C14 BP for an almost homogeneous thin layer with a single short duration of human occupation (Berillon et al. 2009). The discovery of Garm Roud 2 extended the boundary of the Upper Paleolithic toward the north of Iran and helped to better understand the characteristics of a part of Upper Paleolithic tradition (Late Baradostian) in other places than the Zagros.

In 2005, a Paleolithic survey in the Qaleh Gusheh region recorded 24 prehistoric localities in the Rig Boland mobile dunes located to the north-east of the Karkas Mountains and southwest of the Latif Mountains in central Iran (Conard et al. 2009). Among the 24 lithic scatters, 19 yielded lithic artifacts characteristic of laminar technology which were designated as Late Paleolithic. Bardia or Qaleh Gusheh number 1 has been the most fruitful site of this survey with 7215 lithic artifacts. Lithic refitting demonstrated a systematic production of blade/lets with high frequency of a unidirectional knapping method. The tools are dominated by backed and laterally retouched bladelets, with both lateral edges retouched on the dorsal face being very common. Seventeen Arjeneh points were reported among other points as well as end scrapers on blades but burins were infrequent. Despite the very close similarly of the assemblage to the Early Baradostian, the authors hesitated to assign the assemblage to the Baradostian and referred to it as Late Paleolithic (Conard et al. 2009). However, they pointed out that the presence of Arjeneh points and retouched rods may suggest affinities to the Baradostian but surprisingly assigned the production of bladelets to Zarzian. Thus they decided to not use the Zagros terminologies and refer to these materials by the general term of Late Paleolithic encompassing both the Epi and Upper Paleolithic (Conard et al. 2009).

10.2.6 The Problem of the "Rostamian"

After assigning a Baradostian-like industry to the "Late Paleolithic" in Qaleh Gusheh region, the Tübingen Iranian Stone Age Research Project (TISARP) conducted some surveys in Dasht-e Rostam in the Basht region of the southern Zagros (Conard et al. 2007). The Dasht-e Rostam and Basht Region are located in the northwestern part of Fars Province. These surveys resulted in the recording of 121 Paleolithic sites and selection of a cave called Ghare-e Boof for further excavation. The result of their studies on materials from Ghar-e Boof launched another surprising conclusion. TISARP team claimed that the identified EP-UP industries of the Dasht-e Rostam and neighboring regions differ significantly from those of the Baradostian and Zarzian in the northern and central Zagros and represent a new cultural group that deserve a new name "Rostamian" (Conard and Ghasidian 2011).

A quick look at the underlying basis of their knowledge of the Zagros Upper Paleolithic lithic industries, would help us to understand the reasons of this claim.

Interestingly, they themselves mentioned that prior to the radiocarbon dates from Ghar-e Boof, they attributed all the related assemblages to the Epi-Paleolithic post-dating 20 ka BP (Conard and Ghasidian 2011). Thus naturally, the assemblage that is assigned to Upper Paleolithic only with the help of radiocarbon dates (not based on its typo-technological characteristics), would be considered as a new industry or a new cultural group.

Four major horizons were identified in the stratigraphy of Ghar-e Boof, of which some of them were divided into substrata. AH III (AH IIIa, AH IIIb) and AH IV (AH IVa, AH IVb) were the two lower horizons and contained Pleistocene deposits which are assigned to Upper Paleolithic. AH III varies in thickness from a few decimeters to 120 cm thick and yielded the main body of 37,000 lithic artifacts recovered in the Ghar-e Boof excavation.

This horizon seems to be the main and longest Pleistocene occupation of the cave, particularly in the main III layer toward the opening of the cave. The published data shows a significant difference in density of finds between the horizons III and IV.

Three radiocarbon dates from the rear of the cave provided some age determinations for the Paleolithic deposits of this site. One of these dates comes from AH III and the other two from AH IV which contained some burnt lenses and few artifacts (Conard and Ghasidian 2011). Stratigraphically, the positions of the three collected charcoal samples are not very far from each other. In other word, the 31,150 BP from AH III and the dates 33,060 BP and 36,030 BP from AH IV were collected from just a 20 cm vertical distance from each other.

Production of bladelets plays a central role in this lithic assemblage which is described as a homogenous industry. The bladelet cores are mainly unidirectional single platform and made on small cobbles from a nearby river (Conard and Ghasidian 2011).

A look at the description of the cores and the lithic drawings from this site is enough to note the close similarity of the Ghar-e boof industry to the twisted cores technology of the late Baradostian. Some of these similar characteristics are as follows:

- Unidirectional cores preserve the cortical surface of the cobbles and usually the reduction surface covers half of the pebble or cobble
- The removal surface can be located on narrow or broad face of the core
- The striking platform can be located along a projecting edge of the core

- Opposed bidirectional cores are present in lesser frequency

Most of the typological characteristics of the "Rostamian" lithic materials match those of Baradostian (Late Baradostian). The twisted bladelets with dorsal and ventral retouch (Roc-de-Combe sub-type of Dufour bladelets category) are one of the main characteristics of the Late Baradostian alongside a few Arjeneh points that may belong to the earlier phase of Baradostian in this cave. On the basis of the Ghar-e Boof lithic assemblage description and its illustrations, we can see that a major part of AH III (dated back to 31,150 BP) can be assigned to the Late Baradostian. Even though the small assemblage from horizon IV is not described separately for a detailed typo-technological study in the authors analysis, but taking into account all the available data from central Zagros, it is most probable that horizon IV, which dates back to 33,060 BP and 36,030 BP, belongs to the major part of Early Baradostian. The accuracy of this theory proposed here remains to be tested in lower deposits of Ghar-e Boof, particularly toward the front part of the cave, where the deposits seems to be accumulated to a greater depth and more importantly depends on a better understanding of the site formation process in this cave.

In their conclusion, the authors compared the Upper Paleolithic assemblage of this cave with the flake based lithic assemblage of central Zagros and stated that Ghar-e Boof presents a distinctive industry that except for Dasht-e Rostam, remains unknown in other parts of Iran (Conard and Ghasidian 2011). However, such a conclusion and comparison cannot be valid since they are comparing a typo-technologically Late Baradostian industry to the earliest flake based industry of Zagros or the early part of Early Baradostian. They even have gone further and hypothesized that the absence of Middle Paleolithic elements in the lithic assemblage of Ghar-e Boof suggests a lack of continuity between the Middle Paleolithic and the early Upper Paleolithic (Conard and Ghasidian 2011). It is crystal clear that, based on such an assemblage presenting strong characteristics of the late Baradostian (at least in a major part) or even the poorly identified underlying layer, one cannot challenge the well documented early Upper Paleolithic industries of Central Zagros and their relatively long established hypothetical background in the debate of Aurignacian origin. The results and interpretation of the Ghar-e Boof Upper Paleolithic assemblage have been presented during a time in which the techno-typological characteristics of Zagros early Upper Paleolithic or Baradostian have become fairly well defined. Thus introducing a new cultural groups or assemblage type as "Rostamian" with the same characteristics of Baradostian will have no use except to create an unnecessary terminological complexity. Current critique of their work reached them in 2015 (Shidrang 2015) and it seems they are gradually discovering that the characteristics of their lithic assemblage are already known and are moving toward accepting the similarities of the Ghar-e Boof UP lithic assemblage to the Baradostian, as implicitly reflected in their recent publication (Ghasidian et al. 2017).

10.3 Who Were the Makers of the Baradostian?

The Middle Paleolithic of the Zagros Mountains has provided paleoanthropological evidence for the identification of human groups responsible for Mousterian culture. Based on the human remains found in Shanidar and Bisitun caves, we can securely assign the Zagros Mousterian to Neanderthals (Solecki 1963; Trinkaus 1983; Trinkaus and Biglari 2006). However, the Early Upper Paleolithic human remains are more fragmentary and their archaeological context are unclear. The premolar of Wezmeh cave in Kermanshah, dated back to OIS3 or early OIS2 based on gamma spectrometry, might belong to an Upper Paleolithic early modern human that was brought to the carnivores den (Trinkaus et al. 2008).

But, in 2009 the results of a recent study on the Eshkaft-e Gavi hominin remains revealed new interesting discoveries for the Upper Paleolithic of the Zagros (Scott and Marean 2009). The Eshkaft-e Gavi cave contained Middle Paleolithic and Upper Paleolithic layers followed by Epi- Paleolithic deposits that contained the hominin remains. The hominin remains are attributed to anatomically modern humans but unfortunately the age of the bulk of the sample is uncertain. However, a molar recovered at the base of the Upper Paleolithic sequence near the boundary with the Middle Paleolithic confirmed the attribution of this layer to AMH, at its early stage. Many of the hominin specimens have been burnt but the contextual information was not enough to prove whether this burning resulted from intentional cooking or secondary burning. However, interestingly, four of the hominin specimens showed clear traces of stone-tool butchery by humans which indicated the possibility of cannibalism at this site. The Eshkaft-e Gavi hominin sample expanded the record of human butchery of human carcasses into the Upper Paleolithic or Epi-Paleolithic of the Zagros Mountains (Scott and Marean 2009).

10.4 The Baradostian in the Light of New Research: Where Do We Stand?

Finally, in putting together all the available data, an image emerges that certainly is incomplete and needs many refinements but considering the current state of data seems to be quite acceptable.

In the central Zagros, the late Middle Paleolithic, marked by a high frequency of convergent scrapers, Mousterian

points and moderate use of Levallois, is replaced by a fully evolved Early Upper Paleolithic. However, this replacement is not clear cut in the Zagros sequences and between the extremities of the two industries there is a phase which has yielded an assemblage with characteristics of both the periods of Middle and Upper Paleolithic.

The Middle Paleolithic layers of Warwasi were divided into four phases by Dibble and Holdaway (1993). The A and B phases were quite similar in character and contained many single scrapers and phase C also displayed more tendencies of the earlier ones. However, phase D (Levels JJ-MM) or the latest phase was different in character and contained more typical Mousterian points and convergent scrapers that were mixed with Upper Paleolithic elements (Dibble and Holdaway 1993). A year later Olszewski and Dibble proposed a strong probability of continuity between Middle Paleolithic and Early Upper Paleolithic industries in Zagros, based on the assemblages from Levels AA-LL (Olszewski and Dibble 1994, 2006). In this view, the levels classified as an early phase of Zagros Aurignacian display a developmental sequence from Middle Paleolithic throughout Levels AA-LL into evolved or late Zagros Aurignacian which is between Levels P-Z. However this developmental process was based on the typology of artifacts and in fact decreases in frequency of Mousterian type elements and increases in Baradostian type elements. The combination of mainly Middle Paleolithic scrapers and some truncated-faceted pieces and Upper Paleolithic tools like endscrapers on blades, burins and tools on bladelets like Arjeneh points or Dufour bladelets were the characteristics of the transitional layers of Warwasi. Although, Olszewski acknowledged the fact that unlike the Levantine transitional industries which contain Upper Paleolithic tool types with transitional technologies; in Warwasi there is only Middle and Upper Paleolithic tool types. However then she emphasized that the Warwasi sequence displays a shift toward more bladelet production through time and shows less alteration in core reduction strategies for each specific core (Olszewski 2007).

Despite all the efforts that have been made to describe the transitional nature of Early Zagros Aurignacian at Warwasi, the issue still seems to be problematic. It is not possible to understand how an evolved soft hammer blade/let technology may have originated directly from a typical Mousterian hard hammer flake industry, with both stratigraphically found in the same layer. We could also think of an alternative probable explanation for the AA-LL levels of Warwasi rockshelter. What we have in these levels can also indicate a mixture between the layers containing the industries of two different periods. Despite the lack of a clear stratigraphic hiatus between the Mousterian and the Early Baradostian, the density of artifacts decreases between the end of the Mousterian and the beginning of the Early Baradostian deposits which may indicate a change in demography or settlement pattern of the site. According to this explanation, the first 70 cm of deposits right above the pure Mousterian (Levels LL to FF) may be the result of inter-level mixture by different agents. However, another tempting hypothesis may lead us to think what if two different types of populations or in fact human bands were responsible for this mixture. According to this hypothesis, the makers of the Zagros Mousterian or Neanderthals were using the site periodically while some newcomers with blade/let technology were spreading through the landscape gradually and using the rockshelter as well in the absence of Neanderthals. This is a very attractive scenario which lacks fundamental evidence like reliable chronological determination of the crucial levels, reliable stratigraphical information and associated human remains with these layers.

Based on the presented results of the Yafteh cave assemblages, the earliest Baradostian was not as sophisticated as the evolved Baradostian of the middle phase. In this industry, blades and bladelets were produced by soft hammers from single platform prismatic cores with plain platforms. The products were mostly pointed bladelets with straight profile and also moderate size blades from the initial stage of the same reduction sequence. The toolkit is quite simple including Arjeneh points and retouched bladelets with a few Dufour (Dufour subtype) and a moderate frequency of end scrapers on blades. These characteristics can be found in Proto-Aurignacian of Europe and in part the Early Ahmarian industry of the Levant. Taking into the account the available dating for the Baradostian, we might assume that the similar diffusion trend (or agent) that made the Proto-Aurignacian and Early Ahmarian, spread into the Zagros roughly around 36,000 14C BP. Interestingly, tools percentage ratio to debitage is fairly high in this phase which may indicate short term visits of EUP hunter-gatherers to the Yafteh cave rather than a long seasonal occupation in the beginning of the sequence.

As the sequence of Yafteh shows us, we can trace the evolution of this industry throughout its core management toward a more volumetric shape and more complex and diverse reduction sequences. The single phase based on the Bayesian model presented in Otte et al. 2011 is around 33,500 which may belong to the middle phase of Baradostian which represents its highest point of complexity (Shidrang 2015). In this phase, blades become more important and there seems to be a new line of blade production as end scraper's blanks or being retouched laterally into notches or regular retouched blades. Diversity of bladelet cores increases in the middle phase which displays some degree of specialization for production of different bladelet type. There is also evidence of frequent intentional use of ocher and a fire place. All the evidence, particularly the considerable number of domestic tools, suggest a strong probability of an intense occupation specialized in hide working and piercing the hides and ornaments. While keeping its Proto-Aurignacian characteristics, the middle phase of the

Baradostian transformed into a more complicated industry with more diverse and specialized tools. This may remind us of the Early Aurignacian, however, with major differences which are beyond the scope of this paper in comparing these two industries in great detail. In the middle phase of the Baradostian, blade production is not as important as in the Early Aurignacian and carinated scrapers which usually are found in a blade dominant context do not play a typological key role in the Baradostian. However specialization and individualization of the reduction sequence, emphasis on domestic tools made on blades, higher frequency of ornaments, bone tools and frequent use of ocher and other minerals are the general similarities of the two entities. We are not sure when exactly this phase ends but it may have continued until around 30,000 14C BP and the last phase of Baradostian may be placed roughly between 30,000 14C BP to roughly 25,000 14C BP.

The first impression of the later phase of Yafteh cave is significant reduction in components size. A significant number of small twisted bladelets were left unretouched but some have been retouched into Dufour bladelets of "Roc de Combe" subtype, while the production of Arjeneh points decreases dramatically and become almost extinct (Shidrang 2015). The small standardized and lateralized carination technology with a significant frequency of carinated burins (and in lesser number nosed scrapers and small pyramidal cores) and their twisted bladelets began sporadically in middle phase of the sequence and become dominant characteristics of the assemblage in the late phase of Baradostian. End scrapers are usually made on flakes or smaller blades and display a clear reduction in size as we approach the end of Baradostian.

Despite the absence of proper information on the depositional history of the site like stratigraphy and chronology, the Pa Sangar collection provided us with valuable information on the late phase of the Baradostian industries. A recent study revealed that about one meter of the depositional sequence belongs to the Baradostian, which according to the artifact density and their characteristics in each depth can be divided into three phases (Shidrang 2015).

Pa Sangar assemblage is one of the rare assemblages which allow us to detect the changes at the end of Baradostian and its disappearance or transition into Zarzian. Based on the Pa Sangar sequence we may suggest that there is a transitional phase from the Baradostian to the Zarzian. At the end of the Baradostian, the twisted bladelets production loses its importance and a notable number of straight bladelets from semi-pyramidal and pyramidal cores become prominent. These bladelets were used to produce notches and denticulates and backed pieces which were not very significant in the Baradostian. It has been suggested by Hole and then Olszewski that the Zarzian evolved out of the Baradostian based on the Khorramabad sites and Warwasi rockshelter in Kermanshah (Hole and Flannery 1967; Olszewski 1993). But similar to Warwasi, the Pa Sangar sequence also provided us with more evidence in favor of a continuation between the two entities since there is no stratigraphical break between the Baradostian and Zarzian levels and technologically there seems to be a transformation of reduction strategies between the two industries. While the late Baradostian has resemblances to the carinated phase of the Levantine Aurignacian in the Zagros, described by Williams (2006), it also resembles the late Aurignacian of Europe (Bordes 2006).

10.5 Concluding Remarks

Improving the current state of knowledge to understand the crucial shift between the Middle Paleolithic and Upper Paleolithic of the Zagros is faced with several fundamental limitations. First, our knowledge is limited mainly to one site with a major assemblage "the Warwasi rockshelter"; second is the lack of high resolution stratigraphical and chronological information; and, third is the fact that the late Zagros Mousterian is relatively less-known than Late Middle Paleolithic in other regions like the Levant.

The Zagros Mountains and its many Paleolithic sites are particularly important in the studies based on both biological and cultural diffusion theories which discuss the expansion of modern humans and their innovative Upper Paleolithic culture into Eurasia, ultimately replacing the earlier hominids in all regions. However, they also have implications for gradual local evolution of the lithic industries. The variety of the geographical and cultural contexts in which the different traditions developed, and major and minor movement of hunter-gatherer groups within the regions of the Zagros into or from neighboring areas like the Levant or via the northern corridor, were certainly responsible for the archaeological documents of a MP-UP shift in this region. Unfortunately, the current state of the data are not sufficient to reconstruct the processes leading to the appearance of the Earliest Upper Paleolithic in this region. According to the review of evidence in this paper, it is more likely that we have a phase of mixture in the very beginning of Baradostian in Zagros. The phase of mixture can be the result of several factors including both mechanical movement of materials and anthropogenic reasons. The key to understanding this phase is systematic reliable chronological age determinations accompanying multidisciplinary approaches to understand the site formation process. However, for the full bladelet industry of early Baradostian, we are on a firmer ground. This standardized bladelet lithic industry accompanied by a moderate presence of organic tools and ornaments, is the representative of an abrupt shift between the material culture of the Middle and Upper Paleolithic in the Zagros. The Yafteh cave excavation yielded considerable evidence of personal ornaments, bone tools and frequent use of ocher and other minerals throughout the sequence of Baradostian (Fig.10.10) (Otte

Fig. 10.10 The earliest known evidence of symbolic and relatively complex behaviors in Early Upper Paleolithic of Iran (Photos: Shidrang&Biglari)

et al. 2007; Shidrang 2015). Such evidence is completely absent in the Middle Paleolithic of the Zagros and their presence in the early Baradostian reveals another example of dissimilarity in their cultural adaptation history that cannot be easily ignored. These changes in material culture may reflect the undeniable differences of social and economical aspects of hunter-gatherer life in the Middle and Upper Paleolithic of the Zagros.

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