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ORIGINAL ARTICLE

The Epipaleolithic (Iberomaurusian) from Grotte des Contrebandiers, Morocco

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Abstract First identified 100 years ago, the Iberomaurusian is an Epipaleolithic industry that was described from a number of sites across western North Africa. One of these is Grotte des Contrebandiers (Smugglers' Cave) in Morocco, where Abbé Jean Roche recovered Iberomaurusian materials in excavations in the late 1950s. Although the lithics were published in the early 1960s, subsequent changes in methods and in assessing the interpretive potential of lithic assemblages necessitated a restudy of these collections from Contrebandiers. This study led to a better understanding of the lithic types present and of the use of particular stone raw materials. Iberomaurusians emphasized lithic strategies that maximized use of fine-grained stone to the extent that *pièces esquillées* should be, among others, a defining criterion for this lithic industry.

Résumé Identifié pour la première fois il y a une centaine d'années, l'Ibéromaurusien est une industrie épipaléolithique définie dans plusieurs sites situés dans la partie ouest de l'Afrique du Nord. Au Maroc, la Grotte des Contrebandiers fait partie de ces sites où l'Abbé Jean Roche a mis au jour du matériel appartenant à cette civilisation dans les années 1950. Bien que le matériel lithique ait été publié dans les années 1960, nous avons entrepris une nouvelle analyse de ce dernier à partir de nouvelles approches méthodologiques et une évaluation de son potentiel documentaire. Cette analyse nous a amené à non seulement identifier les types d'outils présents dans la collection mais aussi à déterminer les matières premières lithiques. Les ibéromaurusiens ont poursuivi un effort de maximisation des matières premières

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Keywords Epipaleolithic · Iberomaurusian · North Africa · Contrebandiers · Lithics · Collections

Introduction

First defined in 1909 by Pallary, based on excavations by Barbin at La Mouillah in Algeria, the so-called Iberomaurusian (Epipaleolithic) initially was described as a Paleolithic industry with a microlithic component (Tixier 1963: 10). Since then, it has been recognized as Epipaleolithic (Brahimi 1970: 7; Camps 1974: 62–80; Tixier 1963), although some authors prefer to call it Upper Paleolithic (e.g., Barton et al. 2005). In the lithic assemblages, the nongeometric backed bladelets are the dominant tool category and often are characterized by a pointed end or ends. Geometric microliths are rare. Other tools include end scrapers, burins, side scrapers, truncations, backed flakes and blades, retouched blades and flakes, *pièces esquillées* (sometimes called *outils écaillés* or scaled pieces in Later Stone Age assemblages, e.g., Willoughby 2001), and perforators. Microburins also are present (Brahimi 1970; Collina-Girard 1977; Tixier 1963). There are a variety of cores, mainly single- and double-platform types. Of some note is the presence of a large tool component, manufactured on coarse-grained stone at several Iberomaurusian sites (Roche 1963: 25–26).

Other cultural materials recovered from Iberomaurusian sites include minerals (e.g., hematite, galena, and limonite), perforated shells and pendants, ostrich eggshell, some figurines, rock art, and worked bone (Camps 1974; Camps-Fabrer 1960, 1966; Merzoug 2005). The presence of worked minerals was attributed to the practice of body painting (Camps 1974; Camps-Fabrer 1960: 17–58), although a number of skeletons have traces of ochre, which could represent sprinkling of ochre over burials rather than body painting. Camps (1974: 99; see also Camps-Fabrer 1960, 1966) mentions that some tools have traces of ochre—a feature known in modern ethnographic accounts and from experimental research to be associated with hide working and mastic composition (e.g., Brandt and Weedman 2002; Wadley 2005). Pierced shells include examples of scallops, screw shells, *Cardium*, and fossil *Dentalium* (Camps 1974: 99; Roche 1963: 151). Worked bone tools are rare, consisting of pointed, polished pieces, knives, chisels, smoothing tools, burnishers, punches, and a harpoon fragment (Camps 1974: 67; Roche 1963: 150–151). There also is an engraved bone from Ghar Cahal in Morocco (Bouzouggar et al. 2008: 9).

Geographically, the open-air and cave/rockshelter sites of the Iberomaurusian were historically thought of as a coastal phenomenon, occurring in North Africa from western Morocco to northern Algeria and northern Tunisia, as far east as the Gulf of Tunisia. However, some Iberomaurusian sites are found as much as 200 km inland from the current coastlines (Camps 1974: 62; Close and Wendorf 1990: 43), indicating that Iberomaurusian settlement patterns were complex and involved more than only coastal adaptations. Further complicating the picture of Iberomaurusian site distribution is the submergence of sites in coastal areas, given that the sea levels are estimated to have risen some 125±5 m since the last glacial maximum (Fleming et al. 1998). Iberomaurusian sites, for example, are not found along the eastern coastline of Tunisia (Camps 1974: 59–62), which may be due to the submergence of the wide continental shelf in the area of the Gulf of Gabès (Lubell 2001: 130). Furthermore, there are similar assemblages referred to as Eastern Iberomaurusian (Oranian) from sites in Libya (e.g., Haua Fteah, Hagfet et Tera, Ain Zargha [Ras el Wadi], Wadi Ghan, Ain Shakshuk, and Wadi Basina; see Garcea 2010; Garcea and Giraudi 2006; McBurney 1967; McBurney and Hey 1955), indicating that the Iberomaurusian *sensu lato* has a wide geographical extent over much of North Africa.

Subsistence elements from Iberomaurusian sites show a wide variety of hunted or collected food components—emphases on particular animals or on shellfish depend on site locations; those closer to coastal areas often have shell middens in addition to mammalian fauna, while inland sites focus on mammal hunting (Camps 1974: 93–94). Faunal remains include zebra (*Equus mauritanicus*), hartebeest (*Alcelaphus buselaphus*), Barbary red deer (*Cervus elaphus barbarus*), Barbary sheep (*Ammotragus lervia*), gazelle (*Gazella dorcas*; *Gazella cuvieri*), wild boar (*Sus scrofa*), aurochs (*Bos primigenius*), buffalo (*Syncerus antiquus*), and the paleoarctic deer *Megaceroides algericus* (Barton et al. 2005: 88; Camps 1974: 93–94; Lubell 2001: 138; Roche 1963: 152; Merzoug 2005: 105; Merzoug and Sari 2008). Iberomaurusian groups also collected mussels (*Mytilus galloprovincialis*), limpets (*Patella caerulea* and *Patella tarentina*), top shells (Trochidae), and more rarely, terrestrial gastropods (*Helix aspersa*, *Helix melanostoma*, *Helicella* sp., and *Otala* spp.) (Camps 1974: 93–94; Lubell 2001: 130).

Human remains from the Iberomaurusian are relatively well-known, especially from the burials at Taforalt in Morocco and Afalou-Bou-Rhummel and Columnata in Algeria (Arambourg et al. 1934; Chamla 1970; Ferembach 1962). There are more than 500 individuals represented from nearly 30 sites; the sample is described as skeletally robust with cultural practices that included avulsion of the upper central incisors (Barton et al. 2005: 88; Camps 1974: 97–98; Hadjouis 2002; Humphrey and Bocaege 2008; Irish 2000). Studies of skeletal and dental morphological traits suggest that Iberomaurusian populations are similar to post-Pleistocene North Africans, further suggesting population continuity over time (Irish 2000: 406).

Old solid-carbon technique radiocarbon dates indicated a placement of the Iberomaurusian between about 13,700 and 7,200 uncalibrated BP (Camps 1974: 68–69). More recently, however, it has been possible to suggest that the Iberomaurusian falls in the interval between about 18,000 and 9,000 uncalibrated BP (Eiwanger 1998; Görsdorf and Eiwanger 1998; Hachi et al. 2002; Lubell 2001; Roche 1976a; Saxon et al. 1974). More recent calibrated dates show, for example, that the Iberomaurusian at Kehf el Hammar in Morocco falls between 19,350 and 16,300 calibrated BP (Barton et al. 2005: 92), and the Iberomaurusian, in general, is between 21,000 and 11,000 calibrated BP (Bouzouggar et al. 2008).

Although there is a lengthy history of research on the Iberomaurusian beginning in the early years of the twentieth century, much of this predates the 1990s, especially studies of the lithic assemblages. Recently, a reexamination of the Iberomaurusian lithic assemblage from Grotte des Contrebandiers (Smugglers' Cave) was undertaken by the authors. At this site, Iberomaurusian materials were recovered in excavations undertaken in the 1950s by Abbé Jean Roche (1963: 190–200). These excavations yielded lithics, fauna, and worked ochre. This article reports on the results of the new study of the lithic assemblage.

The Site of Contrebandiers

Contrebandiers is next to the coastal road connecting Rabat and Casablanca (Fig. 1). The cave is 17 km from Rabat, at about 220 m from the sea and 14 m above the current sea level. The cave was carved out of consolidated dune deposits (sandstone) by wave action, presumably during the Ouljien period (OIS 5e at about 125,000 BP: Azougagh et al. 2001; Niftah 2003). Roche discovered the cave in 1955 and organized the first excavations from 1955 to 1957, under the field direction of Henrion (Roche 1963, 1973, 1976b). Then, from 1967 to 1975, Roche and Texier (1976) continued excavation in collaboration with the Moroccan authorities. In 1994, Bouzouggar reopened the site to increase lithic sample sizes for his dissertation on the Aterian industry at the site and to reexamine the stratigraphy at the site (Bouzouggar 1997a, b). Additionally, sedimentological and micromorpho-

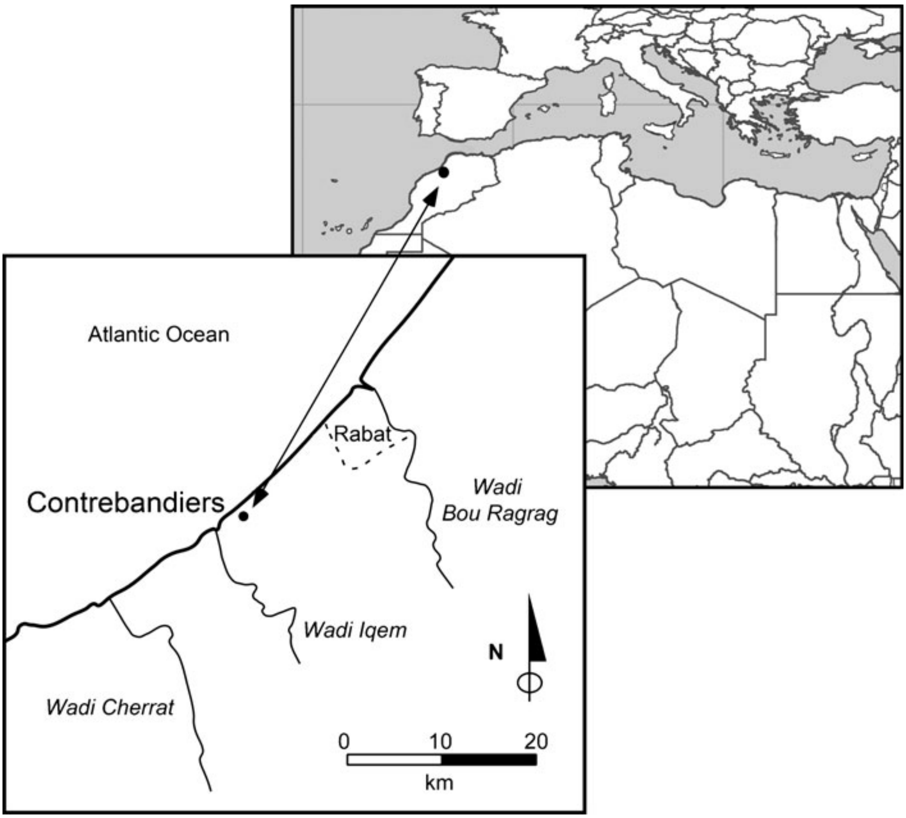

Fig. 1 Location of Contrebandiers, Morocco

logical research at Contrebandiers (among other sites) was carried out in the early 2000s (Niftah 2003; Niftah et al. 2005).

The site yielded artifacts attributed to the Neolithic, Iberomaurusian, Aterian, and Mousterian industries, as well as important early modern human remains (Debénath 2000; Debénath et al. 1986; Ferembach 1976, 1998; Hublin 1993; Ménard 1998; Roche 1976b; Roche and Texier 1976; Saban 1998; Vallois and Roche 1958). No human remains associated with the Iberomaurusian industry have as yet been identified (Roche 1963: 196).

Artifacts attributed to the Iberomaurusian were excavated in the 1950s; these collections form the basis of the study presented below. Published accounts identify Layer II as the source of the Iberomaurusian materials (Roche 1963: 191, 1976b).[1] In Roche's characterization of the stratigraphy from the 1950s excavations, Layer I represents the Neolithic, Layer II, the Iberomaurusian, and Layers III through V, the Aterian and Mousterian (Roche 1969, 1976b: 167). Although there have been reorganizations of the stratigraphic numbering (e.g., Roche and Texier 1976, who labeled the Iberomaurusian as Layer 7), the renumbered layers do not affect how the artifacts from each layer were originally labeled in the Roche collections (see footnote 1). Additionally, discrepancies in the color description of the Iberomaurusian layer (e.g., Roche 1963; *cf.* Roche 1969) are not surprising given variability in layers across the site observed during the 2008–2010 excavations into the remaining Iberomaurusian deposits.

No reliable radiocarbon dates exist for the Iberomaurusian levels at Contrebandiers. However, some of the dates attributed to the Aterian layers are excessively young and might be the result of intermixture of faunal remains from overlaying Iberomaurusian layers, particularly because the Iberomaurusians dug pits that extended into the underlying Aterian levels (Delibrias and Roche 1976). Basing the date of the Iberomaurusian on anomalous young dates from Aterian levels, however, is questionable (see, e.g., Bouzouggar et al. 2008: 6). New excavations at the site undertaken by the Moroccan-American team led by H. Dibble, A. El Hajraoui, and U. Schurmans beginning in 2008 include ^{14}C, OSL, and TL sampling in the Iberomaurusian deposits; these hopefully will clarify this issue.

The Iberomaurusian Lithic Assemblage at Contrebandiers

Published in the same year as J. Tixier's (1963) typology for the Maghreb, Roche's (1963: 190–200) analysis of the Iberomaurusian lithic assemblage from Contrebandiers uses terminology and assemblage hierarchy/organization that predates Tixier's standardization, particularly for various microlith types. During the summers of 2007 and 2008, the Iberomaurusian lithics from Roche's excavations at Contrebandiers were restudied with the goals of standardizing the classification of the materials, ensuring that all recovered lithics were examined and recorded in

[1] While the remains associated with the Iberomaurusian are published as belonging to Layer II, the markings on the artifacts in the collections indicate that the Iberomaurusian material is labeled as Layer I. There is no question that these artifacts are Iberomaurusian, based not only on the typology of the artifacts themselves but also from written information on the box and bag tags.

digital databases, and assessing the potential for new insights into Iberomaurusian behaviors. This restudy recorded lithic artifact class and type, technology and form, distal end termination, amount of cortex, patination and burning, raw material, and weight. Raw material categories include fine-grained (cherts and flints), chalcedony, quartz, coarse-grained (quartzite, basalt), and other (limestone, etc.). Additionally, all complete artifacts greater than 2.5 cm, as well as all complete microliths, were measured (length, width, and thickness).

Results of the Restudy

Data in Roche's (1963) tables, as well as his descriptions of the lithics, can be regrouped into categories broadly similar to those used in study of Tixier[2] and in the restudy (Table 1). Even at a broad scale of comparison, it is clear that there are important differences in the counts (and frequencies) between Roche's analysis and the restudy. In fact, given that the restudy has almost doubled the artifact count compared with that of Roche, it would appear that he did not report all the materials in his 1963 publication. Some discrepancies likely are attributable to the publication's omission of nondiagnostic materials, such as shatter, flakes, and bladelets less than 2.5 cm in size, and core fragments. Other differences, however, are more significant in their implications. The first notable discrepancy is with frequencies of nongeometric microliths and *pièces esquillées*. Roche's analysis recognized very few *pièces esquillées* (possibly because they were among pieces initially considered broken or nondiagnostic); the low percentage of these in his study affects the frequencies of other tool classes, including nongeometric microliths, which are considerably more frequent in his study than in the restudy. The second major discrepancy is in the cores-on-flakes, which attain a modest frequency in the restudy compared with Roche's low frequency (despite the inclusion of core fragments in the totals in the 2007/2008 analysis but not in the Roche study). Implications of these differences are discussed below.

There is, however, comparability between Roche (1963) and the restudy in several other indicators (see Table 1). Most tool class frequencies, for example, are relatively similar, with only slightly different percentages of end scrapers, burins, perforators, notch-denticulates, retouched pieces, and core tools. The presence of geometric microliths in the recent analysis is largely due to classification variability between researchers, for example, some of the curved backed bladelets classified by Roche simply as backed bladelets and shown in his Figure 68 (Roche 1963) are likely to be among those classified in the current restudy as lunates. Additionally, both studies document similar frequencies of single- and opposed-platform cores within each studied assemblage, although comparisons of these categories between Roche's analysis and the restudy do show different frequencies. Finally, both the Roche analysis and the 2007/2008 analysis yielded very few examples of microburins, suggesting that this technique was not integral to the production of microliths at Contrebandiers.

[2] Interested readers should consult Tixier (1963) for extensive definitions and illustrations of the various types.

Table 1 Comparison of Roche and the 2007/2008 restudy

Class	Roche (1963: 199–200)[a]		2007/2008 restudy	
	N	%[b]	*N*	%[b]
Tools				
End scraper	61	11.5	144	9.0
Burin	3	0.6	52	3.2
Backed piece	–	–	84	5.2
Perforator	1	0.2	8	0.5
Truncation	6	1.4	22	1.4
Nongeometric microlith	265	50.3	384	23.9
Geometric microlith	–	–	10	0.6
Special tool				
Side scraper	10	1.9	109	6.8
Pièces esquillées	5	0.9	299	18.6
Other	7	1.3	1	0.1
Notch–denticulate	32	6.0	66	4.1
Retouched piece	130	24.7	390	24.3
Multiple tool	–	–	8	0.5
Core tool	3	0.6	21	1.3
Varia	3	0.6	6	0.4
Subtotal	526		1,604	
Cores				
Single platform	27	39.7	82	18.3
Pyramidal/prismatic	2	2.9	7	1.6
Opposing platform	25	36.8	88	19.7
90° platform	2	2.9	17	3.8
Discoidal	3	4.4	17	3.8
Core-on-flake	2	2.9	63	14.1
Multiple platform	7	10.3	71	15.9
Other	–	–	9	2.0
Fragment	–	–	92	20.6
Subtotal	68		447	
Debitage				
Flake, blade, burin spall	7,653	99.8	11,903	86.8
Microburin	14	0.2	40	0.3
Shatter	–		1,745	12.7
Other	–		24	0.2
Subtotal	7,667		13,712	
Hammerstone	–	–	4	100.0
Total	8,261		15,767	

[a] For purposes of comparison, Roche's categories have been regrouped to correspond to the recent 2007/2008 restudy. Roche (1963: 200) reports 543 tools and six large tools (total $n=549$). Removing the microburins from tools gives a total $n=535$; however, the counts given in Roche's published table only sum to a total $n=526$, as shown here

[b] Frequencies are calculated within each major class (tools, cores, and debitage)

The restudy identified 1,604 tools (Table 2; Fig. 2). The most important classes are nongeometric microliths, special tools (which are composed mainly of *pièces esquillées*), and retouched pieces. The frequency of microliths is considerably lower than others have reported as typical—for example, Camps (1974: 63) mentions that the nongeometric component is always more than 40% and can reach over 80% of the tool assemblage, while Lubell (2001: 137) states that microliths comprise 40% of tool assemblages. Such differences, however, may result from variability in activity emphases from site to site. Tixier (1963: 95) notes that nongeometric microliths in the Maghreb fall into three broad categories: pointed with a straight-backed lateral, curved backed, and blunt (obtuse)-ended. In the Contrebandiers assemblage, 16.9% (Ain Keda and pointed/spike) are pointed forms, 9.6% are curved backed, and 8.6% are blunt-ended. Ouchtata bladelets are relatively well-represented (6.8%), while La Mouillah points are not (0.5%), likely due to the infrequent use of the microburin technique at this site.

Pièces esquillées are quite common (18.6%). Many of these are bipolar, while others are single. Occasionally, the removals occur bifacially along one or more ends of the flakes and blades used as blanks. While these artifacts sometimes have been interpreted as wedges used to split bone, antler, or wood (e.g., Bardon et al. 1906: 14–15; Chauchat et al. 1985; Tixier 1963: 146), there is a good possibility that *pièces esquillées* are simply another type of core (e.g., Escalon de Fonton 1969). If they are cores, then the removals made are quite small (certainly much less than 2.5 cm in size). This may be indicative of the need for quite small flakes for particular tasks[3] and/or the need to conserve flint raw material, resulting in intensive use of existing pieces (see below).

The final major class of tools is the retouched pieces. It is not unexpected that this tool class is frequent, given that many lithic assemblages of the Upper Paleolithic and Epipaleolithic are characterized by modest to high frequencies of retouched pieces. The somewhat unusual feature at Contrebandiers, however, is that the retouched pieces exhibit well-formed light retouch that usually is continuous along one or more edges of a flake or blade. Note that this differs from scraper retouch, which in many Old World typologies in common use generally is defined as more invasive onto a piece and can be semisteep, abrupt, or scaled in appearance. Very few retouched pieces at this site have marginal (nibbling-like) retouch. Along with the exceptionally low frequency of notch–denticulates, which often can be the result of trampling or other accidental damage, the general lack of marginal retouch on retouched pieces suggests that artifacts at Contrebandiers have not suffered from much postdepositional damage.

As Table 2 indicates, tools such as burins, backed pieces, perforators, truncations, notch–denticulates, and core tools are less common. End scrapers, especially those manufactured on flakes, tend to be somewhat more ubiquitous. These two features—low representation of most tool classes and moderately high numbers of end scrapers

[3] Deliberate manufacture of small flakes is known in several other contexts, including the Middle Paleolithic Asinipodian and other Middle Paleolithic industries with small flake components (Dibble and McPherron 2006; Schurmans 2008), precontact Hawai'i (Barrera and Kirch 1973; Olszewski 2003a), and the American Southwest (Shackley 1988, 2005).

Table 2 Iberomaurusian tools from Contrebandiers, 2007/2008 restudy

Tool type	Number	Percent within class	Percent within tools
End scraper	(144)		9.0
On blade	8	5.6	
On retouched blade	11	7.6	
On flake	79	54.8	
On retouched flake	27	18.8	
Denticulated	2	1.4	
Circular	11	7.6	
Double	1	0.7	
Nosed/shouldered	5	3.5	
Burin	(52)		3.2
Straight dihedral	15	28.8	
Offset dihedral	4	7.7	
Angle dihedral	2	3.8	
Off truncation	4	7.7	
Off break	8	15.4	
Off platform	1	1.9	
Off natural surface	4	7.7	
Transverse	5	9.6	
Plan (flat)	1	1.9	
Multiple burin	8	15.4	
Backed piece	(84)		5.2
Backed blade	37	44.0	
Backed flake	26	30.9	
Partially backed	11	13.1	
Backed fragment	10	11.9	
Perforator	(8)		0.5
Single	5	62.5	
Drill	3	37.5	
Truncation	(22)		1.4
Truncated blade	10	45.5	
Truncated flake	10	45.5	
Fragment	2	9.0	
Nongeometric microlith	(384)		23.9
Ain Keda point	22	5.7	
La Mouillah point	2	0.5	
Ouchtata bladelet	26	6.8	
Backed and truncated	7	1.8	
Curved	37	9.6	
Pointed/spike	43	11.2	
Blunt distal	33	8.6	
Irregular backed	22	5.7	
Inversely retouched	2	0.5	

Table 2 (continued)

Tool type	Number	Percent within class	Percent within tools
Shouldered	1	0.2	
Double backed	13	3.4	
Truncated	16	4.2	
Partially backed	44	11.5	
Fragment	116	30.2	
Geometric microlith	(10)		0.6
Isosceles triangle	1	10.0	
Scalene triangle	1	10.0	
Lunate	8	80.0	
Special tool	(409)		25.5
Single side scraper	82	20.0	
Double side scraper	27	6.6	
Pièces esquillées	299	73.1	(18.6)
Fragment	1	0.2	
Notch–denticulate	(66)		4.1
Notched blade	10	15.2	
Notched flake	37	56.1	
Denticulated blade	1	1.5	
Denticulated flake	18	27.2	
Retouched piece	(390)		24.3
Retouched blade	109	27.9	
Retouched bladelet	63	16.2	
Retouched flake	151	38.7	
Inversely retouched	38	9.7	
Fragment	29	7.4	
Multiple tool	(8)	100.0	0.5
Core tool	(21)		1.3
Biface	1	4.8	
Carinated	5	23.8	
Chopper	4	19.0	
Core scraper	9	42.9	
Fragment	2	9.5	
Varia	(6)	100.0	0.4
Total	1,604		

on flakes—reflect patterning known from Iberomaurusian sites in general (Camps 1974: 63, 72–76; Lubell 2001: 138).

Although manufacture of microliths—which are produced from bladelet blanks—is one key characteristic of the Iberomaurusian, this aspect is not immediately obvious from an examination of the cores at Contrebandiers (Table 3). The final removals on the majority of cores (61.1%) are those of flakes. A similar frequency is

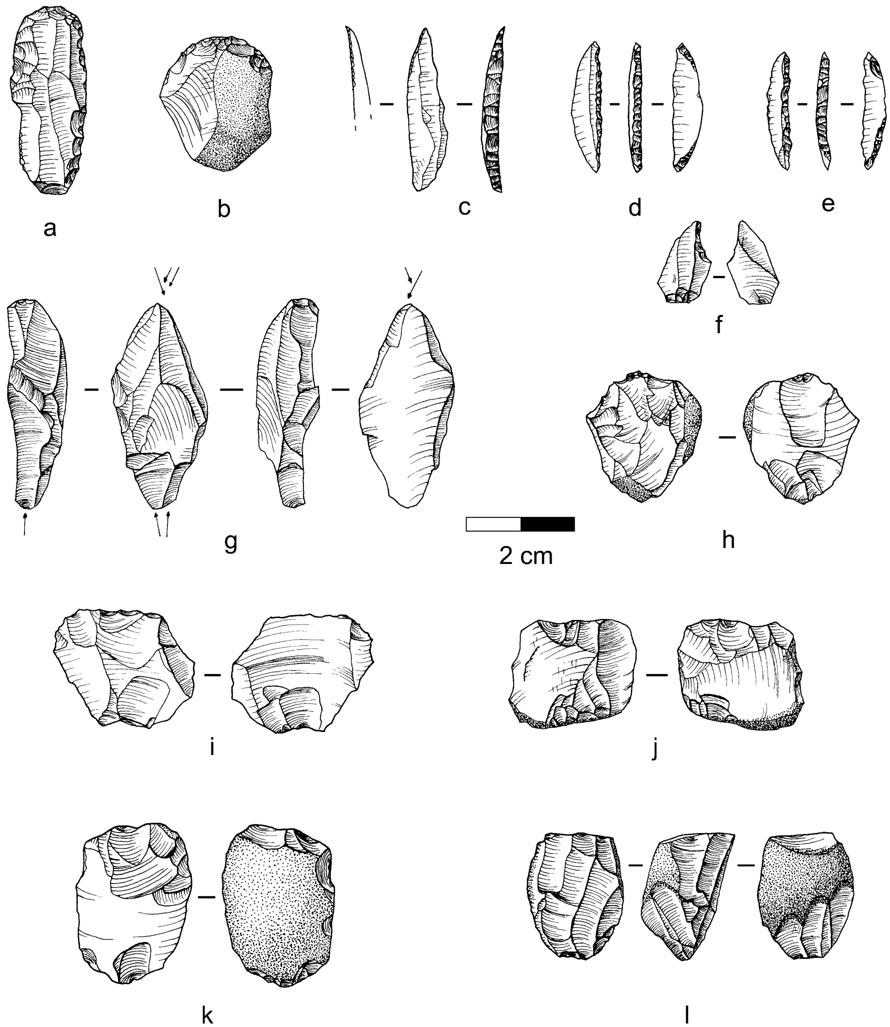

Fig. 2 Iberomaurusian artifacts from Contrebandiers. **a** End scraper on retouched blade; **b** flake end scraper; **c** curved backed bladelet; **d**, **e** Ain Keda points; **f** microburin; **g** multiple dihedral burin; **h**–**j** *pièces esquillées*; **k** core-on-flake; **l** opposed-platform bladelet core (drawings by Rita Gaspar)

noted by Collina-Girard (1988: 43) for Wadi Iquem. This frequency suggests either that cores used initially for bladelet removals were shifted to flake removals as they were reduced or that many of the cores were used exclusively for flake production throughout their use life. Camps (1974: 66) characterizes Iberomaurusian cores as mainly single platform, although multiple-platform cores also are relatively common. The data from Contrebandiers, however, show a small number of 90° cores (also noted by Roche 1963: 200) and, more importantly, indicate that cores consist of four main types. These are opposed platform, single platform, multiple platform, and cores-on-flakes.

The Contrebandiers debitage, like the cores, reflects the production of considerable numbers of flakes (Table 4). Flakes larger than 2.5 cm in maximum dimension are more frequent (16.6%) than blades (3.7%) and bladelets (3.7%). The

Table 3 Iberomaurusian cores from Contrebandiers, 2007/2008 restudy

Core type	Blade	Bladelet	Flake	Mixed	N/A	Total	Percent
Single platform	2	15	59	7	–	83	18.3
Subprismatic	–	3	–	1	–	4	0.9
Prismatic	–	1	–	–	–	1	0.2
Subpyramidal	–	1	–	1	–	2	0.5
Opposed platforms	1	28	40	19	–	88	19.7
90° platforms	–	3	14	–	–	17	3.8
Discoidal	–	–	17	–	–	17	3.8
Multiple platforms	–	–	59	12	–	71	15.9
Cores-on-flakes	1	4	52	5	1	63	14.1
Tested	–	–	6	1	–	7	1.6
Other	–	–	2	–	–	2	0.5
Core fragment	1	6	24	3	58	92	20.6
Total	5	61	273	49	59	447	

most abundant type (52.6%) is small flakes (<2.5 cm in maximum dimension). Unfortunately, it is usually not possible to distinguish between small flakes which result from retouch or core shaping and small flakes which were produced from cores-on-flakes or perhaps from *pièces esquillées*. The restudy, however, did note a few instances of small flakes with characteristics suggesting that they are derived from *pièces esquillées* (Fig. 3). The category of small bladelets contains only small bladelets; elements such as burin spalls and platform bladelets that are smaller than 2.5 cm were recorded in the classes of burin spalls and platform bladelets, respectively (see note on Table 4).

While earlier descriptions of Iberomaurusian core preparation (e.g., Camps 1974: 66) suggest that little effort was undertaken, data from the restudy indicate that this is not an apt description. There is evidence in the form of various core-preparation blades, bladelets, and flakes, particularly platform blades and bladelets,[4] which reflect the removal of core-striking platforms in order to refurbish cores for further blank removals. This technique is widely known, for example, in Levantine Epipaleolithic bladelet assemblages (Goring-Morris 1987: 49; Olszewski 2003b).

As might be expected from the rarity of burins in the Contrebandiers tool assemblage, burin spalls are infrequent. Many of these, however, are characterized by a triangular cross section which has the evidence of retouch along the primary crest. This retouch does not represent retouch of the burin spall or cresting but rather the removal of a retouched lateral edge from an existing tool (most likely a side scraper or a retouched piece).

[4] The term platform blade or bladelet refers to the partial removal of an existing core-striking platform along the end of the core (e.g., Coinman 1998: 44). This type of rejuvenation is similar to the term *flanc de nucleus*. Rejuvenation elements such as core tablets are extremely rare (these are comparable to *tablette de ravivage*). The term "rejuvenation blade, bladelet, or flake" is used here for those pieces which are not crested, platform, or core-tablet forms but which still preserve a portion of the original striking platform of a core on their dorsal (exterior) surface.

Table 4 Iberomaurusian debitage from Contrebandiers, 2007/2008 restudy

Class	Complete and proximal	Medial and distal	Total *N*	% within class	% within debitage
Blade			(509)		3.7
Blade	186	270	456	89.6	
Core tablet	1	3	4	0.8	
Platform blade	20	21	41	8.0	
Rejuvenation blade	3	5	8	1.6	
Bladelet			(503)		3.7
Bladelet	185	182	367	72.9	
Crested bladelet	2	1	3	0.6	
Core tablet	1	–	1	0.2	
Platform bladelet	57	69	126	25.0	
Rejuvenation bladelet	–	6	6	1.2	
Flake			(2,272)		16.6
Flake	1,281	894	2,175	95.7	
Core tablet	8	2	10	0.4	
Rejuvenation flake	53	34	87	3.8	
Burin spall	55	42	97	100.0	0.7
Small bladelet (<2.5 cm)	na	na	1,307	100.0	9.5
Small flake (<2.5 cm)	na	na	7,215	100.0	52.6
Microburin			(40)		0.3
True	na	na	24	60.0	
Krukowski	na	na	14	35.0	
Trihedral	na	na	2	5.0	
Shatter	na	na	1,745	100.0	12.7
Other	na	na	1	100.0	<0.1
N/A	na	na	23	100.0	0.2
Total			13,712		

Generally, only complete debitage larger than 2.5 cm was measured. However, in certain categories, complete elements less than 2.5 cm were recorded. For example, there are 55 complete burin spalls, of which 19 are ≥2.5 and 36 are <2.5 cm. Additionally, within complete platform bladelets (n=54), there are 42 which are ≥2.5 cm and 12 which are <2.5 cm. Shatter (a nondiagnostic category) was weighed only

Finally, microburins are extremely rare (0.3%). Of those present, the majority are true (regular) microburins, and there are Krukowski microburins as well. The sporadic numbers of microburins, as noted previously, suggest that this technique of bladelet segmentation was not widely practiced at Contrebandiers.

Evidence of Burning

A total of 7.7% of the entire lithic assemblage shows signs of burning, such as potlids, crazed surfaces, or discoloration. Within major lithic categories, a slightly

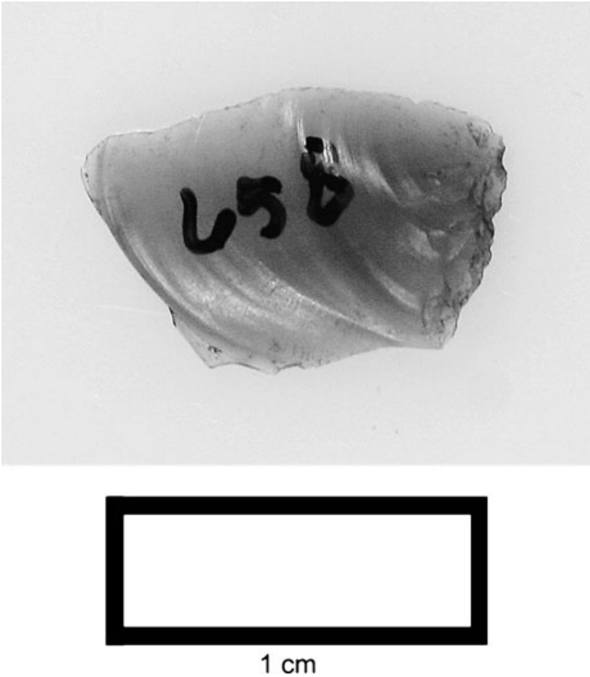

Fig. 3 Small flake probably from a *pièce esquillée*. Note the "splintered" effect along the interior flake surface on the right

higher percentage of all tools are burned (8.9%) and correspondingly fewer cores and blanks (7.4% and 6.5%, respectively). This pattern is most likely related to the fact that it is easier to distinguish burning in fine-grained stone (of which most tools are made) than in other types of raw material. Evidence of burning was observed for 12% of the fine-grained material, but for only 1.7% of the coarse-grained stone and 1.5% of the chalcedony, suggesting that it is important to analyze burning evidence for each of the raw materials separately. The burning evidence in the fine-grained artifacts is discussed below.

Table 5 shows two interesting patterns. First, it is quite clear that broken pieces are more often burned. This is not unexpected, as burning frequently will fragment lithic artifacts. Cores, together with complete blanks and tools, are the least likely to be burned. Second, at first glance, there does not seem to be any difference between the rate at which tools and blanks are burned. Each of the classes of broken tools and blanks (distal, proximal, and medial) has roughly similar rates of burning. However, the frequencies of burned medial fragments are always higher than those of proximal and distal fragments. Upon closer inspection, it appears that broken tools are slightly more likely to be burned than their unretouched equivalents. When burning among tools is examined in more detail (Table 6), certain tool classes appear to be more frequently burned than others. These are backed pieces, geometric microliths, and nongeometric microliths. There are at least two hypotheses that could explain these patterns. One would simply be that, as noted above, broken pieces show evidence of burning more frequently. An alternative might be that backed pieces, geometric, and nongeometric tools came into contact with fire either during the initial fastening of the tool in its haft or during removal from the haft when retooling or both.

Table 5 Iberomaurusian burned and unburned artifacts (fine-grained stone)

Type	Number burned	Percent burned	Number unburned
Core	15	5.6	253[a]
Core fragment	14	19.7	57
Complete blank	59	8.0	677
Complete tool	35	6.9	473
Proximal blank	51	14.6	299
Proximal tool	32	17.9	147
Medial blank	49	22.0	174
Medial tool	35	22.9	118
Distal blank	63	12.7	432
Distal tool	35	13.8	219
Total	388	12.0	2,849

[a] Cores include the core tools

The incidence of burning evidence among all backed pieces, geometric microliths, and nongeometric microliths broken down into complete, proximal, medial, and distal tools suggests that there are aspects of both hypotheses at work. As in the case for all tools and other artifacts, certain types of fragments, such as medial pieces, are more frequently burned than others. However, it is also clear that the percentage of burned pieces is markedly higher for these particular types of tools than for others. This is true for each of the categories. For example, medial blanks have burning evidence 22% of the time, whereas medial backed pieces and microliths show similar evidence for 29% of the artifacts. The percentages are consistently higher for each of the microlith/backed piece categories (proximal

Table 6 Iberomaurusian burned and unburned tools (fine-grained stone)

Type	Number burned	Percent burned	Number unburned
Backed pieces	14	23.3	46
Geometric microliths	2	28.6	5
Nongeometric microliths	48	20.3	189
Burins	4	9.1	40
End scrapers	9	9.0	91
Notches/denticulates	3	6.8	41
Perforators	0	0.0	7
Retouched pieces	28	10.5	239
Special tools	28	9.2	276
Truncations	1	6.7	14
Varia[a]	0	0.0	22
Total	137	12.4	970

[a] Varia combines composite tools, core tools, and varia from Table 2

burned 23.3%; distal burned 18.5%) when compared with those for equivalent tool categories in Table 5. In other words, these types of tools (backed pieces and microliths) came into contact with fire more often than others, likely indicating initial hafting or retooling events.

Raw Material and the Intensity of Its Use

Several broad categories of stone raw material were recorded in the restudy, including fine-grained (chert/flint), chalcedony, coarse-grained (mainly quartzite), quartz, and other (e.g., limestone). Examination of the lithic classes documents differences in Iberomaurusian use of these raw materials, indicating careful selection. Tools, for example, were mainly (98.1%) made on fine-grained materials such as chert, as well as chalcedony. The same pattern can be observed for the total number of tools as a percentage of all blanks and tools combined within each class of raw material. Among the coarse-grained raw material, only 3.9% of all blanks were transformed into tools, whereas the corresponding percentage for the fine-grained material is 37.1%. Another measure indicating preference for fine-grained materials at Contrebandiers is the Raw Material Retouch Index proposed by Orton (2008).[5] When calculated, it produces indices—1.2 for fine-grained, 0.2 for coarse-grained, and 0.04 for quartz—indicating the relative importance of fine-grained compared with other material types in selection for retouching.

These differences in raw material use are even more pronounced if accessibility is considered. Coarse-grained raw materials are available as close as the current beach, at 220 m from the site. The nearest identified sources of fine-grained materials, on the other hand, are much further away, in local wadis such as the Wadi Iquem (5 km), the Wadi Cherrat (16 km), and the Wadi Bou Ragrag (17 km), where flint can be found in secondary position (see Fig. 1). While detailed raw material surveys have not yet been conducted in the area (Bouzouggar 1997a) and thus the exact locations where raw material was obtained are unknown, cortex on various artifacts at Contrebandiers is indicative of nodules transported in an alluvial setting, suggesting that wadis were at least one of the sources of fine-grained stone. In other words, if the availability of raw material was the only criterion determining which stone Iberomaurusian populations would select, then the site should be dominated by coarse-grained materials. Instead, the occupants of the cave went out of their way to acquire fine-grained materials from further away.

The preference for fine-grained types of stone can also be seen when examining the size of the available raw materials. The average sizes of cores, flakes, and tools are significantly different between fine-grained and coarse-grained stones. In each of the cases and in all size measures, such as length, width, thickness, and weight, fine-grained artifacts are always smaller than coarse-grained equivalents (Fig. 4a, b). This results not only from differences in the sizes of the available material (coarse-grained materials come in larger-sized packages) but also is the result of the intensity of the reduction in each of these classes of raw material.

[5] The RMRI is the frequency of a raw material among all retouched artifacts divided by its frequency among all flaked artifacts (Orton 2008: 1092).

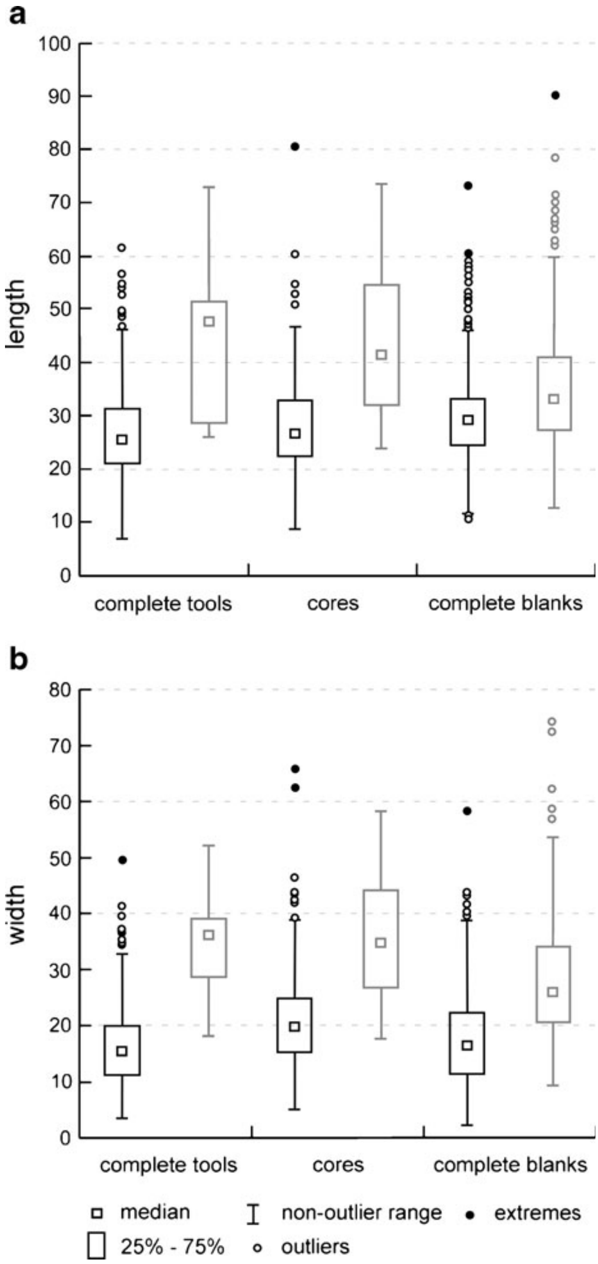

Fig. 4 Length (**a**) and width (**b**) plots for complete tools, cores, and complete blanks (in millimeter); *black box plots* = fine-grained raw material, *gray box plots* = coarse-grained raw material

In addition to core size, the intensity of raw material use is also reflected by the types of cores in the assemblage. Single-platform and tested cores, for example, suggest less intense use of individual nodules, whereas multiple-platform, opposed-platform, and cores-on-flakes indicate greater use of individual pieces of available raw material. As might be expected, cores that are less reduced are frequently coarse-grained materials, whereas cores showing greater reduction are mainly fine-grained and chalcedony (Fig. 5). The same is true for cores-on-flakes because small-sized cores-on-flakes can, by definition, only yield small-sized flakes, and thus the use of blanks as cores further highlights intensive use of fine-grained raw material.

Finally, based on the bipolar appearance of many of the *pièces esquillées*, similarities between them and opposed-platform cores may reinforce the hypothesis that *pièces esquillées* are cores (Escalon de Fonton 1969). The small-flake removals from the interior surface of flake or blade *pièces esquillées* resemble removals from opposed-platform cores. Figure 6 shows the distribution of length of *pièces esquillées* compared with that of the opposed-platform, 90° platform, and cores-on-flakes. While *pièces esquillées* are at the smallest end of the size distribution of cores, there is significant size overlap, showing that *pièces esquillées* are not too small to have been used as cores. As the majority of the *pièces esquillées* are between approximately 19 and 26 mm, flake removals from them will most often be less than 25 mm and thus fall within the small-flake class. Additionally, as can be seen in Fig. 6, the majority of flake removals from cores-on-flakes and opposed-platform and 90° cores are only slightly larger, with removals at maximum being between approximately 20 and 32 mm if the entire length of the core was used. If Iberomaurusian flintknappers were intensively reducing fine-grained as opposed to other raw materials, then *pièces esquillées* should not be typical in other raw materials (quartz and other coarse-grained stone). This is, in fact, the case, as there are 41% *pièces esquillées* among fine-grained cores and core fragments (including *pièces esquillées*), 53% among chalcedony, and only 5% in coarse-grained and 7% in quartz.

Given the differences in the use of the various raw materials (see Fig. 4a, b) and the differences in the sizes of artifacts in these materials, average sizes of different types of cores and blanks are presented for fine-grained material only. Table 7 underscores the intensity of reduction for particular types of cores. Tested cores, for example, are much larger on average than other core types in fine-grained materials. What is interesting is that the average size of blanks (Table 8) tends to be larger (with the exception of burin spalls) than the average sizes of the cores. This, as proposed below, can be interpreted as another measure of intensity in raw material use.

Modeling Reduction Intensity

To better understand the relationship between blanks in an assemblage and the cores from which most presumably derive, the reduction of a single core and its resultant

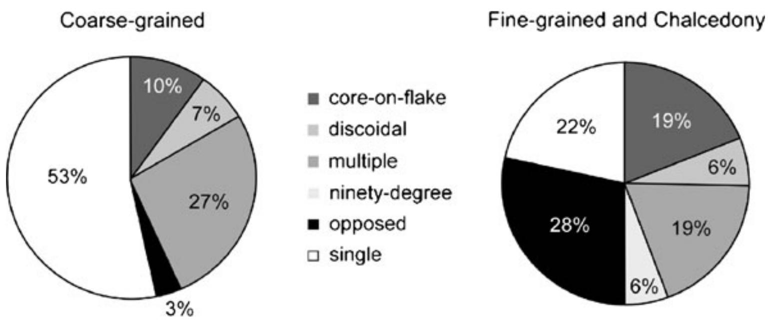

Fig. 5 Distribution of core types by raw material

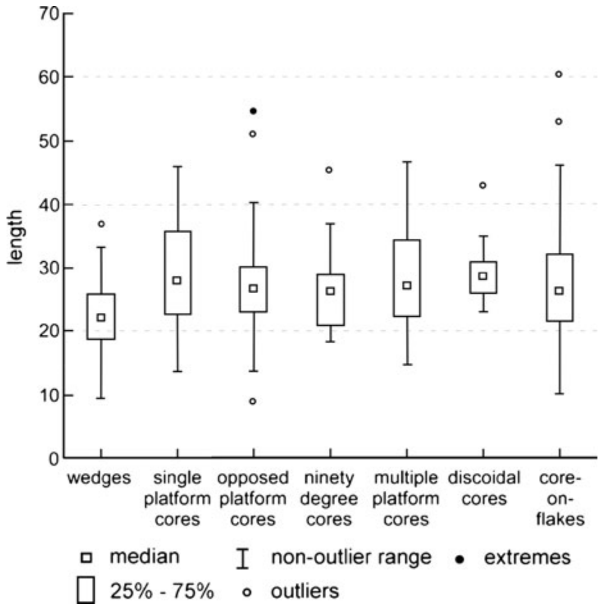

Fig. 6 Length of core types compared to *pièces esquillées*, labeled wedges (in mm)

blanks can be modeled. Figure 7 represents a hypothetical assemblage of a single core and its blanks at various stages of increased reduction intensity (or time, the *X*-axis). As the core is flaked, the average size of the core becomes smaller. At the same time, the blanks from the core also will reduce in size proportional to the reduction in size of the core itself. However, the reduction in the *average* size of all blanks will decline at a slower pace than the reduction in size of the core itself. There are two important assumptions in this model. First, both core and blanks produced from that core are assumed to reduce at a rate proportional to each other. Second, the size of the blanks taken from a core at any given time will always be smaller than the core itself, for example, a blank of 8 cm from a 10-cm core. If the resulting core is reduced by 1 cm, the next blank also will be reduced by 1 cm (core=9 cm and

Table 7 Average size of Iberomaurusian core types and pièces esquillées (in mm and g)

Fine-grained material		Length		Width		Thickness		Weight	
Core type	*N*	Avg	SD	Avg	SD	Avg	SD	Avg	SD
Tested core	5	44.4	21.6	31.5	13.3	24.1	11.0	48.1	52.6
Multiple-platform core	49	29.5	8.5	21.8	8.8	14.9	6.5	15.4	15.0
Single-platform core	46	28.3	7.1	23.9	8.3	15.4	6.2	16.5	14.1
90° platform core	12	26.9	7.7	22.4	7.8	14.9	5.4	14.7	15.9
Opposed-platform core	73	27.4	7.5	18.9	7.8	13.2	5.6	10.5	12.9
Discoidal core	11	29.7	5.4	24.8	3.2	11.4	3.7	9.6	7.0
Core-on-flake	52	27.1	9.3	19.1	8.9	8.6	4.1	7.8	18.8
Pièces esquillées	189	22.0	5.2	15.1	4.5	5.6	1.8	2.2	1.6

Table 8 Average size of Iberomaurusian debitage (in mm and g)

Fine-grained raw material		Length		Width		Thickness		Weight	
Type	*N*	Avg	SD	Avg	SD	Avg	SD	Avg	SD
Complete flake	518	29.1	7.4	20.7	7.0	6.2	3.4	5.0	5.4
Complete blade	65	37.1	7.1	13.4	2.6	4.9	2.1	3.2	2.0
Complete bladelet	105	30.6	5.6	8.7	1.8	3.7	1.4	1.2	0.6
Complete burin spall	43	24.8	7.9	5.9	1.9	5.0	1.8	0.9	0.9

blank=7 cm). However, in this example, the *average* blank size is only reduced by 0.5 cm given that the average of the first blank (8 cm) and the second blank (7 cm) is 7.5 cm.

It is likely that a similar effect occurs in archaeological assemblages and that the ratio between average blank length and average core length can be used to gauge the intensity of raw material use (or the intensity of reduction) at a site. If, for example, only a few blanks are removed from a core prior to using a different nodule as a core, then the blanks will always be smaller (on average) than the cores, thus indicating a low intensity of reduction. If, on the other hand, one keeps using the same core, it will over time inevitably become smaller than the initial blanks removed from it and perhaps even smaller than the average size of those blanks, thus suggesting high reduction intensity. This is the case as shown on the right side of Fig. 7, where the line of the average core size dips below that of the average blank size. By dividing the average length of flakes by the average length of cores, it is possible to compute an assemblage reduction index (ARI). In Fig. 7, the ARI is 0.75 on the far left, 1.00 where the two lines intersect, and 1.33 on the far right. Actual archaeological assemblages, of course, are subject to processes such as artifact removal and pieces brought in from elsewhere, which could affect the ARI. Controlling for this might be possible with total refitting of all artifacts in an assemblage, but, in practice, this often is not possible. Most studies using various indices consequently implicitly assume, in the absence of other contrary data, that export/import of pieces is not at a large enough scale to significantly affect such calculations.

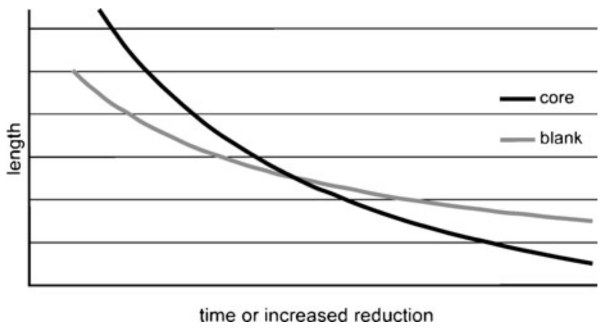

Fig. 7 Modeling the reduction of a single core and comparing its length with that of the blanks from it

In addition to being able to quantify reduction for an assemblage as a whole, the ARI can also be used to gauge the relative intensity of reduction in different raw materials. In fact, in the Iberomaurusian collection from Contrebandiers, the average length of complete blanks is slightly larger than the average length of cores for both chalcedony (ARI=1.05) and chert/flint (ARI=1.01), whereas both quartz (ARI=0.83) and coarse-grained material (mostly quartzite, ARI=0.83) have larger cores on average than blanks. These data further document the intense reduction of the fine-grained stone (chert/flint) and chalcedony at the site.

Finally, the intensity of the use of raw material can be seen in the average percentages of cortex for each of the different raw material classes (Fig. 8). The more pronounced is the reduction, the fewer are the cortical pieces expected for any given nodule size (Dibble et al. 2005). However, if raw material comes in different package sizes, as is the case at Contrebandiers, then comparisons are not as straightforward. The smaller the package size of the material, the relatively more cortex there is per unit volume of stone. Cores in both coarse-grained stone and chalcedony tend to have more cortex on average than either fine-grained stone or quartz. This suggests, particularly for coarse-grained material which comes in bigger package sizes, that this material is not very extensively reduced at the site. The same can be said for tools, but not for blanks where average frequency of cortex coverage is roughly similar between different materials. The relatively large amount of cortex on coarse-grained tools suggests that these tools are struck from less intensively reduced cores. As such, they are part of a more expedient technology, as opposed to the fine-grained stone and chalcedony, which are abundantly represented in formal tools and are part of a more carefully planned and executed technological schema (or curated technology; see, e.g., Andrefsky 2008; Nelson 1991). An example of the effect of a highly curated technology on the average percentage of cortex can be seen in the microliths. The frequency of cortex on geometric and nongeometric microliths in chalcedony (avg. 3.1%, N=150) and chert/flint (avg. 1.6%, N=244) is much lower than the average for all tools in these materials (>10%).

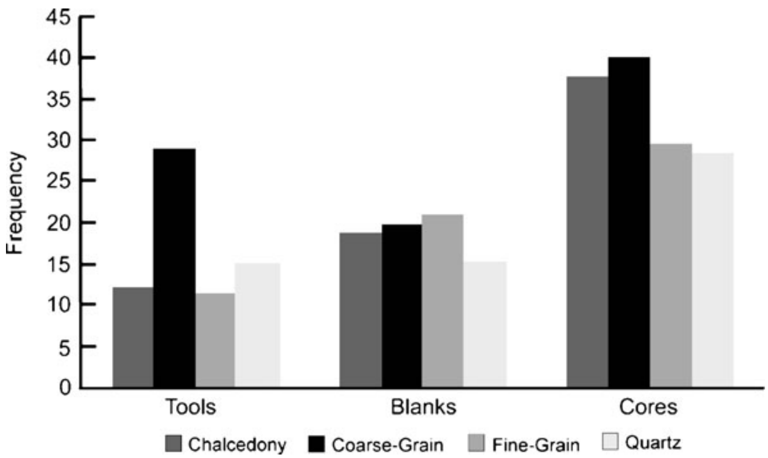

Fig. 8 Frequency of cortex for tools, blanks, and cores by raw material

Discussion

The restudy of the Iberomaurusian lithic assemblage from Abbé Roche's 1950s excavations at Contrebandiers in Morocco has provided several new insights into Iberomaurusian behavioral strategies, as well as into the classification of the materials. It is a testament to the meticulous recovery methods of Roche that this collection contains not only larger elements and diagnostics but also the minute fraction (artifacts less than 2.5 cm and often less than 1 cm in size), and it speaks to the potential of older collections for new analytical investigations. This means that analyses of this collection can be comprehensive rather than influenced by excavator bias or poor recovery techniques. Additionally, the lithics have quite fresh edges, with little evidence for trampling or postdepositional movement damage. This suggests that the Iberomaurusian deposits at Contrebandiers were *in situ*. Examination of patterning in burned lithics during the restudy shows high fragmentation in microliths and backed pieces, which may be due to hafting and retooling activities in proximity to hearths that resulted in these discarded tools showing more evidence of burning.

While there is general agreement between Roche's (1963: 190–200) study and the 2007/2008 analysis, Roche appears to have underrecognized *pièces esquillées*, which meant that Contrebandiers was not counted among those Iberomaurusian sites for which *pièces esquillées* approached modest frequencies (e.g., er-Recheda-es-Souda and Kerma in Algeria, as reported in Camps 1974: 64). In fact, Camps (1974: 64) states that coastal Iberomaurusian sites from the vicinity of Oran in Algeria and west into Morocco have very low frequencies of *pièces esquillées*, an observation that is not supported by the 2007/2008 restudy of Contrebandiers. The revised percentage of *pièces esquillées* coincides much better with the numbers reported from the nearby open-air site at Wadi Iquem (Collina-Girard 1988: 37).

Roche also appears to have undercounted cores-on-flakes. As these artifacts are sources for the production of quite small flakes, their low frequency in Roche's analysis meant that their contribution to interpretations of Iberomaurusian strategies was not apparent. Moreover, *pièces esquillées* also may have been cores to produce small flakes; the low frequencies of both these "tools" and the cores-on-flakes reported by Roche underscore the fact that high intensity of use and reuse of certain stone raw materials at Contrebandiers is not obvious in his study. Additionally, while it is not currently possible to ascertain the tasks for which small flakes were used, their deliberate production highlights the fact that they were an important component in Iberomaurusian activities.

There are several lines of evidence suggesting that the *pièces esquillées* at Contrebandiers represent a strategy aimed at maximizing the use of certain stone raw materials. First, *pièces esquillées* have features (removals from opposite ends and along the same face of the artifact) that resemble opposed-platform cores and/or bipolar technique. If *pièces esquillées* functioned as cores, then Iberomaurusians were utilizing any available blank with sufficient size to strike off additional blanks. Second, the size of small flakes removed from *pièces esquillées* is comparable to the small flakes removed from cores-on-flakes. That is, all such removals are much less than 2.5 cm in size, and there is evidence that small flakes from *pièces esquillées* are present in the assemblage (see Fig. 3). Third, the size of *pièces esquillées* is comparable to several other core types in fine-grained stone (see Fig. 6), suggesting the intensive use of this raw material across several typological categories. Finally, *pièces esquillées* are primarily made on fine-grained materials (74.1%) or chalcedony (24.7%), which emphasizes the importance to Iberomaurusians of stone that was sought from sources some distance away from the cave. The fact that the percentage of *pièces esquillées* at the nearby open-air site of Wadi Iquem is similar (Collina-Girard 1988: 37) lends further support to the suggestion that raw material is a major contributor to the observed pattern.

The restudy also demonstrated that fine-grained materials (67.5%) and chalcedony (30.6%) were preferentially used for retouched tool manufacture. The coarse-grained and quartz tool component (1.6%) shows that these locally available materials were not targeted to any degree, contrary to expectations from some other Iberomaurusian sites where large tools were made in these materials (Roche 1963: 25–26). All of these indicators (*pièces esquillées*, cores-on-flakes, average blank size, tools in fine-grained materials) reinforce the idea that Iberomaurusians at Contrebandiers carefully selected and used particular lithic raw material.

On the surface, the Iberomaurusian (as documented at Contrebandiers) appears to share features, such as *pièces esquillées* (*outils écaillés* or scaled pieces) and preferential selection for fine-grained raw materials for tools, with other Later Stone Age (LSA) assemblages in Africa (e.g., Barham 1989; Close 1989; Mitchell 1990; Orton 2008; Parsons 2003; Willoughby 2001). Care, however, must be taken in not overextending these comparisons because of the considerable geographic, habitat, temporal, and contextual differences found across LSA Africa. Some researchers (e.g., Mercader and Brooks 2001), for example, report the presence of bipolar cores, but these are not necessarily *pièces esquillées* because bipolar cores are on nodules, while *pièces esquillées* are on blanks. The technology (bipolar reduction) may be the same, but the typology is not. In other cases (e.g., Barham 1989: 36), *pièces esquillées* are subsumed under bipolar cores, which hinders examination of their frequency. Moreover, in some contexts, such as the Kubbaniyan of southern Egypt, there is tremendous variability in the frequency of *pièces esquillées* in sites within several hundred meters of one another (Close 1989: 523), perhaps suggesting activity differences related to the production of small flakes. Based on what is currently known from descriptions of Iberomaurusian sites, they appear to consistently have modest to high frequencies of *pièces esquillées*, which may distinguish them (along with different types of microliths) from other LSA assemblages.

Conclusion

It is likely that *pièces esquillées* in the Iberomaurusian in general (across Morocco and other parts of North Africa), as well as in many Later Stone Age assemblages in other parts of Africa, are a signal either for a situational context in which fine-grained raw materials were scarce or not available in immediate proximity to sites and/or for activities necessitating small flakes as informal (unretouched) tools. The precise explanation for the abundance of *pièces esquillées* in particular assemblages, however, must be formulated within the temporal and habitat contexts of those assemblages as such explanations can be expected to differ from region to region or temporally within regions.

For the Iberomaurusian, the degree to which this phenomenon is mainly coastal or also typical of inland contexts remains to be investigated. Presently, the best-known Iberomaurusian sites are in coastal settings (or were within reasonable distance [<10 km] of coasts during periods of lowered sea levels); the Contrebandiers restudy suggests that the choice of these coastal caves and rockshelters was made using criteria other than access to preferred stone raw material types. These criteria may have included the need for protected shelter provided by caves and rockshelters, easy access to coastal food resources, or other scheduling decisions.

Issues raised above will be further researched using new data from Contrebandiers, obtained from a portion of the remaining Iberomaurusian deposits near the mouth of the cave excavated during the 2008–2010 field seasons. Analyses of the recovered materials are underway. Additionally, other researchers are pursuing investigations of the Iberomaurusian either at previously excavated or newly discovered and excavated sites (e.g., Barton et al. 2005; Bouzouggar et al. 2008; Garcea and Giraudi 2006; Nespoulet et al. 2008), and the publication of these assemblages will greatly augment the information available to construct a more nuanced understanding of Iberomaurusian adaptations.

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