**Description of the specimens analysed (technological and functional analysis)**

Figure 7: Experimental use-wear traces a. aligned angular scars with bending and cone initiations and step, hinge and feather terminations related to butchery activities; b. spot of smooth polish on high areas with clear boundaries related to butchery activities, when the tool hits bone; c. circular scars with bending initiations and feather and hinge terminations related to the processing of plant material and d. domed and smooth polish on high and medium areas related to the processing of plant material.

# MAR1 1.2 (Figure 5)

MAR1 1.2 is an unretouched flint flake with a rectangular shape, and is one of the largest lithics of the assemblage (88x49x27mm). The dorsal surface has three removals that initiate a flat surface. A back is present on the right lateral edge of the flake that is possibly the result of an accidental siret fracture or an intentional fracture using the dorsal face as the striking platform.

The left unretouched edge is 46 mm long, with edge angles from 50° to 60°. It is concave in plan view, straight in delineation and biplane in cross-section, with twenty scars on both surfaces, isolated or overlapped, and medium or large in size. The scars are irregular, trapezoidal or semicircular in shape and have step, hinge or feather terminations and a cone initiation. Orientations are both oblique and perpendicular to the edge. Some small crushing groups are present along the cutting edge (Figure 5b). Microscopic analysis shows some isolated polish on the cutting edge (Figure 5c). A smooth texture and clear limits characterize this polish. Short and narrow striations are associated with the polish and are parallel to the cutting edge, with a rough or smooth bottom.

Thus, an association of coherent and localized marks on the left lateral edge is interpreted as functional traces. The scars are bifacial and often oblique to the edge, and striations are parallel to the working edge, showing a longitudinal motion. The material processed would have been hard, because crushing is present and scars are large, sometimes overlapping with cone initiation. Smooth spots of polish confirm this interpretation. Nevertheless, the material processed cannot be precisely determined because the polish is not developed enough, and some diagnostic criteria are absent. For example, there are no triangular shaped scars visible, as one would expect to find from animal processing. There is also no bending initiation, and the scars are not elongated enough as expected in vegetal processing, and striations are too few and the polish too smooth to suggest, for example, mineral processing.

In summary, this specimen is a large flint flake with backing opposite to an unretouched edge. The latter edge bears functional traces related to the working of a hard material in a longitudinal motion. The origin of the backing is indeterminate and is either an accidental siret fracture or intentional break.

# MAR1 620 (Figure 5)

MAR1 620 is a backed knife on a radiolarite flake with a quadrangular shape (39x22x14 mm). The right side of the dorsal face is natural. The left side is retouched to create a back. The retouch is continuous, direct and abrupt, with a long extent and an irregular delineation. In continuity with the backing, the distal part is also abrupt. The right edge exhibits a small notch on the ventral surface. It could not be determined whether the notch is a taphonomical scar, a functional scar or from retouch? In any case, this edge has use-wear traces.

The right lateral edge is 25 mm long with an edge angle of 50°. It is both straight in plan view and in delineation, and biplane in cross-section. The ventral surface shows a notch in the mesial part. Here, near the working edge, localized spots of polish on the highest areas of the microtopography are visible (Figure 5a). The polish is smooth with vague limits and an open linkage. Short and isolated striations are present, which are oblique to the edge, narrow or large and with a rough bottom. High areas are affected by a slight rounding. Because none of these three types of evidence is present elsewhere on the piece, but they are instead localized near the working edge, they are interpreted as use-wear traces.

The traces are not well developed so it is not possibile to precisely identify the material processed. Although, the latter is probably a hard material, because polish and rounding are only present on the highest areas of the microtopography. The polish and striations appear similar to use-wear traces from butchery activities when a tool accidentally strikes bone. Traces are insufficiently developed to securely determine the type of processed material. However, a longitudinal motion can easily be identified, because striations are oblique to the edge.

In summary, the piece is a red radiolarite flake that is backed by abrupt continuous retouch along the left lateral edge opposite to an unretouched edge. This latter unretouched edge has been used to process hard material in a longitudinal motion, possibly during a butchery activity. The use-wear traces are insufficiently developed to identify the material processed.

# MAR1 625 (Figure 5)

MAR1 625 is a small, unretouched radiolarite flake (23x21x8 mm). The distal is natural with two bidirectional removals that create two slightly secant, flat surfaces.

The right unretouched lateral edge is 24 mm in length, with an edge angle of 30°. This edge is convex in plan view, straight in delineation and plano-convex in cross-section. Some twenty scars extend along this edge (Figure 5d) that are more numerous on the dorsal, than on the ventral surface. These scars are discontinuous, medium to occasionally small in size and isolated or aligned. The shapes are mainly triangular, quadrangular, and sometimes semicircular, they are feathered or stepped and rarely exhibit hinge terminations. Both bending and cone initiations oblique to this edge are visible. Microscopic analysis shows an isolated spot of polish on the highest parts of the microtopography (Figure 5e). A smooth texture, with compact linkage and clear limits characterizes this polish, while short and narrow striations associated with the polish are oblique to the edge. Finally, a light rounding is locally present on the working edge.

A combination of coherent marks is located on the right lateral edge, indicating possible use-wear traces. The direction of the scars and striations are oblique to the edge, rounding is symmetrical, and scars bifacial, resulting from a longitudinal motion. The material processed is both soft and hard, with numerous scar patterns that are small and isolated. Also, polish and rounding are evident on the highest parts of the edges microtopography. Polish and striations resemble microscopic traces related to bone processing, as evident by the smooth texture, clear boundaries and a compact linkage. The scar characteristics are the same as those one would expect from butchering activities, namely with a triangular shape, bending and cone initiations, which are isolated or aligned. Therefore, it is concluded that this flake has been used for butchering activities, with occasional contact with bone.

In summary, the specimen is a small unretouched radiolarite flake with two convex lateral edges, and no backing. The right lateral edge has been used for butchering activities in a longitudinal motion, while the left lateral edge shows no use-wear traces.

# MAR1 605 (Figure 6)

MAR1 605 is a small unretouched red radiolarite flake (19x22x8 mm). The dorsal surface bears some flake scars. A short back is located on the proximal left side.

The distal edge is convex in plan view and biplane in cross-section with an edge angle of 45°. This edge exhibits functional traces, it is 20 mm in length with numerous scars on the dorsal and with only two visible on the ventral surface (Figure 6a). They are continuous, small to very small in size, overlapped or aligned with semicircular or quadrangular shapes, with feather or hinge terminations that are perpendicular to the edge, and with cone or bending initiation. The left side of the distal edge exhibits light rounding. The morphology of the rounding is flat to rounded and is more developed on the ventral, opposite the scars. Rounding is also present but less developed on the arris of the scars on the dorsal surface. The right distal edge exhibits a discontinuous polish on the ventral surface with a smooth and domed polish which is visible on the high and medium parts of the microtopography, with a semi-compact linkage and diffuse boundaries (Figure 6b). Striations are missing, but polish undulations are perpendicular to the edge.

Coherent marks are present on the distal edge, which indicate that the piece has been used. Traces are dissymmetric, scars are on the dorsal surface and rounding is mostly visible on the ventral surface, so motion is transversal and unidirectional. The scars are similar to those which form by working on plant materials, i.e. they have circular and elongated forms. Polish confirms this interpretation because it is domed, smooth, with undulations, and on the high to medium parts of the microtopography. These characteristics are indicative of plant polish. However, this functional polish seems to be slightly altered. In some areas, the pits are filled by polish and the polish has a greasier, covering appearance. Whereas, chemical alterations are more developed on this piece than on any of the other specimens of the sample, chemical alterations may have modified the appearance of the polish.

In summary, the piece is a small unretouched radiolarite flake with a distal edge that was used in a transversal unidirectional motion to process plant material. The polish is possibly modified by chemical alterations.

# MAR1 637 (Figure 6)

MAR1 637 is a thick brown radiolarite chunk (24x19x12 mm), with two natural surfaces designated as side 1 and side 2 (dorsal and ventral) that mimic cleavage plane fractures with bifacial and continuous retouch along the left lateral edge. On side 1, the retouch is located only on the lowermost half of the piece. It is invasive, slightly denticulated, semi-abrupt and scaled. On side 2, the retouch is irregular, abrupt and stepped.

The retouched edge is 25 mm in length, with an edge angle ranging from 60° to 80°, straight in delineation and biplane in cross-section. In plan view, a pointed convergent tip is visible, created by two retouched segments on the edge. This pointed tip bears some scars (< 10 in total; Figure 6c), that are bifacial, continuous, very small with irregular or semicircular shapes, with feather or step terminations, rarely hinged. The orientation and initiation are difficult to determine because the scars are very small in size. A polish is present on an arris near the edge on side 1 (Figure 6d). It differs from soil sheen, because this polish is on a high area and exhibits a rough to smooth texture with diffuse boundaries. Numerous striations are associated with the polish that are long, perpendicular to the edge, narrow, discontinuous with a smooth bottom. These traces are developed with a light rounding.

Scars, polish, striations and rounding are localized on the convergent tip and are coherent, meaning that they are functional traces. The scars are bifacial and the striations are perpendicular to the edge, implying a transversal bidirectional motion. The material processed is semi-hard because polish and striations are on high areas indicating a rigid material and the scars are infrequent, a pattern consistent with use on soft materials. Rounding and numerous striations are indicative of an abrasive material. Polish and striations are altered by soil sheen which explains the difficulty in identifying the precise material processed. These traces are possibly production traces and may be the result of retouch along this edge. The abrasive nature of the material could match traces from hammerstones, although these traces could also indicate the utilization of the pointed tip on a semi-hard and abrasive material.

In summary, the piece is a small tool made on a chunk, with a pointed tip on a single retouched edge. Traces are visible on the convergent spine shaped by retouch related to the work of a semi hard and abrasive material in a transversal bidirectional motion. The polish is altered, hindering identification of the material processed. Therefore, the traces are interpreted as resulting from either the initiation of retouch or from tool use.

# MAR1 1132 (Figure 6)

MAR1 1132 is a small thick flake (20x14x11 mm) with a cortical butt; the right edge has a cortical back opposite a retouched edge.

The left lateral edge has direct, continuous, semi-abrupt, long retouch, that creates an irregular denticulated working edge, plano-concave in section, with an edge angle of 70°. On the ventral surface, a large band of polish perpendicular to the edge is present on the mesial (Figure 6e and f). It starts at the edge and continues far towards the center of the piece. The polish is smoother than soil sheen, with compact linkage and vague limits. The band of polish is evident in the center of a crescent-shaped crack that looks like an impact mark on the edge. Numerous, organized striations are present in the band of polish, that are thick and strictly parallel to each other, discontinuous, narrow, with a rough or smooth bottom.

This band of polish and associated striations are concentrated, and the cutting edge is fresh. These marks cannot be use wear traces because they are not related to other traces of use and are present only at one isolated location. Also, they cannot be PDSM because they are too organized. Hence, this combination of traces probably has a technological origin. These traces are located on the ventral surface, whereas the retouch is on the dorsal surface. The striations are strictly parallel to each other indicating that they come from the same event. Polish occurs in one isolated place and goes far towards the center of the piece. It is associated with an impact mark, which could be a crack formed by the impact of the hammer on the edge.

Technological traces are rare, and we currently do not have any specimens in our reference collection with similar characteristics. Technological traces are commonly seen on the working edges in the general form of a spot of polish associated with numerous striations perpendicular to the edge. However, these types of traces formed by retouching are sometimes described by traceologists (Anderson-Gerfaud 1981; Claud 2008; Mansur-Franchomme 1986; Rots 2002 2010). The traces from retouching are on the opposite side to the retouch in the case of direct percussion. They come from the impact of a hammerstone on the surface, explaining why their specific qualities depend on the type of hammer utilized (Rots 2010; 2002). Retouch traces can be long, isolated, wide and discontinuous striations as in the case of MAR1 1132.

In summary, the lithic is a small retouched radiolarite flake with a cortical back. The retouched edge bears technological traces, which are rare in archaeological assemblages. No traces of use-wear are present.