Journal of Arid Environments 156 (2018) 96–105

Contents lists available at ScienceDirect

Journal of Arid Environments

journal homepage: www.elsevier.com/locate/jaridenv

Decorated boulders and other neglected features of the Central Saharan rock art

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ARTICLE INFO

Keywords:
Engravings
Grooves
Kel essuf
Ovals
Cupules
Kettles

ABSTRACT

Although the Central Saharan rock art has been studied for more than five decades, attention has been given almost exclusively to figurative paintings and engravings. Images were divided into stylistic groups, which functioned as a sequence of relative chronology.

Non-figurative engravings, such as grooves, ovals, kettles and cupules, have been considered only marginally or were completely ignored. Next to the impressive images of animals and human beings, these small engravings were not even considered a true form of rock art and were never included into the stylistic rock art table.

Even more surprising is the exclusion of Kel Essuf. These particular anthropomorphic petroglyphs were already known in the 1960s, however, because of their marked stylistic and thematic difference from other engravings, they were treated as anomalous and, like the non-figurative art, they were not included among the official styles.

This paper focuses on previously neglected or unpublished rock art, and suggests that the simplest engravings are signs bearing their own meaning. When studied as a whole instead of being treated as isolated units without any relation to other forms of rock art, it emerges that grooves, ovals, cupules and Kel Essuf engravings were probably created following the same pattern.

1. Introduction

The Central Sahara is extremely rich in rock art from various periods stretching from prehistory until the modern era. Paintings and engravings are present in virtually all the mountainous ranges and they are particularly abundant in southern Algeria and southern Libya (Fig. 1). Wet conditions in the whole Central Saharan region from the 10th millennium BP (Maley, 2004; Cremaschi et al., 2010) enabled a human occupation in the mountains and also in previously dry lowlands. This period is documented archaeologically; human settlements are attested to in the mountains from the 10th millennium BP, documenting first a hunting society and, from the 8th millennium BP, a society of pastoralists based on cattle and later, on sheep herding (Aumassip, 1980–81; Barich, 1987; Cremaschi et al., 2014).

Both hunters and herders produced rock art. The style now known as the Round Head, for example, is based on representations of human figures - mainly males with body decoration and sometimes bows, mainly wild animals and only a few examples of possible domestic cows which probably indicates a gradual change of economy (Sansoni, 1994; Soukopova, 2012). Rock art made by pastoralists is dominated by herds of domesticated cattle and scenes of everyday life although hunting scenes are not rare (Hachid, 1998).

Whereas figurative paintings and engravings in the study area (i.e. the Algerian Tadrart, Tassili and Libyan Acacus) have since long been documented, studied, collocated into the stylistic groups and tentatively assessed into periods, non-figurative rock art has scarcely been taken into consideration except for rare works (e.g. Huard and Leclant, 1980; Hallier, 1997; Di Lernia, 1999; Mori, 2000; Van Hoek, 2003; Dupuy, 2003). This paper concentrates on those forms of rock art which have traditionally been neglected or even ignored, mainly for these reasons:

- Non-figurative rock art has been considered less significant than figurative rock art.
- The relevance of non-figurative rock art has not been noticed or understood.
- In the presence of such an abundant number of rock images in the Central Sahara, and during fieldwork expeditions which are always limited in time, the equal attention to all forms of rock art is almost impossible.

The engraved forms examined here are short lines called grooves, ovals, 3–7 cm small circular holes called cupules, human-made oval or circular holes up to 50 cm deep and large called kettles, small-sized

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https://doi.org/10.1016/j.jaridenv.2018.05.001
Received 29 January 2018; Received in revised form 20 April 2018; Accepted 3 May 2018

Fig. 1. Map of the Central Saharan mountains mentioned in the text (Google maps).

engravings called Kel Essuf and single stone blocks bearing engraved (mostly non-figurative) decoration. All these forms are not treated here as isolated units but their interconnection is postulated, showing that a holistic approach to rock art may lead to its better understanding.

2. Methodology

This study presents the results of fieldwork in the Central Sahara between 2005 and 2017. Before the fieldwork started, all published information was collated. The sources were useful for the Kel Essuf engravings and for the kettles which had been partially published (Mori, 1967; Tauveron, 1999; Mori, 2000; Striedter et al. 2002-3; Ferhat, 2003), however they were insufficient or non-existent for grooves, ovals and cupules.

The research was undertaken mainly in the mountains of the Algerian Tassili and the Algerian Tadrart and to a lesser extent in the Libyan Tadrart Acacus. Shelters and open air sites were explored resulting in the discovery of several thousand painted and engraved images. Due to the enormous extent of the research area (80,000 km^2 only for the Tassili) as well as the exceptional frequency of the rock art, it is impossible for a single researcher with extremely limited budget to produce an exhaustive inventory of each rock art unit. Nonetheless, the results in this paper include information not only from known rock art sites, but also from those which have not been published so far.

All rock art sites were studied in their entirety, considering equally the figurative and non-figurative art, other anthropogenic modifications in the shelters and their surroundings, the environment, the position of the site in the landscape. These features were photographically documented.

The lack of attention to non-figurative rock art and the lack of published photographs showing the necessary context of the rock images, namely the site and its environment, is understandable for "paper" publishing. Books and papers in the printed form means that, inevitably, only a selection of the most significant items are selected, which results in an incomplete or even distorted presentation of the reality. Future publishing should be oriented towards the digital form for two fundamental reasons:

- the digitalisation permits one to publish virtually unlimited number of photos and thus to present information without discrimination,
- the digital information that could be disseminated over the internet will finally reach the local population, who have long been excluded from the research. Saharan people cannot afford to buy printed publications produced by Europeans, which means that Saharan rock art research has become almost totally dominated by foreigners and foreign universities.

The recent improvements in internet access in the Saharan oasis has meant that there has been a boom in the interest in rock art among local people, especially the younger generation. Even though they rarely possess computers, everybody owns a smart phone, which has truly opened a window to knowledge. Part of my fieldwork, as well as the fieldwork of other researchers, has been published on the web site www.roundheadsahara.com It is a mobile-friendly site created in order to share information and images which, otherwise, would continue to remain in private collections and accessible to a limited audience, mainly outside Africa. The positive feedback has confirmed that digital information in an open access format helps to increase awareness in the immensely rich cultural heritage of African people.

3. Main rock art styles

Although well documented since its discovery by the first Europeans in the 19th century, the chronology and categorization of the Central Saharan rock art remains the subject of great controversy.

A classification system was set up by previous scholars (Lhote, 1958, Mori, 1971, Muzzolini, 1986) where the art was categorised into artistic groups determined by various criteria. These criteria included the technique of production, patina on the art, anthropological type, the fauna represented, themes, super-imposition, and style. In this classification only figurative rock art was considered; engravings and paintings were divided into several distinct large groups, encompassing variable periods. The proposed styles would function as a classificatory scheme but also as a sequence of relative chronology, with each class being granted the status of a period.

These "official" groups are:

- Bubaline engravings
- Round Head paintings
- Pastoral engravings + paintings
- Caballine (Horse) engravings + paintings
- Cameline engravings + paintings

This chronological-stylistic sequence is still widely used but it has become a target for criticism in recent decades (Muzzolini, 1996; Le Quellec, 2017). This critique refers mainly to the Bubaline engravings considering them to be the same (recent) group of Pastoral engravings. Regarding the earliest stages of the rock art, the lack of direct dating gives a wide margin for subjective chronological interpretation, which resulted in two chronologies being established, a high (earlier) and a

low (later) one. According to the supporters of the high chronology, the rock art appeared together with the first documented hunting settlements in the 10th millennium BP or slightly before (Aumassip, 2004; Soukopova, 2012). Some scholars suggest an even earlier start in the Pleistocene period (Mori, 1971; Ferhat et al., 1997), which corresponds with the recent findings of at least 16,000 year old engravings in Egypt (Huyge, 2009; Huyge et al., 2011). In contrast to this, the low chronology states that there was no rock art made before the Holocene period, with the most probable starting point being the Pastoral period around 7500 BP or slightly before (Muzzolini, 1995; Le Quellec, 2013). However, no scholar supporting the low chronology has yet explained why an evolved hunting society that produced sophisticated pottery with fine decoration as early as the 10th millennium BP (Aumassip, 2004), would avoid rock art production for more than two thousand years.

3.1. Kel Essuf petroglyphs

The fact that the chronological/stylistic table was set up decades ago in a period of intense field research in the Central Sahara, means that these classifications have become seen as solid fact in the scientific and public literature, rather than a theory that needs to be regularly revisited. Moreover, the constant repetition and analysis of these styles resulted in very little attention being given to other forms of rock art existing in the Central Sahara.

One of the best examples of such an omission is a group of engravings called Kel Essuf (Fig. 2). They are completely different from the Bubaline and Pastoral engravings in their theme, style and technique of execution. Bubaline and Pastoral engravings are dominated by animals, which are very rare in the Kel Essuf group. Also the techniques are different: Bubaline and Pastoral engravings are characterised by large, naturalistic depictions of animals engraved with deeply incised and polished lines. Anthropomorphic representations of disproportionately small figures exist but are quite rare (Barnett and Mattingly, 2003; Jelínek, 2004). Kel Essuf are dominated by human figures executed by shallow carving or by very fine pecking. There is a significant difference also in the distribution; the Bubaline and Pastoral engravings are present mostly in the open and are spread over a large area, whereas the Kel Essuf are often located inside rock shelters, the figures are usually grouped together in one place and their distribution seems to be limited to the Algerian Tadrart, Libyan Acacus and to the Djado mountains in Niger (Hallier and Hallier, 1999, 2015; Striedter et al. 2002-3, Soukopova, 2012).

Even though the Kel Essuf were already documented in the Libyan Sahara in 1963 by F. Mori with the name “ichthyomorphous” figures (Mori, 1967), and in 1974 described by Barich (1974), quite incomprehensibly they were never included into the stylistic table. The corpus of these singular petroglyphs was often hardly mentioned in successive publications concerning Central Saharan rock art, probably as a result of general indecision or embarrassment as to where in the stylistic table they should be collocated (Muzzolini, 1995).

This omission does not apply for the Djado mountains in northern Niger. This region was explored by U. and B. Hallier, who documented and lavishly published small-sized painted and pecked figures, representing both humans and animals (Hallier, 1990, 1995; Hallier and Hallier, 1992). For their resemblance to the early forms of the Round Head paintings Hallier called these petroglyphs “pecked Djado-Roundheads” (Hallier and Hallier, 1999). Indeed, painted and pecked Djado-Roundheads are very similar to the Round Head paintings of the Algerian Tadrart and of the north-western Tassili (Hallier and Hallier, 2005) and they are also similar to the petroglyphs in the Algerian Tadrart and to some figures in the Libyan Acacus, which leaves little doubt about their belonging to the same cultural matrix, but it raises issues with the terminology. Different names, i.e. “ichthyomorphous figures”, “Kel Essuf” and “pecked Djado-Roundheads” are likely to label regional variations of the same ideology recorded on the rock by various hunting groups.

If the Kel Essuf, which represent simplified human bodies, have been neglected in the rock art research, it is no wonder that even simpler forms, such as grooves or ovals, have been almost completely ignored. The long lasting preference for studying the figurative rock art of the main styles may have been due to practical reasons. The working conditions in the Sahara are very hard, so that fieldwork is always limited in time. Moreover, except for several funded projects, the Central Saharan rock art research has traditionally been carried out by single researchers who have had to self-fund their fieldwork. The lack of a detailed study of all rock art forms, including those considered marginal or less significant, is often caused by shortage of time and financial stringency.

Fig. 2. A cluster of Kel Essuf petroglyphs. Several figures are covered by paintings of the Round Head style (Uan Tabarakat, Algerian Tadrart).

Fig. 3. A row of grooves mixed with engraved ovals. Grooves are present also on the shelter's floor where they are mixed with engravings of animal paws (In Tehaq, Algerian Tadrart).

4. Grooves

Engraved lines on a horizontal and vertical rock support are abundant in the Central Sahara and they are particularly numerous in the Algerian Tadrart where over a hundred grooves concentrated on a single rock wall is not exceptional. The Sahara is also rich in "runnels", which are naturally formed horizontal and vertical grooves left by flowing water, but due to their non-anthropic origin they are not considered in this paper.

Although we sometimes find a single groove or a couple of lines, it is more usual to find that grooves are grouped in clusters of at least a dozen lines, leaving the surrounding rock surface empty. These short lines are usually between 0,5 and 2,5 cm deep and 5–40 cm long and are not scattered randomly on the rock. They are usually placed side by side; their careful arrangement is evident. They are concentrated in two main forms: horizontal rows (Fig. 3) and circular clusters (Fig. 4). All engraved lines in rows or clusters are roughly of the same length and they sometimes form an aesthetic composition, a motif, for example grids, zig-zags, triangles or fan-shapes.

This lack of study of grooves may be caused by the fact that sometimes they are not considered as rock art because at first sight, they may seem to be only secondary products of some activity, such as sharpening of tools (Di Lernia, 1999). If considered at all in the literature, they are usually only mentioned in passing (e.g. Menardi Noguera, 2017). However, for their large number, their ordered layout and for their arrangement into motives, a great part of the grooves are unlikely to be remains of sharpening of lithic, bone or metal instruments. Some grooves may have certainly been the result of ancient

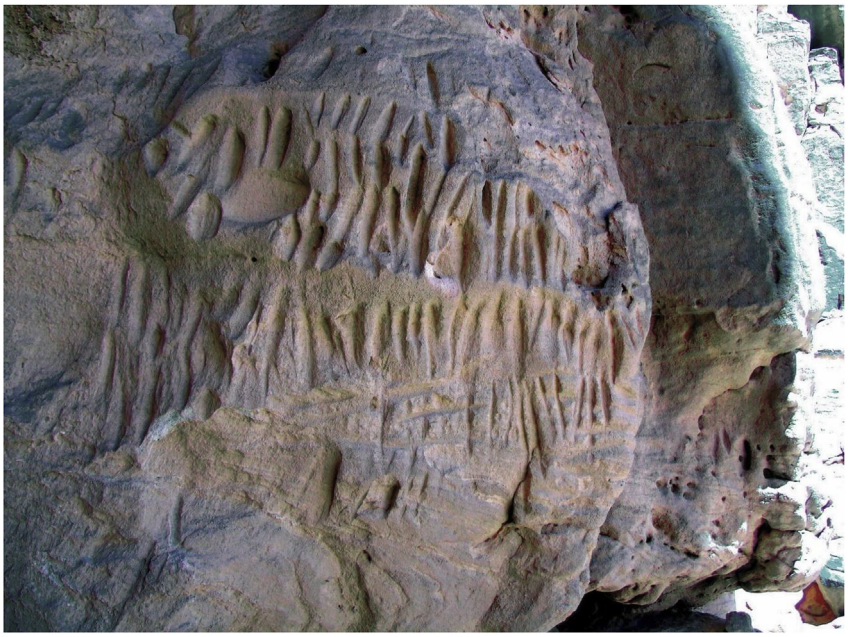

Fig. 4. A cluster of grooves and ovals, carefully arranged side by side (In Tehaq, Algerian Tadrart).

sharpening events but, in the case of such carefully arranged compositions, the sharpening of instruments would have had to have followed special rules in order to create the engraved motifs.

Moreover, since the grooves are usually assembled in groups, ancient hunters would have had to visit certain places to sharpen their tools, raising the question – for what reason would a hunter gone several kilometres to sharpen his arrow? Was the action of sharpening in special places part of a ritual? Or, which seems more probable, were the clusters of grooves produced under other circumstances? Were they intended to bear a message? To support the hypothesis that clusters of grooves were not sharpeners, is the fact that many grooves are carved in rather coarse-grained sandstone which is not suitable for fine sharpening. Also, there are lines which are carved high up on the wall, around 3 m above the soil or higher, which means that for practical purposes they are unlikely to be ancient sharpening surfaces.

If compared with the neighbouring mountains of the Tassili, which are rich in figurative rock art, grooves are very abundant in the Algerian Tadrart, whereas in the Tassili grooves are relatively rare. Considering that the grooves are spread throughout a great part of the Algerian Tadrart and that they are very densely present in some wadies (for example at In Djaren), it appears that these marks on the rock were peculiar to this geographical area.

4.1. Chronology of grooves

As there is a lack of direct dating we can attempt to assess only the relative chronology of grooves. From the different colouring of the patina it is evident that engraved lines were produced in various periods. A great number of grooves present a totally black patina. Total patination is characteristic for the most ancient engravings called Bubaline and also for Pastoral engravings. In the Libyan Messak mountains the examination of the patina, combined with the dating of archaeological remains found under patinated stone structures, indicates that the main formation of patina in this region occurred between 6100 and 5100 BP (Cremaschi, 1996; Mori, 2000). This period is therefore the *ante quem* limit for all fully patinated engravings in Messak, but the spatial distribution and formation of patina may have been irregular in different Saharan regions.

The great age of groove engravings is confirmed not only by the black patina but also by superimposed paintings. At Abri Freulon, a deep shelter in southern Algerian Tadrart, grooves arranged in zig-zag and V-shaped pattern are covered by paintings of the Round Head style (Fig. 5), which are considered to be the most ancient paintings of the Central Sahara belonging possibly to the 9th millennium BP (Aumassip, 2004; Hachid et al., 2010). In the same region, at Uan Tabarakat shelter, we also find Kel Essuf engravings superimposed by Round Heads paintings, and another shelter nearby presents grooves with lateral appendages suggestive of human figures which are superimposed by Pastoral paintings (Fig. 6). In the archaeological record of the Central Sahara domesticated cattle are attested to at around 7500 BP (Dunne et al., 2012).

The relative chronology appears to be the following:

ANCIENT ROCK ART	MORE RECENT ROCK ART
Grooves, Kel Essuf	Round head paintings, Pastoral paintings

Horizontal and vertical pecked lines, often many meters of length, were reported in the Djado mountains and they have been ascribed to the petroglyphs of the “pecked Djado-Roundheads” (Hallier and Hallier, 2013). Grooves, in the sense of straight engraved lines on the rock, were probably produced in various periods until the modern era, as evident by many recent grooves with no patina. However, because of their totally black patina and because of the superimpositions, their first examples are certainly to be considered among the oldest rock art in the Sahara.

4.2. Similarity of grooves, ovals and Kel Essuf

Grooves are found in multiple situations: on horizontal and vertical surfaces, inside rock shelters or outside them, on the rock wall or floor, on boulders inside or outside rock shelters. Occasionally they are represented by a single groove, but the most frequent situation is that of an accumulation of grooves in clusters or in rows, containing usually dozens of short lines.

We observe the same pattern of clustering with another kind of human-made engraving, the cupules (or cups) which are also particularly abundant in the Algerian Tadrart (Soukopova, 2017a). As with the grooves, these small, circular, shallow holes, just a few centimetres in diameter are found on horizontal and vertical surfaces, outside or inside

Fig. 5. Straight grooves, v-shaped and zig-zag formed grooves are covered by Round Head paintings. Photo elaborated with DStretch (Abri Freulon, Algerian Tadrart).

Fig. 6. A cluster of ovals and grooves. Some of them present appendages evoking arms and legs. They are covered by paintings of the Pastoral period. Photo elaborated with DStretch (Aman Sammednin II, Algerian Tadrart).

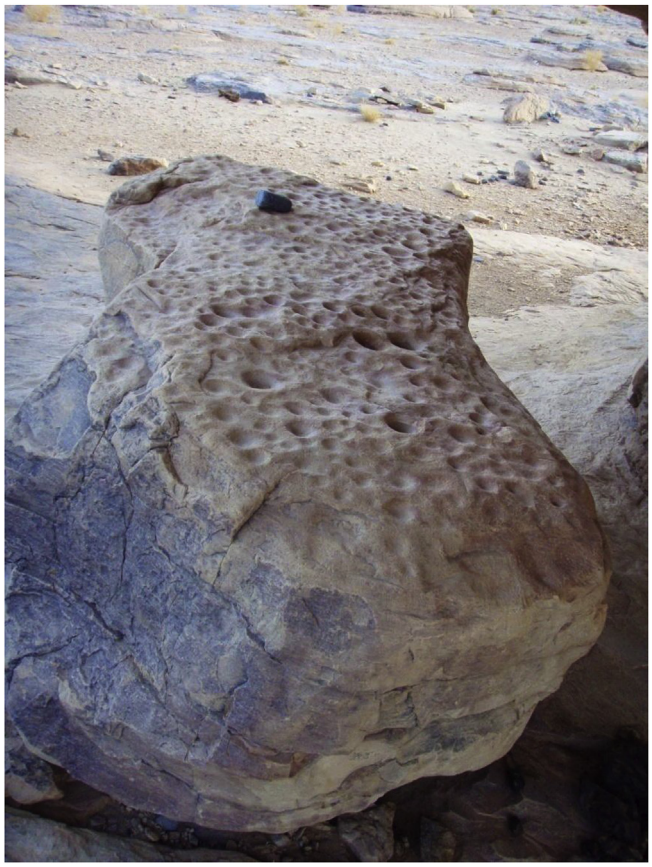

Fig. 7. A boulder decorated exclusively with cupules (In Tahadoft, Northwestern Tassili).

rock shelters, and frequently carved on boulders (Fig. 7).

Although there are cases of a single, or just a few, cupules in a site, their main characteristic is their grouping in large numbers – occasionally in rows but most often in clusters, of up to several hundred cupules in one group. There are also several sites where cupules and grooves coexist in the same cluster.

In the hypothesis proposed here, a similar pattern appears to underlie grooves and the Kel Essuf engravings. Even though there are rare representations of a single Kel Essuf figure, these engravings are found most frequently in clusters or in rows. There is also a similarity in their shape because in many cases the grooves are not just simple lines but are rounded up to form ovals, and these different forms are often mixed together in the same cluster. Slightly oval grooves or ovals, are similar to the body shapes of Kel Essuf, as if they were – at least in some cases – extremely simplified Kel Essuf figures. Indeed, among simple grooves in a cluster there are also engraved lines with short lateral appendages evoking arms and legs, and sometimes a lower appendage evoking a penis (Fig. 6).

Clusters of ovals occur in which there are both simple forms and ovals presenting short appendages evoking limbs. As these forms are sometimes carved next to Kel Essuf human figures, it is legitimate to suppose that at least some oval forms stand for anthropomorphic representations (for example at Aman Sammednin I site, see www.roundheadsahara.com). The association of ovals with Kel Essuf figures is particularly evident in the Libyan Acacus where an ichthyomorphous figure is represented with a large oval exiting from its body through divaricated legs (Mori, 1967: Fig. 7a). The importance of oval motif continued in later periods, as we find the same representation of a large oval hanging between legs of male figures in the Round Head paintings. Except for the earliest forms of the Round Head art where the penis was frequently depicted, in later stages men were represented without genitalia except for a special group of beings, so called “Great Gods”. These are male figures with raised hands in a worship-like position, represented frontally and with a large oval hanging up to their knees (Soukopova, 2017b).

If the Kel Essuf are stylized human figures, then grooves and ovals with appendages may represent even more simplified, but still symbolic human beings. However, it is not suggested here that grooves or ovals are the original form of the Kel Essuf. I would rather suppose that different symbols for the human body reflected different circumstances, such as different groups creating them, different periods of realization or a different purpose, message or meaning of the engraved figures. Grooves with appendages are sometimes mixed with simple grooves in the same cluster and present the same patina, which could indicate roughly the same period of creation.

According to the working hypothesis which I present here and which has to be further tested, certain clusters of simple grooves, especially when made up of very short lines (Fig. 4) may represent symbols of human beings in the same way as the clusters of Kel Essuf engravings also represent human figures (no matter whether they were symbols for living/dead persons or representations of spirits, surreal or

Fig. 8. A boulder with a cluster of grooves, cupules and small engravings of bovines. They are in the lower part leaving the upper part of the boulder empty (Wadi Berigh, Algerian Tadrart).

mythological beings). It is obvious that not every engraved line is to be interpreted as a symbol for a human figure. Many grooves may be the results of carving into the rock wall or floor without the intention of creating any visual meaning at all. Moreover, several clusters include grooves which are long or curved which unlikely represent persons. Such forms are often found on isolated boulders.

5. Decorated boulders

In the central Sahara, besides the rock shelters, engravings are frequently found on stone blocks (Fig. 8). These isolated boulders are found both in the open air and inside rock shelters. Shelters containing decorated boulders are sometimes empty with no rock art, but they are usually decorated with engravings and/or paintings, and with cupules and/or kettles.

The current position of boulders inside rock shelters may be original or secondary. In numerous cases the boulder stones in shelters have become detached from the roof and fallen onto the shelter's floor. It is often clear to see from where the boulder fell either from the irregular shape in the roof or because the detached part of the cave rock presents different colouring.

In numerous cases blocks were left in the position in which they fell, and they were consequently decorated with cupules, kettles, grooves or other engravings. In other cases the current position of the boulder is not the original one, i.e. a detached boulder was then moved to another place in the shelter, often near the entrance of the shelter. Relocated boulders also present engravings, but it is impossible to know whether they were decorated before or after the relocation.

In the Algerian Tadrart decorated boulders inside shelters are so frequent that they seem to be a common “piece of furniture” of many occupational sites. From the displacement of boulders it is evident that people were able to move them; they could have cleared them away out of the shelter but they did not do so. In several cases boulders bear traces of grinding activity, mostly in forms of shallow oval kettles. In such situations the practical use of boulders is evident even though oval kettles are often present also on the shelters' floor, indicating that grinding activity occurred in various locations within a site.

A frequent decoration on boulders both outside and inside shelters are cupules, which may count from a single cupule up to several hundred cupules on a single boulder (Fig. 7). Sometimes, boulders are decorated exclusively with cupules, being present on their horizontal and/or vertical surfaces. Cupules usually have roughly the same size around 3–7 cm in diameter but sometimes, among them several cupules are twice as large as the others. Several flat boulders with only a single cupule or a few cupules on the edge of the horizontal surface were documented. Their presence on the edge, easy to reach for a standing or sitting person, might indicate the creation of cupules as a secondary product of an activity.

Some boulders are decorated exclusively with grooves (Fig. 9). These engraved lines may be of various width, length and depth, and they may be straight, curved or thick enough to almost form ovals. They are not carved randomly on the surface but they are usually placed side by side and their careful arrangement is evident. Sometimes grooves on boulders are organised into various motifs such as squares, grids or triangles (Fig. 10). A frequent situation is that in which a row of short engraved lines is crossed by a long line, as if the short lines were “cancelled” by the long line or vice versa (Fig. 10).

6. Kettles

The Central Sahara is very rich in holes carved in the rock. Naturally formed pits are also abundant but, for their non anthropic origin, they are not treated in this paper. Kettles are human-made oval or circular holes carved on horizontal, or occasionally on slightly vertical, rock supports. The number of kettles is impressive, especially in the Algerian Tadrart, north-western Tassili and in the Libyan Acacus (Soukopova, 2017a). Kettles may have been carved in various periods of prehistory. In the Acacus a layer covering two kettles was dated at 8255 ± 209 calBP (Mori, 2000) which indicates that the earliest examples of kettles are to be collocated, together with grooves, among the oldest Central Saharan rock art predating the advent of pastoral economy.

Kettles are frequently present in those rock shelters which bear other marks of human presence, i.e. figurative or non-figurative rock paintings and engravings. Circular or oval kettles were also carved into isolated boulders. Such boulders are mostly found inside or nearby shelters but they may also be isolated in the open air, for example in the bottom of a wadi.

In several cases circular kettles inside shelters were carved in pairs

Fig. 9. A boulder decorated with straight and curved grooves. Photo enhanced by DStretch (In Djaren, Algerian Tadrart).

(Fig. 11). For example at Tin Uded (Algerian Tadrart) or at Imha (Libyan Acacus) two kettles of roughly the same diameter and depth were placed side by side inside shelters, which were also decorated with paintings and/or engravings. In many sites, next to large circular kettles there are often smaller shallow oval kettles and almost always there are one or several cupules (Mori, 2000).

Kettles are often related to the ancient sources of water, being frequently carved under rainwater cascades (Tauveron, 1999; Soukopova, 2017a). Channels leading water inside and/or outside kettles are common and they may be quite large, up to 5 cm wide (Fig. 12). Sometimes shallow channels were carved on the rock wall above the kettle in order to lead the water course directly into it. Considering that many shelters frequented by prehistoric groups are situated high on the upper terraces of the valley, to catch rain water in the dwelling rather than bring it from the stream in the valley or from even more distant locations, appears to be a logical strategy.

It is interesting to note that in several cases, clusters of cupules were also carved in those spaces in the shelter where rain water was flowing, which is still visible from the colouring of the rock. However, cupules were carved in a variety of contexts because in numerous cases cupules or clusters of cupules were carved in covered, i.e. dry, spaces of the shelter. Sometimes several cupules of a cluster are connected by shallow channels. For small clusters of cupules associated with the engravings of wild animals, it was proposed that they may have represented traps (Huard and Leclant, 1980).

Under the ancient rainwater cascades, groups of very shallow oval kettles are sometimes found. Since they are only about 1 cm deep, they may represent traces of some activity, for example of grinding plant seeds on the shelter's floor. Their position in that space of the shelter where rain water was flowing may have had a practical reason as the

Fig. 10. A boulder decorated with grooves arranged in various motifs (In Djaren, Algerian Tadrart).

Fig. 11. A pair of kettles carved under an ancient rainwater cascade. A channel leads into the deeper kettle, the second channel was carved between the two kettles There are shallow oval kettles next to them (Tin Uded, Algerian Tadrart).

rain water cleaned the floor carrying away discard and dust from the working area.

7. Conclusion

Minor, non-figurative or seemingly non-figurative engravings have been given little or no attention in the study of Central Saharan rock art. Research has primarily focused on the well known and traditionally acknowledged rock art styles, namely the Bubaline, Round Heads, Pastoral, Horse and Camel styles, for which a stylistic/chronological table has been elaborated. Non-figurative rock art and, surprisingly, neither the small sized engravings called Kel Essuf, have been included in this scheme.

Grooves are present in the whole Sahara and they are so abundant in certain parts of the desert, for example in the Algerian Tadrart, that they cannot be ignored any longer. Due to their number, their location and arrangement on the rock wall and for the aesthetic compositions they often represent, they cannot be considered simple sharpening marks or secondary products of an activity, without their own meaning or message.

It seems that certain grooves, ovals, Kel Essuf and cupules were produced following a similar pattern. An important characteristic of the grooves is their grouping into clusters or rows. We observe the same clustering for the Kel Essuf, engraved ovals and for cupules. In several cases certain grooves in clusters have lateral appendages evoking arms and legs, which connects them further to the Kel Essuf engravings.

Fig. 12. A large channel leads in and outside a kettle carved under a shelter's wall. Another shallow channel was carved on the wall above to direct the water course into the kettle. Next to it there are small shallow kettles, cupules and Round Head paintings (Tin Uded, Algerian Tadrart).

Cupules do not evoke human beings but sometimes grooves and cupules coexist in the same cluster or they are present on the same rock wall.

In the Algerian Tadrart, Tassili and in the Libyan Acacus, the rock art has been documented mostly in shelters and on rock walls in the open. Based on the material presented here, it is evident that studies should concentrate equally on decorated boulders which are found both isolated in the open air and inside shelters. Indeed, boulders bearing some form of rock art are so common in the Central Saharan shelters that they must have represented a standard piece of equipment of occupational sites.

Acknowledgement

I would like to thank Prof. Jeremy Keenan, Dr. George Nash and Dr. Alistair Pike for their help with my early research. I am especially grateful to Dr. Ulrich Hallier, Brigitte Hallier, Bernard Fouilleux, and Andras Zboray for sharing their photographical documentation and for precious information they could provide. The University of Bristol (UOBPGSCHOL/07 Arts (Archaeology & Anthropology)/0748436) and the AHRC (2007/134615/University of Bristol) are thanked for funding my research. I equally thank Eng. Filip Weber and the company CompuNet s.r.o. for the funding and for practical help with my last fieldwork in the Algerian Sahara.

References

Aumassip, G., 1980-81. Ti-n-Hanakaten, Tassili n'Ajjer, Algérie. Bilan de 6 campagnes de fouilles. Libyca 28–29, 115–127.
Aumassip, G., 2004. Préhistoire du Sahara et de ses abords. Maisonneuve and Larose, Paris.
Barich, B.E., 1974. La serie stratigrafica dell'Uadi Tin Torha (Acacus, Libia). Per una interpretazione delle facies a ceramica saharo-sudanesi. Origini 8, 7–184.
Barich, B.E., 1987. Archaeology and Environment in the Libyan Sahara – Excavations of Tadrart Acacus 1978 – 1983. Oxford BAR. Series 368.
Barnett, T., Mattingly, D., 2003. The engraved heritage: rock-art and inscriptions. In: In: Mattingly, D. (Ed.), The Archaeology of Fazzan. Volume 1. Synthesis The Department of Antiquities & The Society for Libyan Studies, Tripoli/London, pp. 279–316.
Cremaschi, M., 1996. The rock varnish in the Messak Settafett (Fezzan, Libyan Sahara). Age, archaeological context and palaeoenvironment implications. Geoarchaeology 11, 393–421.
Cremaschi, M., Zerboni, A., Spötl, C., Felletti, F., 2010. The calcareous tufa in the Tadrart Acacus Mt. (SW Fezzan, Libya). An early Holocene palaeoclimate archive in the central Sahara. Palaeogeogr. Palaeoclimatol. Palaeoecol. 287, 81–94.
Cremaschi, M., Zerboni, A., Mercuri, A.M., Olmi, L., Biagetti, S., di Lernia, S., 2014. Takarkori rock shelter (SW Libya): an archive of Holocene climate and environmental changes in the central Sahara. Quat. Sci. Rev. 101, 36–60.
Di Lernia, S., 1999. A particular form of human activity: rock markings, cupules and kettles. In: Di Lerina, S. (Ed.), The Uan Afuda Cave. Hunter – Gatherer Societies of Central Sahara. All'nsegna del Giglio, Milano, pp. 49–56.
Dunne, J., Evershed, R.P., Salque, M., Cramp, L., Bruni, S., Ryan, K., Biagetti, S., di Lernia, S., 2012. First dairying in 'green' saharan africa in the 5th millennium BC. Nature 486, 390–394.
Dupuy, Ch, 2003. Lége des signes curvilignes représentés dans lárt rupestre du Sahara algérien. In: Algérie, deux millions d'années d'histoire. L'art des origines. Musée de préhistoire d'Ile-de-France/Museum d'Histoire naturelle de Dijon, Nemours/Dijon, pp. 56–65.
Ferhat, N., 2003. Dans les abris de la Tadrart, des images troublantes. Les "Kel Essuf". In: Algérie, deux millions d'années d'histoire. L'art des origines. Musée de préhistoire d'Ile-de-France/Museum d'Histoire naturelle de Dijon, Nemours/Dijon, pp. 53–56.
Ferhat, N., Striedter, K.H., Tauveron, M., 1997. Une limite *ante quem* pour Íart bubalin du Sahara central. In: Comptes Rendus de ÍAcadémie des Sciences, vol. 324. pp. 75–77.
Hachid, M., 1998. Le Tassili des Ajjer. Aux sources de l'Afrique, 50 siècles avant les pyramides. Mèditerrané, Paris.
Hachid, M., Le Quellec, J.L., Agsous, S., Amara, A., Beck, L., Duquesnoy, F., Grenet, M., Heddouche, A., Kaltnecker, E., Mercier, N., Merzoug, S., Quiles, A., Sahnoun, H., Valladas, H., Vigears, D., Gauthier, C., Bassinot, F., 2010. Premiers résultats du projet algéro-francais de datation directe et indirecte des images rupestres dans la Tasili-n-Ajjer. Sahara 21, 27–58.
Hallier, U.W., 1990. Die Entwicklung der Felsbildkunst Nordafrikas. In: Untersuchungen auf Grund neuerer Felsbildfunde in der Süd-Sahara (1).
Hallier, U.W., 1995. Felsbilder früher Jägervölker der Zentral-Sahara. In: Untersuchungen auf Grund neuerer Felsbildfunde in der Süd-Sahara (3). Franz Steiner Verlag, Stuttgart.
Hallier, U.W., 1997. Les relations préhistoriques entre le Haut-Nil (la Nubie) et le Sahra central. In: ARCHÉO-NIL, Lettre d´information 9. pp. 6–42.
Hallier, U.W., Hallier, B.C., 1992. Felsbilder der Zentral-Sahara. In: Untersuchungen auf Grund neuerer Felsbildfunde in der Süd-Sahara (2). Franz Steiner Verlag, Stuttgart.
Hallier, U.W., Hallier, B.C., 1999. Rundkopfe als Punzer und Maler – die ersten Felsbildkunstler der Sahara? In: Untersuchungen auf Grund neuer Felsbildfunde in der Süd-Sahara (4). Franz Steiner Verlag, Stuttgart.
Hallier, U.W., Hallier, B.C., 2005. Rundköpfe" – im Djado (N-Niger) und im Tassili (S-Algerien). Gepunzte und gemalte Menschen-Darstellungen im Oeuvre der Felsbilder beider Regionen. Roundheads" – in the Djado- (N-Niger) and also in the Tassili-Mountains (S-Algeria). Pecked and Painted Human Figures among the Rock Pictures of these two Regions. StoneWatch Magazin, vol. 9, 3–26 Warmsroth 2004/2005.
Hallier, U.W., Hallier, B.C., 2013. Der Djado (Niger). Das Djado-Plateau (Niger) und die Felsbilder seiner Enneris.Schönheit und Kulturgeschichte einer fast unbekannten Bergwüste der Sahara. Beier and Beran, Langenweissbach.
Hallier, U.W., Hallier, B.C., 2015. Felsbilder DerTadrart Algerienne (S-algerien). Beier and Beran, Langenweissbach.
Huard, P., Leclant, J., 1980. La culture des Chasseurs du Nil et du Sahara. Algiers: Mémoires du C.R.A.P.E. XXIX, vol. 2.
Huyge, D., 2009. Late palaeolithic and epipalaeolithic rock art in Egypt: qurta and el-Hosh. Archeo-Nil 19, 109–118.
Huyge, D., Vandenberghe, D.A.G., De Dapper, M., Mees, F., Claes, W., Darnell, J.C., 2011. First evidence of Pleistocene rock art in north Africa: securing the age of the Qurta petroglyphs (Egypt) through OSL dating. Antiquity 85, 1184–1193.
Jelínek, J., 2004. Sahara. Histoire de l'art rupestre libyen. Editions Jerome Million, Grenoble.
Le Quellec, J.-L., 2013. A new chronology for saharan rock art. In: Lal Malla, B. (Ed.), The World of Rock Art. An Overview of the Five Continents. Indira Gandhi National Centre for the Arts/Aryan Books International, New Delhi, pp. 23–44 IGNCA Rock Art Series, 8.
Le Quellec, J.-L., 2017. I petroglifi del Sahara centrale: il contesto cronologico e stilistico/the petroglyphs of the Central Sahara: stylistic and chronological framework. In: La fragilità del segno. Istituto Italiano di preistoria, Firenze, pp. 47–64.
Lhote, H., 1958. A la découverte de fresques du Tassili. Arthaud. (Paris).
Maley, J., 2004. Le bassin du Tchad au Quaternaire recent: formations sedimentaires, paleoenvironnements et prehistoire. La question des Paleotchads. In: Renault-Miskovsky, J., Semah, A.M. (Eds.), Guide de la Prehistoire Mondiale. Artcom-Errance, Paris, pp. 179–217.
Menardi Noguera, A., 2017. The Oval Engravings of Nabara 2 (Ennedi, Chad). Association des Amis de l'Art Rupestre Saharien (AARS) Arts 2017, pp. 6–16.
Mori, F., 1967. Figure umane incise di tipo ittiomorfo scoperte nel Tadrart Acacus. Nota preliminare. Origini 1, 37–51.
Mori, F., 1971. Proposta per una attribuzione alla fine del pleistocene delle incisioni della fase più antica dell'arte rupestre sahariana. Origini 5, 7–20.
Mori, F., 2000. Le grandi civiltà del Sahara antico. Bollati Boringhieri editore, Torino.
Muzzolini, A., 1986. ÍArt rupestre préhistorique des massifs centraux sahariens. BAR International series 318, Oxford.
Muzzolini, A., 1995. Les images rupestres du Sahara. Toulouse, author's edition. .
Muzzolini, A., 1996. Northern Africa: some advances in rock-art studies. In: Bahn, P.G., Fossati, A. (Eds.), News of the World I, Rock-art Studies. Oxbow Monograph 72, Torino and Pinerolo, pp. 59–69.
Sansoni, U., 1994. Le più antiche pitture del Sahara. L'arte delle Teste Rotonde. Jaca Book, Milano.
Soukopova, J., 2012. Round Heads: the Earliest Rock Paintings in the Sahara. Cambridge Scholars Publishing, Newcastle upon Tyne.
Soukopova, J., 2017a. Central Saharan rock art: considering the kettles and cupules. J. Arid Environ. 143, 10–14 Special Issue on Rock Art in Arid Environment.
Soukopova, J., 2017b. Penis only for Gods? Sexual imagery in the earliest Central Saharan rock art. In: Expression: Quaterly e-journal of Atelier in cooperation with UISPP-CISNEP. International scientific comission on the intellectual and spiritual expressions of non-literate people, vol. 15. pp. 69–76.
Striedter, K.H., Tauveron, M., Ferhat, N., 2002-3. The most ancient rock engravings in the central Sahara? Afrique: Archeol. Arts 2, 31–38.
Tauveron, M., 1999. Planchers rocheux aménagés du Sahara central. ÍAnthropologie 103 (3), 391–419.
Van Hoek, M., 2003. Rock art of twyfelfontein, Namibia, africa. In: A Survey into the Relationship between Animal-engravings and Cupules, . http://www.bradshawfoundation.com/namibia/cupules_animals1.php.