Tethering Stones in Oman's interior: Further Evidence

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Abstract: *New evidence of tethering stones has been discovered in al Fouli and al Baida areas in A'Dakhliyah region (the Sultanate of Oman). Previous surveys and investigations in the adjacent broad geographic area of al Mudhaibi have revealed a number of tethering stones. These stones are considered indicators of trapping activities by prehistoric groups and are also considered climatic indicators. This paper documents further evidence of these stones in Oman's interior and cast light on their mechanism and efficiency as trapping tools.*

Introduction

Traps are ancient inventions that facilitate the capture of reptiles, birds and mammals. Since the distant past man has used them to acquire food. Our knowledge about prehistoric traps comes from two main sources: material evidence remains and rock scenes depicting trapped animals. Indeed, rock art has enhanced our knowledge of traps more than any material evidence retrieved from archaeological contexts. Traps anyway must have contributed significantly to the dietary subsistence activities of prehistoric societies. Moreover, they made a decisive impact on man/animal ecological interaction. Crucially, they manifest the resourcefulness of early human imagination and achievement.

These hunting tools were needed by early man to overcome his own limitations when faced with the well-equipped animals sharing the ecosystem. Enemy and prey alike were better equipped with sharp natural instincts for detecting prey and escaping the enemy. Animals have self-defense instincts of flight, speed, camouflage, sharp sight and an acute olfactory sense. The prehistoric hunter was not so well-equipped but finally he dominated them by his imagination, innovational proficiency, social organization and tools.

At present, evidence of traps is limited in Oman and complete specimens are absent. Made partially of organic material, prehistoric traps had low preservation potential within archaeological contexts. But Omani rock art has depicted scenes that include traps (cf. ElMahi 2000 and 2010). What remains to limit and preclude understanding the traps' rock scenes is usually the difficulty in comprehending and dating it. On the other hand, reports by early travelers and ethnographers lack a clear comprehensive description of traps, their technical components and operating mechanisms (ElMahi 1996:63).

In Oman archaeological investigations have reported trap evidence, namely tethering stones, from three locations: Dhofar (Cremaschi and Negrino 2002:333-334), Al Mudhaibi area (ElMahi 2007:37-62) and the Ja'alan area (Cleuziou and Tosi 2007:49-50) (Map1). This paper presents the results of a survey designed

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to locate tethering stones in al Fouli and al Baida south of Adam (Map 1). The paper also elaborates on the mechanism of the tethering stones as instruments of trapping animals. It also discusses the success of traps in relation to the optimal environments and animal's behaviour characteristics.

Surveying the study area

The survey took place in April-May 2009. It was triggered by the fact that two specimens of tethering stones were discovered by sheer chance at al Fouli and al Baida in the A'Dakhliyah Region (Map 1). As it is known, tethering stones are usually found on the surface. These stones have not been reported from any archaeological contexts such as a cultural strata or within an archaeological site. This area extends southwards from Adam, which is Oman's most southern oasis. Beyond Adam flat arid land stretches to the Mountains of Dhofar. The study area is flanked on the west by the Ad Dhahirah Region which is characterized by semi desert plain. Here, the elevation of the flat plains descends gradually westwards to the Empty Quarter desert and southwards to Oman's central desert region.

The geology of the study area can be described as comprising horizontal terraces, extending over broad flat terraces and surfaces. It is also characterized by wadis and flat water galleries composed of fine rock deposits (cf. Scholz 1980: 41-42).

There are significant wadis running from the north to south A'Dakhliyah, such as Wadi Indam. The vegetation cover along these extended terraces consists of acacia trees and bushes concentrated on the wadi banks and flat water galleries. Grass grows in scattered areas between the gravel terraces (cf. Scholz 1980: 22). On the other hand, Ghazanfar (1992: 10-11) classifies this region as one of Oman's major vegetation zone and is described as Acacia tortilis and Acacia ehrenbergiana community. This vegetation is very common indeed in the central limestone and gravel plains of A'Dakhliyah Region.

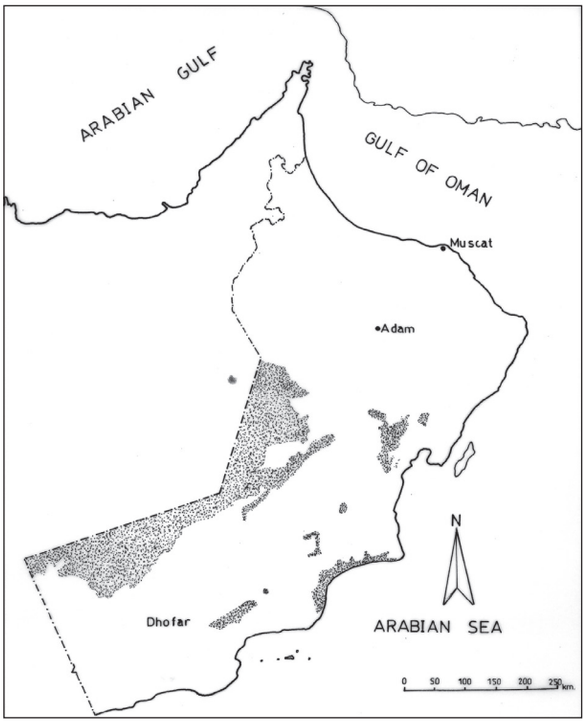
No doubt, tethering stones are located in specific spots away from any living site. These spots were well chosen by prehistoric hunters as these reflect the ecological requirements of the prey and the characteristic features of the habitat, and most of all the frequency of the animals' presence in this geographical area.

Tethering Stones of al Fouli and al Baida

Seven stones were recovered from the survey carried out in the al Fouli and al Baida area south of Adam (Map 1 and Figs 1, 2, 3, 4, 5, 6,7). Similar to those found in al Mudhaibi, these were in reddish Bw soil, a type believed to be related to a wetter phase in the Holocene. Such a climate must have been characterized by grassy and dense vegetation conditions similar to savannah (cf. Cremaschi and Negrino 2002:333-334 and ElMahi 2007:37-62). At present, the available indicator of the date and climatic conditions in which these stones are found is reddish Bw soil which is confirmed by geologists as a geological mark of a wetter phase in the Holocene.

Table 1: al Fouli and al Baida area

	Site	Spec.	Weight (kg.)	GPS Reading		Figures
				Northing	Easting	
1	al Baidia 1	1	17.3	22 23 215'	057 52 681'	Fig. 1
2	al Baidia 2	1	18.1	22 23 305'	057 52 617'	Fig. 2
3	al Fouli 3	1	16	22 24 096'	057 51 850'	Fig. 3
4	al Fouli 4	1	19.2	22 24 853'	057 56 469'	Fig. 4
5	al Fouli 5	1	19.6	22 24 873'	057 56 455'	Fig. 5
6	al Fouli 6	1	12	22 24 873'	057 56 455'	Fig. 6
7	al Fouli 7	1	7.5	22 24 873'	057 56 455'	Fig. 7



Map. 1: Map of Oman and study area

Fig. 1: Al Baidia tethering stone.

Fig. 2: Al Baidia tethering stone.

Details of the seven tethering stones found sites (al Baidia 1, al Baidia, al Fouli 3, al Fouli 4, al Fouli 5, al Fouli 6, al Fouli 7) in the area of al Fouli and al Baida area (Table 1).

Tethering Stones

A tethering stone is one component of a trap made of a stone and a rope or a cord. The stones are the main part of the trap and derive from a varied geological spectrum. Their size

Fig. 3: Al Fouli tethering stone.

Fig. 4: Al Fouli tethering stone.

Fig 5: Tethering stone al Fouli.

Fig. 6: Al Fouli tethering stone.

Fig. 7: Al Fouli tethering stone.

and weight differ widely, ranging from four kilograms up to more than fifty. They are usually elongated in shape. What distinguishes a tethering stone from any other stone is the groove around its middle. Also some have bilateral notches. The grooves and notches vary in depth and width. The grooves in the middle of the stone are clearly made by abrading the stones' surface. The bilateral notches seem to be made by knapping. Grooves and bilateral notches are located centrally to serve a particular purpose; namely, to attach the rope securely to the stone. Also this maintains a balance if the rope is pulled and the stone is lifted from its position (cf. ElMahi 2007:37-62).

The trap's second component is the rope. One end is secured to the groove or bilateral notches while the other is formed into a noose by means of a slipknot. Then, once the rope is pulled, the loop immediately tightens and the stronger the pull the tighter it becomes (cf. ElMahi 2007:37-62).

As mentioned above, the ropes or cords used in these traps are not found in the archaeological context because they are made of organic material. However, the traditional practice of the Bedouins in al Mudhaibi area has cast light on the ways these desert dwellers use wild plants to make ropes. They use the plant species Nannorrhops ritchieana (Fig. 8), which is known locally as 'al gadaf'. Its fan-shaped leaves are cut and soaked in water, then four leaflets are interwoven by braiding them together (ElMahi 2007: 37-62).

In Oman, tethering stones are found in three areas. Cremaschi and Negrino (2002:333-334) report a large number from the al Nejd area in Dhofar, ranging in weight from 7 to 40 kilograms, and they are either grooved around the main body of the stone or have two lateral notches (ibid.). They also confirm that the reddish Bw soil associated with the stones indicates a wetter phase during the Holocene and thus a savannah like vegetation cover.

Cleuziou and Tosi (2007:49-50) report several hundred stones found on Oman's plain of Ja'alan. These range in weight from four to seventy kilograms (ibid.). The two reports,

Fig. 8: The plant species Nannorrhops ritchieana, 'al gadaf' used for making ropes.

however, are brief and do not offer precise numbers or exact positions.

The third report comes from al Mudhaibi (ElMahi 2007:37-62). It provides the exact number of stones identified and maps their geographical distribution. It also casts light on such issues as the making of the stones and the rope attached to them, the setting of the trap, the camouflage, the distance between stones and the rope's length against the stone's weight. Again, this report mentions that the area is characterized by reddish Bw soil which is associated with all the stones encountered in the survey. It is again an indicator of a wetter phase during the Holocene and thus a savannah-like vegetation cover (cf. ElMahi 2007:37-62).

In Africa, tethering stones and their function are seen on ancient rock scenes. Scenes depicting wild animals trapped by such stones are numerous and well distributed across the African Sahara. Evidence from Algeria, Libya, the Third Cataract and Jabal Aweinat

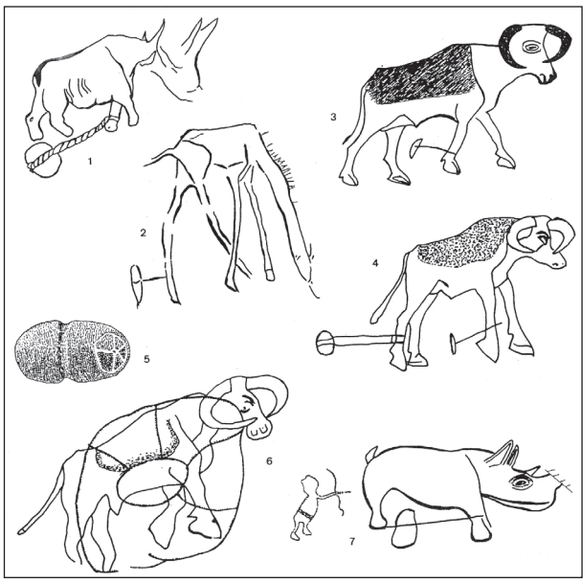


Fig. 9: Rock scenes of trapped animals in North Africa (After Allard-Huard 1993: fig. 57/ 1,2,3,4,5,6,7).

in the Sudan are reviewed by Allard-Huard (1993: fig.57/1,2,3.4,5,6,7) (Fig. 9). Rudiger and Gabriele Lutz (1992-92:71-76) studied some twenty five rock scenes depicting Bos "a tenaille", rhinoceros, asses, lion, giraffe, ostriches and a Bubalus in Messak Sattafet (Libya). They concluded that these rock engravings depict animals trapped by tethering stones, thus Lutzs (ibid.) confirms that these stones are hunting instruments.

On this matter, ElMahi (2007: 58 & Fig: 6) also proposes that an ostrich rock scene from Najran (southern Saudi Arabia) portrays the bird being caught by a baited tethering stone trap. It seems that tethering stone use was widespread across Africa and Arabia; it was an invention that manifests the ability to foresee and calculate the outcome of a human action and a prey's reaction.

Discussion

Throughout time, man has designed and used various types of traps with different mechanisms to suit diverse environmental conditions and to target a single animal. There are two major types:

1) Killing traps are designed to instantly or quickly kill an animal.
2) Restraining traps are designed to hold an animal alive until the trapper returns to kill it.

Tethering stones are designed to restrain the animal and must have certain features to be effective. For example, the traps are not designed to work in mountainous terrain. The necessary features are related to the habitat, the animal's size and behaviour, that is, mobility, ferocity, and choice of geographical area. Optimal environments and animal's behaviour characteristics are:

1. Forest or bush conditions
2. Desert condition
3. Plain and savannah conditions
4. Animal behavior; e.g., diurnal or nocturnal.
5. Whether animal is solitary or gregarious
6. The animal's ecology
7. Dependence on permanent water or seasonal surface water, rain or pools.

A tethering stone trapping mechanism consists of three components: the stone, the cord and the noose. The noose is a loop formed from a long cord. Basically, the loop tightens as the cord is pulled and the more the cord is pulled, the more it tightens. This technique must have been used widely by Holocene hunters and the earliest evidence comes from Tabouk in Saudi Arabia and Oman (ElMahi 2001). This complex device marked a turning point in Stone Age technology. ElMahi (2007: Fig. 2a) suggests how a tethering stone trap is set to catch an animal, but this suggestion needs elaboration, as indicated in figure (Fig.10a). Using just one noose attached to the stone limits the trapping potential. Slobodkin (1962:184) argues that contact between prey and predator populations is a requirement for predation. Reduced contact results in reduced predation. Therefore, it is reasonable to assume that the early hunters used with one tethering stone several nooses spread in different directions to increase effectiveness (Fig.10b). Indeed, more nooses would increase contact frequency, especially if spread in different directions from the stone. Frequency of contact between the trap and the animal can either be increased by more tethering stones in the area, which we have not encountered or with more nooses attached to the tethering stone. It is interesting to point out that all the tethering stones reported in Oman show no concentration of stones specimens in one specific location. Therefore, their spreading range on the terrain

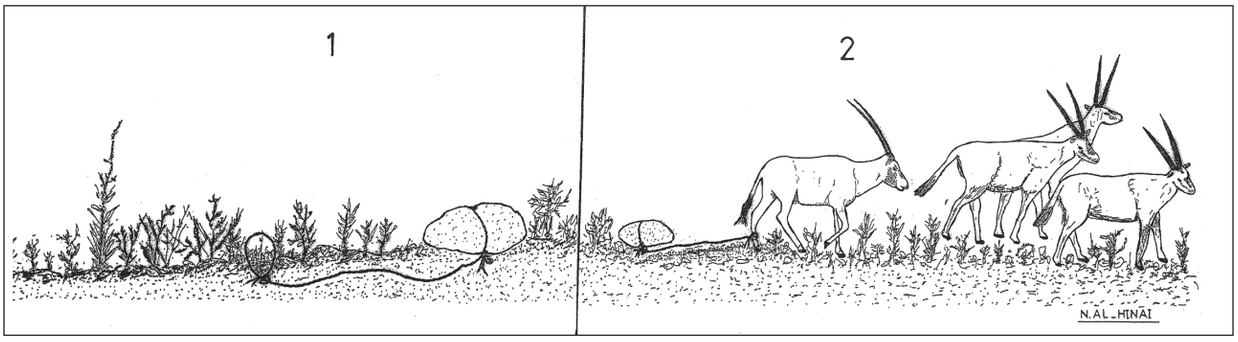


Fig. 10a: A reconstruction of a tethering stone trap After ElMahi (2007: Fig. 2a).

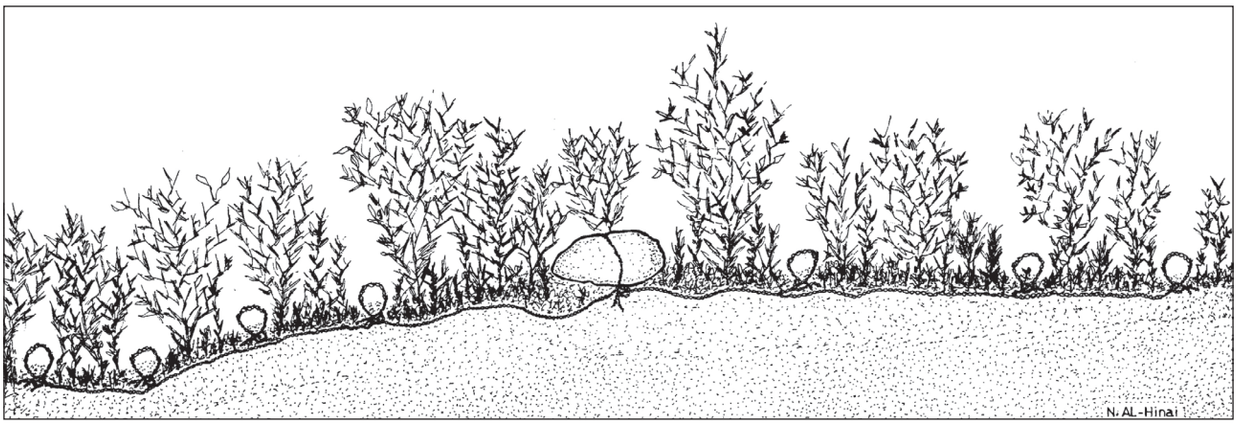


Fig. 10b: A reconstructed one tethering stone with several nooses spread in different directions.

supports prehistoric hunters' use of several nooses attached to one tethering stone (cf. Fig.10b).

On the other hand, environmental conditions have a significant part in increasing the possibilities of contact with the trap. Tethering trap success also depends on the camouflage effect of a suitable vegetation cover which might hide all parts of the traps. Animals are usually attracted to graze and browse in such locales.

Furthermore, tethering stones are designed to meet such factors as size and cord length. The important relationship between stone weight and cord length has been demonstrated (cf. ElMahi 2007: 37-62). In essence, the smaller the stone, the longer the cord. Thus, large heavy stones are tethered by short cords.

Obviously, the position of every tethering stone on the plains is a spot carefully chosen by the hunter. Placing and setting a trap in a certain spot reflects the hunter's special knowledge of a particular area and of certain animals' behaviour and habitats. Choosing a certain spot to set such a stone trap brings to mind Butzer's statement (1984:213) that not all points in space are of equal value.

Hunter-Foragers Subsistence Strategies

It is clear that tethering stones succeed in conditions where other means and methods fail. When direct killing is not effective, these traps can be. They do not, however, have an immediate return like the bow and arrow. Overall strategy must have arisen from the following two situations and possibilities:

First, the animal must have been in abundance

in a particular area and its behaviour predicable, though this type of trap reflects no preference for a particular animal.

Second, a determining factor in success, the seasonal availability of animals in a certain area had to be understood. Seasons and animal migration are determining factors in the success of this type of traps.

The stones are designed to trap herbivore of various sizes and types, though any other animal ensnared in such environs was undoubtedly welcomed too. The practices of traditional Bedouins in Oman and contemporary hunter/gatherers suggest that their ancestors had enjoyed a very varied diet.

Holocene hunter/gatherers probably trapped small animals such as lizards, rodents, hedgehogs, etc. Plant resources must have also been suitable for food. Reports of contemporary hunter-gatherers indicate key information that can possibly help in understanding their prehistoric counterparts. The study of Hadzabe hunter-foragers in Northern Tanzania suggests that they are a mobile egalitarian group. They have a broad dietary subsistence patterns (Mabulla 2007:22, 27) and it seems that plant food constitutes a major part of hunter-forager subsistence (cf. Hawkes et al. 199; Mabulla 2007). Thus, the contribution of the tethering stones to the subsistence of early hunter-foragers is significant, but not as crucial as the gathering of esculent plants and for foraging other minor food resources.

Hunting big game on open plains could not be done successfully with weapons such as Stone Age arrow or spear heads. This would require either poison or traps. Stone Age technology could not inflict wounds that would cripple or disable large animals, let alone kill them. A good example is documented among the !Kung of South Africa. Although their arrows and spears are made of iron, they used poison. The distance the animals keep between themselves and hunters, which is known as flight-distance, impedes arrows and spears from inflecting vital wounds. Therefore, !Kung hunters used poison to disable their prey.

In Oman, and especially in the interior where the surveys of 2007 and 2009 were conducted, the Bedouins insist that they have never used poison in their hunting. Furthermore, field investigations of minor food resources in that area show that poison is not part of the hunting equipment used by traditional societies. In Oman, arrow head evidence comes from Stone Age, Bronze Age and Iron Age sites (cf. Smith 1976:192; Puller and Jackli 1978:54; Puller1985:74; Amirkhanov 1994; Zarins 2001: 48, fig. 18; Al-Belushi and ElMahi 2009: 43-56; Al-Belushi and ElMahi 2007: 7-34 ; Al Jahwari and ElMahi 2008: 7-40 and Yule and Weisgerber 1988: 28-65). On the other hand, the archeological context does not present any evidence for the use of poison. Therefore, whether hunter/gatherers in the plains of Oman's interior used poisoned arrow heads to disable and cripple animals, remains short of evidence. In the absence of such evidence, it seems sensible and more profitable to assume the use of tethering stones traps.

Interior hunters and gatherers

Up to the present, tethering stone evidence comes from Dhofar (cf. Cremaschi and Negrino 2002:333-334), the plains of Ja'alan in eastern Oman (cf.Cleuziou and Tosi 2007:49-50) and the interior of Oman (cf. ElMahi 2007:37-62). In Dhofar, these traps were found in the al Najd area, which is also a plain with some wadis and hills. Current evidence suggests that there were hunters/gatherers in Oman's interior and along its coastal areas.

Coastal and Interior hunters/gathers must

have needed to adapt to different circumstances concerning seasonality, methods and territory. For example, fishing and harvesting mollsucs were undoubtedly essential for the livelihood and the subsistence of the coastal groups.

Similarly the interior's hunters, namely the al Fouli and al Badia, must have possessed an acute sense of direction and territoriality. Territoriality also means the knowledge of the various food resources and their seasonality, the locality and its seasonal conditions and potential. Indeed, the distribution of tethering stones over the plains al Mudhaibi, Ja'alan, al Fouli and al Badia indicates that each area was inhabited by groups of hunters/gatherers who set these traps in their territory. It is well known that no hunter can trap in an area not known to him or not part of his hunting grounds. In other words, the geographical distribution of tethering stones in the plains of the interior and the eastern coast of Oman is a reflection of the hunters' territoriality. It emphasizes the key significance of territoriality. In short, territoriality is a crucial element in the adaptation of hunters/gathers and a vital precondition for their survival and well-being.

During the Early Holocene and early Neolithic periods there were almost certainly coastal hunters and mangrove foragers as is the case in Tihamah, Yemen (cf. Cattani and Bokonyi 2002) and Ras al Hamrra in Oman (cf. Cleuziou and Tosi 2007). The subsistence activities of the coastal groups focused on hunting on the plains and exploiting mangroves resources (shells and small fish), while for those in the interior there was game but no shells and fish. This situation has continued down the ages so that even today in Oman there are coastal Bedouins and Bedouins of the interior (cf. ElMahi 2011). It is possible to assume that the hunters/gatherers of Oman's interior are the predecessors of the contemporary Bedouins in the area (ElMahi Forthcoming).

The fauna and the region

The environment in the interior of Oman during the mid-Holocene was rainy as geological evidence testifies (cf. ElMahi 2007). Therefore, the ecological setting of the tethering stones found in al Fouli and al Baida must have originally been green and lush. But if these stone traps were for catching large and medium-sized animals, what were these animals? To answer this question we need to address the fauna of Arabia and its distribution. Given that the tethering stones were used during a wet phase of the Holocene, which was adequate to support sufficient vegetation cover for the plains of al Fouli, al Baida and al Mudhaibi, one must assume that the fauna of Arabia belonged to the Ethiopian variety (cf. George 1972). Illies (1974; Fig 15) focuses on the southern corner of Arabia as part of the Ethiopian Region which is an extension of the Ethiopian fauna into Arabia. On the other hand, Distant (1878:282) points out that affinity between the African and Indian fauna also exists and that several naturalists have indicated this relationship between the Ethiopian and Oriental regions.

A survey carried out by Cattani and Bokonyi (2002:33) in Tihamah and excavations of the ash-Shumah site in Tihamah revealed valuable information. For example, wild equid bones and ostrich egg shells were plentiful in these sites of the 8th millennium BC. Again, recovered shells from ash-Shumah site were dated to 7770 BP + 95, calibrated 6684- 6475 BC. On the other hand, rock scenes in Arabia testify to the presence of such wild animals like wild camels, ostriches and large-sized antelopes (cf. Zarins 1989: 125-155).

With such information in mind, the presence of large sized herbivores in the area of this study in Oman should not therefore be surprising. As

a result, prehistoric hunters in costal and interior areas of Oman must have encountered such sizeable animals. Accordingly, the stone points of the Stone Age hunters were not sufficient and effective for these animals in the open terrain of Oman. It seems logical that the invention of tethering stones traps was an inevitable necessity in such environmental conditions, state of hunting technology and economy.

Conclusion

The survey of al Fouli and al Badia plains shows that tethering stones have a widespread distribution in the interior. They have also been found in the eastern coastal plains and the al Najd in Dhofar of southern Oman. Therefore, it can easily be concluded that stone traps were widely used by hunters/gatherers during the wet phase of Mid Holocene, and were used for hunting both large and medium-sized animals. It would seem that there were indeed many animals roaming the plains of Oman during prehistoric times. Moreover, the traps proved to be climatic indicators since the reddish Bw soil of the interior and of the al Najd plain is associated with a wet phase of the Holocene (cf. Cremaschi and Negrino 2002:333-334 and ElMahi 2007:37-62).

Equally, the geographical distribution of the traps in the interior and coastal areas indicates the varied exploitation of natural resources in both habitats. Furthermore, it signifies the territoriality of the hunters/gatherers and their hunting grounds. They must have been small groups moving around and visiting their traps set within their specific territory. Nor was this early type of nomadism significantly different from contemporary Bedouin movement which, indeed, is a cyclical or transhumant seasonal movement, but within a well-known and recognized territory. Since such territories are recognized and exploited by contemporary Bedouins, these same territories were probably ranged over by prehistoric hunters/gatherers on the plains of al Fouli, al Baida and al Mudhaibi.

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ملخص: كشف المسح الأثري في منطقة الفولي والبيضة في أجزاء من ولاية الداخلية بسلطنة عمان عن أدلة جديدة لحجارة شَرَك الصيد. وكانت مجهودات المسح الأثري السابق في منطقة المضيبي، المتاخمة لهذه المنطقة، قد توصلت كذلك للكشف عن أدلة مماثلة من هذه الحجارة. ومن ناحية أخرى، تعد حجارة شَرَك الصيد مؤشراً أثرياً بيِّناً لنشاط الصيد بواسطة هذه الطريقة التي مارستها مجموعات ما قبل التاريخ في المناطق المذكورة ومؤشراً لطبيعة المناخ في تلك الفترة. هذا البحث يوثق لهذه الحجارة في داخل عمان، ويسلط الضؤ على مكونات هذا النوع من شَرَك الصيد، والآلية التي يعمل بها، وكيف يعمل بفعالية، والكفاءة الفعلية في الإيقاع بالفريسة.

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