

# The Unnamed Plateau (Western Desert of Egypt). New geological and geoarchaeological data from an exploration in a remote area

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**Abstract** - The Unnamed Plateau is a low plateau in the Western Desert of Egypt close to the Libyan border, about halfway between the Gilf Kebir to the north and Jebel Uweinat to the south. It is little known and seldom visited. In the past, we have conducted three field surveys in order to assess its geomorphic features and the human presence in the Holocene.

During our explorations we have found a Paleozoic fossil plant, which allows to ascribe the sedimentary cover to the late Paleozoic (as in the Geologic Map of Egypt, 1981), not Mesozoic, as indicated in the 1987 Geologic Map. We could retrace and walk an ancient mountain path connecting the two slopes of the Plateau and leading to a fossil lake. The area was visited by hunters-gatherers and perhaps the first nomadic herders moving north-south, until the mid-IV Millennium BC, when the final desiccation of the Eastern Sahara pushed them out definitely.

**Key words:** anatectite formation, eastern Sahara explorations, geology of Egypt, Gilf B cultural phase.

**Riassunto** - Unnamed Plateau (Deserto Occidentale d'Egitto). Nuovi dati geologici e geoarcheologici da esplorazioni in una zona remota.

Unnamed Plateau, "l'altopiano senza nome" è un rilievo poco emergente del Deserto Occidentale molto vicino al confine con la Libia, a metà strada tra il Gilf Kebir a nord e Jebel Uweinat a sud. È un'area assai poco conosciuta e raramente visitata. Alcuni anni fa vi abbiamo condotto tre spedizioni esplorative che avevano come scopo di approfondire la sua struttura geomorfologica e stratigrafica ma anche di indagare su di una eventuale presenza umana nell'Olocene.

Durante la nostra esplorazione abbiamo rinvenuto una pianta fossile paleozoica, che conferma la copertura sedimentaria paleozoica già indicata dalla "Geologic Map of Egypt" del 1981 poi modificata in mesozoica sulla più recente del 1987. Abbiamo inoltre individuato e percorso un antico sentiero di montagna che connetteva i due versanti dell'altopiano, raggiungendo un bacino lacustre attualmente

estinto. L'area fu frequentata da cacciatori-raccoglitori e probabilmente anche da pastori nomadi o semi-nomadi che si muovevano tra i due massicci principali fino alla metà del IV millennio AC, quando il completo inaridimento del Sahara orientale li allontanò definitivamente.

**Parole chiave:** anatectite formation, Deserto Occidentale egiziano, esplorazioni nel Sahara orientale, fase culturale Gilf B, geologia dell'Egitto, Unnamed Plateau.

## INTRODUCTION

In 2004 we had the opportunity to join an expedition into the western desert of Egypt. It sparked our interest in the exploration of the desert and prompted us to organize our own journeys to the least traveled areas. Since then, we have carried out nine trips into the western desert, until 2013. Afterwards we were no longer allowed to continue our field research due to the socio-political developments in Egypt, which resulted in a ban to all non-military Egyptian desert journeys.

In the last 40 years the western desert has been the subject of archaeological explorations and prehistoric studies by many international institutions. To name a few: The combined prehistoric expedition in the eastern Sahara (Directed by Fred Wendorf; Southern Methodist University, Dallas, Texas); the Heinrich Barth Institute, Cologne; the Polish Academy of Sciences Poznań; La Sapienza University, Rome. This remote desert has been crisscrossed many times but the area of the so-called Unnamed Plateau has remained little known. For this reason, we made it the target of three of our expeditions (2007, 2009 and 2010) which brought to new findings and interesting results.

Given the impossibility to complete our explorations, we have decided to compile a summary of all historical records, add our own results and share with the informed public the knowledge amassed so far.

## THE REGION AND ITS EXPLORATION

The Unnamed Plateau is situated in the eastern Sahara, about halfway between the Gilf Kebir to the north and Jebel Uweinat to the south, in a most remote and seldom traveled corner of the Egyptian territory along the Libyan border (Fig. 1).

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Fig. 1 - Map of Egypt. The Unnamed Plateau is located at the south-western corner (Google Earth™, modified). / Mappa satellitare dell'Egitto. L'Unnamed Plateau si trova all'estremità sud-occidentale.

It is also known among the modern desert travelers as the “Small Gifl”, being less imposing and smaller in size than its northern neighbor. The Small Gifl is dryer than the two other massifs and even in antiquity it must have been less suitable for human settlements though, as we will see, still carrying archaeological evidences.

Nowadays only Jebel Uweinat, 50 km to the South, maintains a few water-sources thanks to its noteworthy mass and height; the Uweinat can still intercept the farthest reaches of the monsoon, capturing modest and infrequent rains. Its five “springs” or water reservoirs are presently the only source of permanent water in this vast corner of the eastern Sahara.

The whole area has remained unknown to European explorers for centuries; a geographic map of Africa dated to the end of the XIX century, the Justus Perthes of Gotha, 1892, only shows two unnamed oases in a totally blank space.

In 1913 the British explorer William Joseph Harding King reports of having heard of an oasis called *Owana* or *Owanat*, about halfway of the caravan route between Merga (now in the Sudan) to Kufra (now in Libya) (Harding King, 1913). His estimate of the oasis position matches that of Jebel Uweinat. According to Kemal el Dine Hussein, news of such a major water point were circulating in Kufra since the return of a team of local voyagers sent by the chief of the Senussia to look for oases or water points (el Dine Hussein, 1928: 325).

The first modern explorer to reach this remote area of the western desert is Ahmed Hassanein Bey, diplomat, tutor and Chamberlain to King Faruk. In 1923 he undertakes

a never-dared-before camel ride across the Libyan Desert from Sollum (Egypt) to El Obeid in the Sudan via Kufra, covering more than 3500 kilometers in eight months. During his journey Hassanein Bey identifies and locates quite precisely the two “lost oases” of Jebel Arkenu and Jebel Uweinat, thus opening the possibility to cross the Libyan Desert with camel caravans (Hassanein Bey, 1925).

Another important explorer is Hussein Kamal el-Din. Immediately after the aforementioned newly discovered caravan route, the Egyptian prince decides to traverse the desert by car (half-tracks and Fords) which, though less suitable for the very soft terrain of the dunes, can run better and faster than camels on hard ground. In 1925 during one of his expeditions, while traveling north of Jebel Uweinat, Kamal el-Din catches a glimpse of an unknown high escarpment: he consistently calls it *Gifl Kebir* (i.e., *big cliff* in Arabic), since adopted as its geographic name (el Dine Hussein, 1928).

In the thirties the Hungarian Nobleman László Almásy, together with Sir Robert Clayton-East, H. G. Penderel and Patrick Clayton, comes to the Gifl Kebir in search of Zerzura, the mythical oasis of an old Arabic legend. Almásy & Co. use a light plane to explore the north-western side of Gifl Kebir from the air and map some of its hidden valleys. Almásy's party reaches Wadi Abd el Malik, the Gifl's main valley, by car reporting a water point hardly surviving and giving undrinkable water (Almásy, 2004).

The Unnamed Plateau appears in the chronicles for the first time in 1933 when P. Clayton makes a field survey and explores the southeastern section of the plateau starting from two hills he discovered the year before and named by him “Peter and Paul” (Fig. 2A). Clayton gives quite precise altitude data and reports some interesting observations; among others, that the relief is split into two parts and mainly made of granite. Despite of being quoted, the plateau still remains nameless.

In 1938 Ralph Alger Bagnold leads an expedition of the Egypt Exploration Society, the “Sir Robert Mond Expedition”, in order to continue his studies on sand movements and dunes. The party includes scholars of different disciplines, among others, O. H. Myers who starts a paleo-ethnological investigation of the area and Hans A. Winkler, a Rock Art specialist. The party's camp is set up on the eastern side of the Gifl, so Bagnold can explore the main eastern wadis and parts of the Gifl's top. Afterwards, he visits Jebel Uweinat and then Wadi Abd el-Malik but leaves out the Unnamed Plateau.

In 1978 Farouk El-Baz organizes a multidisciplinary exploratory expedition to the Western Desert with a team of geologists, geographers, paleo-ethnologists, archaeologists, botanists etc. thus starting a new era of scientific explorations. El-Baz himself skirts twice the Unnamed Plateau on its eastern side while driving to Jebel Uweinat, without recording any specific observation. (El-Baz, 1980: 56, Fig. 2).

During two expeditions in 2002, the rock art specialist and explorer András Zboray visits in the spring the eastern side of the Unnamed Plateau, looking for rock art and discovering a panel with engraved cattle; in the autumn he surveys the western side without finding “something of interest, aside its desolate beauty” (Zboray, 2002).

**GEOGRAPHY, TOPOGRAPHY, GEOLOGY AND HYDROLOGY**

The Unnamed plateau lies approximately from 22°57'N to 22°20'N, and from 25°6'E to 25°35'E, covering an area of more or less 1000 km<sup>2</sup>. The true boundaries are hidden by a thick cover of quaternary deposits, both alluvial and aeolian.

During World War II the 1942 Geographic Map (Survey of Egypt, 1942) (Fig. 2B) faithfully includes Clayton's draft-map but leaves the plateau wi-

thout a geographic name. The map, rather inaccurate when compared to the real topography, nevertheless indicates the presence of the stone circles discovered by P. Clayton during his 1932 exploration (Fig. 2A).

The physical depiction of the Unnamed Plateau is rather improved in the Geological Map of Egypt (Egyptian Geological Survey and Mining Authority, 1981) though, owing to its remoteness and difficult accessibility from Cairo, its geology still remains a somewhat undefined issue.

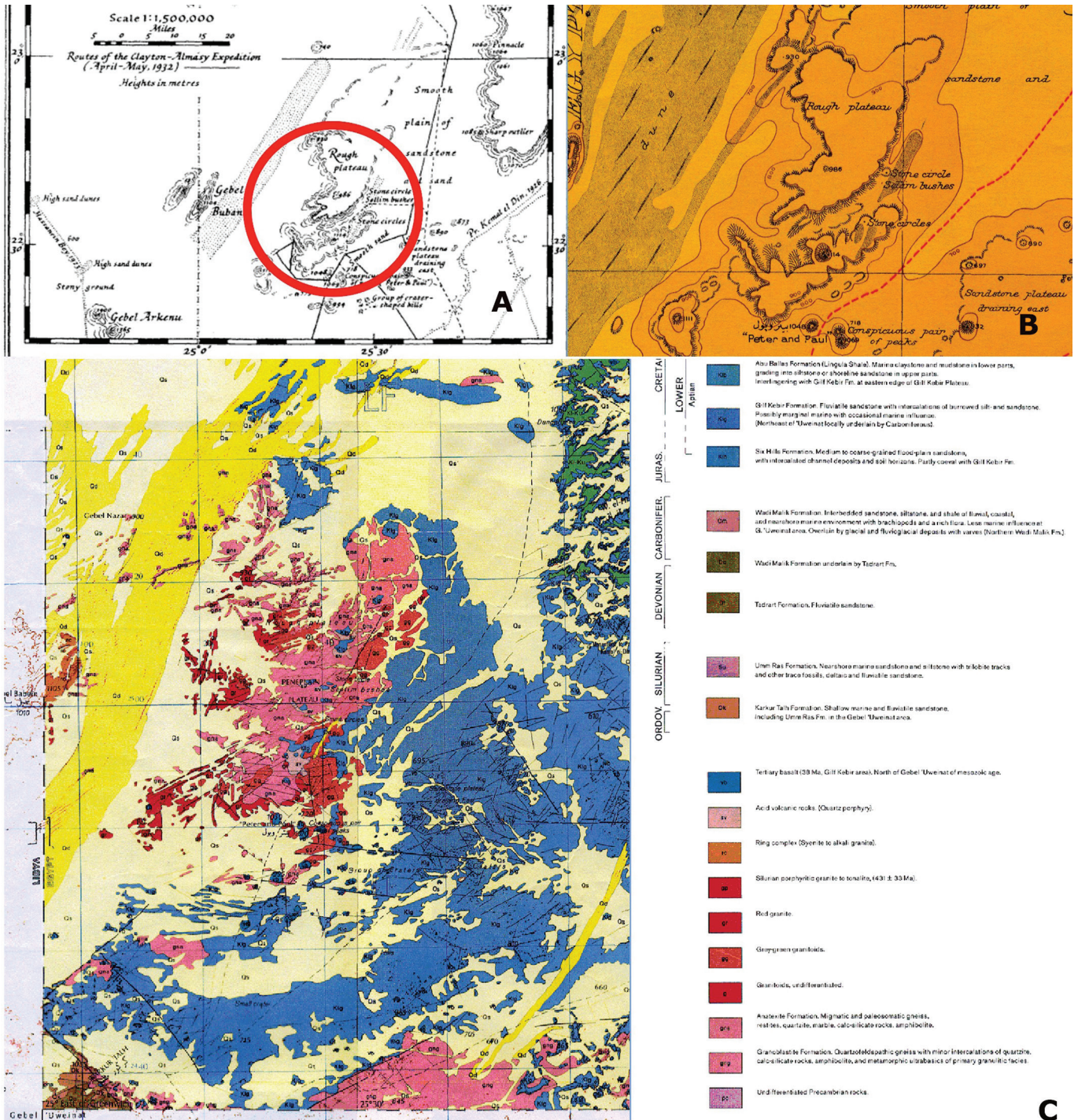


Fig. 2 - A) Clayton's map detail (1933) / Dettaglio della carta geografica di Clayton (1933). B) Geographic map of Egypt (Survey of Egypt, 1942). / Carta geografica dell'Egitto (Survey of Egypt, 1942). C) Geological map of Egypt (Conoco Coral & Egyptian General Petroleum Corporation, 1987). / Carta geologica dell'Egitto (Conoco Coral & Egyptian General Petroleum Corporation, 1987).

The southwestern corner of the Egyptian territory presents a limited outcrop of Pre-Cambrian rocks, due to a structural high called the Uweinat-Bir Safsaf-Aswan Uplift. The Unnamed Plateau is located at the northwestern end of this tectonic structure, where the basement rocks belonging to the major Jebel Uweinat basement inlier outcrop.

It is quoted as a “Peneplain area” and described as “an elevated plateau topped by a flat denudation surface and cut by frequent wadis” (Richter & Schandelmeier, 1990), or indicated as “Peneplain plateau” on the Geologic Map of Egypt (Conoco Coral & Egyptian General Petroleum Corporation, 1987).

Richter & Schandelmeier (1990, 189) distinguish three main basement formations by their lithofacies: a) the high metamorphic grade ‘Granoblastite Formation’ overlain by b) the clearly remobilized ‘Anatexite Formation’, and c) the probably youngest, clearly bedded ‘Metasedimentary Formation’.

Rb/Sr whole rock ages taken on granulitic rocks and anatexitic gneisses outcropping at the southeastern slopes of Jebel Uweinat give a Late Archean age as well as a later Mid-Proterozoic event which affected these rocks (Klerkx & Deutsch, 1977). NNE or NE fold axis trends dominate but locally they change to E-W or NNW-SSE. The prevailing dip of schistosity planes is moderately steep to the NW, even though it varies in respect of the axial deformation of the folds. Landsat image interpretation shows that the fault pattern of the region is dominated by lineaments trending NE-SW with subordinate E-W-trending faults.

According to the Geologic Map of Egypt (Conoco Coral & Egyptian General Petroleum Corporation, 1987) (Fig. 2C) in the Unnamed Plateau the Anatexite Formation is prevailing, especially along its central axis, followed by grey-green granitoids at the northeastern and southeastern sides; at the western margin the grey-green granitoids are cut-in by red granite *s.s.* and the Anatexite Formation crops out in connection to the main valley. A few minor exposures of acidic volcanic rocks are reported locally. On top of these basement rocks, patches of sedimentary cover lie unconformably (Fig. S1). Geologists’ opinion about these phanerozoic rocks are contrasting. The 1981 Geologic Map of Egypt indicates them as “Devonian clastics west of Gilf Kebir, and Cambro-Ordovician clastics below the Carboniferous section in Gabal ‘Uweinat’”, while the 1987 Map labels them “Upper Jurassic-Lower Cretaceous rocks”. The geologist Norbert Brüggge (2020) on the contrary argues that the “Mesozoic rocks” of the 1987 Geologic Map are actually Paleozoic, as some Paleozoic fossils have been reported in the area between the Gilf Kebir and Jebel Uweinat by desert travelers.

The Quaternary deposits are represented by playa and wadi deposits and by aeolian sands, especially to the west of the plateau, where a major chain of dunes has developed starting from the southern scarp of the Gilf Kebir down to the Libyan Desert and beyond.

Lying the Unnamed Plateau in one of the most arid deserts of the world, its present hydrology is limited to surface scroll of ephemeral waters running for a few kilometers after the occasional rains.

During the Plio-Pleistocene the climate situation was different, with permanent rivers such as the Kufra River running for 950 km from Chad to the Mediterranean Sea.

Its large basin collected waters also from parts of the Sudanese and Egyptian territories. Thanks to remote sensing techniques, scholars have reconstructed the hidden river courses, now covered with windblown sand sheets and dune fields. According to the model of the ancient Kufra basin, the Unnamed Plateau stands out as the watershed between two of its major righthand tributaries (Fig. 3). The southernmost one going south then bending to the west, the northern one, after flowing north, turning west and passing along the Wadi Sura, very close to the now famous “Cave of Beasts” (Kuper, 2013), and then again to the north to join the main river axis (Ghoneim *et al.*, 2012: Figs. 4 and 7).

The local flora is very limited. During our explorations we have come across a few groups of acacias (*Vachellia flava*, syn. *Acacia ehrenbergiana*) (Fig. 4A) and small bushes such as *Tricodesma africanum* (Fig. 4B: left) and camel thorn (*Zilla spinosa*) (Fig. 4B: center); lots of dried Colocynth gourds (*Citrullus colocynthis*) lay on the riverbed of a major eastern wadi which takes its name from it (i.e., Wadi Handal, the valley of the Colocynths) (Fig. 4C). In the left branch of Wadi Handal, the small riverbed is covered by shrubs of *Eremobium aegyptiacum* (Fig. 4B: right), some still blooming, and by some freshly-grown grasses, a sign of recent rains in the area.

In relation to the big fauna, in 2007 we only found a concentration of dung and urine of the elusive Barbary sheep (*Ammotragus lervia*).

The plateau remains along the route of migratory birds, as testified by the spoils of a dead stork (Fig. S2).

## ARCHAEOLOGICAL FRAME

Traces of human frequentation during the Pleistocene (Old and Middle Stone Age) in the Unnamed Plateau are present at many places, though being less numerous than in the Gilf Kebir or in Jebel Uweinat.

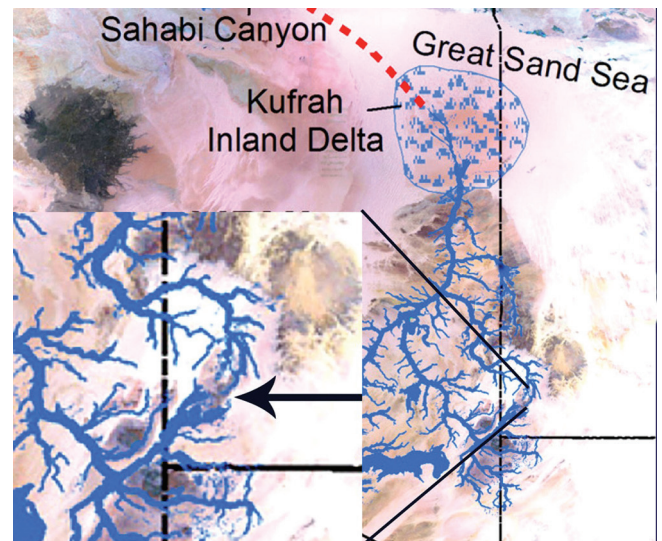


Fig. 3 - Hydrographic network around the Unnamed Plateau as reconstructed for the Plio-Pleistocene (modified from Gonheim, 2012). The two water courses originate from the two sides of the “Through valley”. / Ricostruzione del reticolo idrografico attorno ad Unnamed Plateau per il periodo Plio-Pleistocenico (modificato da Gonheim, 2012). I due corsi d’acqua hanno origine dai due versanti della “valle di Through”.



Fig. 4 - A) Groups of acacias survive in sandy hollows of Wadi Handal riverbed. / Boschetti di acacia sopravvivono nelle conche sabbiose di Wadi Handal. B) Blooming flowers: *Tricodesma africanum* (left); *Zilla spinosa* (center); *Eremobium aegyptiacum* (right). / Fioriture: *Tricodesma africanum* (sinistra); *Zilla spinosa* (centro); *Eremobium aegyptiacum* (destra). C) Clusters of dried colocynth gourds inside Wadi Handal. / Ammassi di zucche secche di colocyntha lungo Wadi Handal.

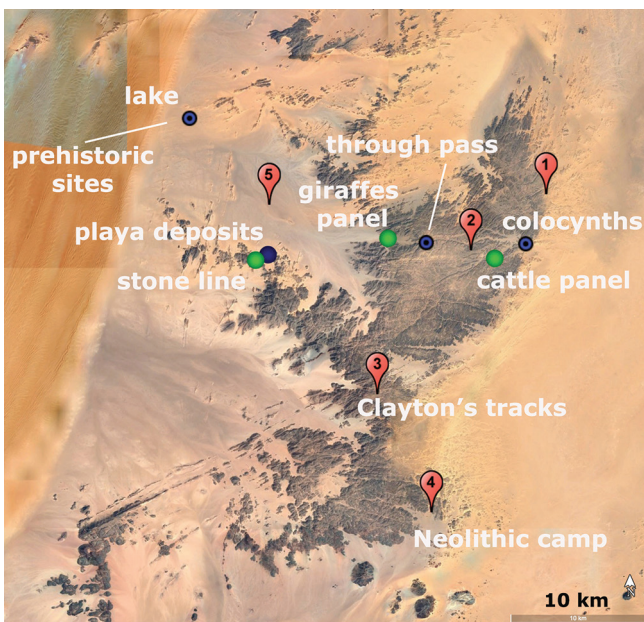


Fig. 5 - Map illustrating the explored areas and the main points of interest (modified from Google Earth™). / La mappa illustra le aree esplorate e i punti d'interesse principali (modificata da Google Earth™).

The long late-glacial hyperarid period at the end of the Pleistocene, when the desert extended 400 km further south than today (Nicoll, 2004), probably ended by 11,000 BP when a northward shift of the African monsoon belt brought a wetter climate. Several rain-fed lakes formed in the Sahara and the vegetation was of Sudanian and Sahelian type. The chronological framework of Holocene occupation of the Western Desert is based on more than 400 radiocarbon dates taken at archaeological sites (Kuper & Kröpelin, 2006). Around 8500 BC small groups of hunter-gatherers moved into the area (Riemer *et al.*, 2017) but the wet climate was unstable, with oscillations affecting the human presence at these latitudes. A further sequence of colder episodes and increased aridity ensued, so the lakes progressively dried up from north to south.

Around 8000 BP, the Sahelian vegetation zones were about 500 km north of the current range, moving to 300-400 km at around 6400 BP. With the worsening of the desiccation, from 6000 BP the savannah further retreated reaching its present position at 3800 BP (Neumann, 1989). As a consequence, the semi-arid climate with 100-150 mm of rainfall per year became a hyperarid one with less than 50 mm of rain per year (Kröpelin, 1987). Still, as both Kröpelin and Linstädter point out, these “low figures of paleo-rainfall during the first half of the Holocene are more than 50 times the current rates of precipitation” in the Eastern Sahara, where the estimated mean annual rainfall is 2 mm (Linstädter & Kröpelin, 2004).

In the last twenty years, many archaeological researches have been carried out in the southwestern and eastern boundaries of Gilf Kebir, with remarkable results. According to recent studies, an initial Holocene occupation phase called “Gilf A” by the German scholars, and represented by hunter-gatherers with a blade industry and microliths (8500-6500 BC) is followed in the mid-Holocene by “Gilf B”. This was a double phase of ceramic-bearing hunter-gatherers (6500-5500 and 5500-4400 BC) with short microliths and an increased use of grinding implements. The pottery used at this stage is characterized by the distinctive decoration of the Khartoum pottery, well represented in many Saharan regions.

Subsequently, from 4200 to 3500 BC, nocturnal, fine and steady winter rains, although not as conspicuous as the summer monsoonal ones of the previous phase, led to a better absorption by the ground and, consequently, to a more extensive vegetation cover. This is the period of cattle pastoralism called “Gilf C”, less represented in the Gilf Kebir but very extensive in Jebel Uweinat. The corresponding ceramics feature smaller and thin-walled vessels, as well as different decoration patterns, such as the herring-bone motif (Linstädter & Kröpelin, 2004; Kuper, 2013; Riemer *et al.*, 2017). After 3500 BC, the lack of archaeological evidences implies that the Gilf was possibly abandoned in favor of Jebel Uweinat, where pastoralists remained until 3000 BC. Successively, the massif witnessed only the presence of hunting groups or caravans stopping for water. Over the past two Centuries we have evidence that Tebu people from Chad or Kufra Oasis continued to pasture their camels and cows after heavy, occasional rains.

## MATERIALS AND METHODS

Before each field trip we plan the routes and paths we want to follow through careful land analyses, studying satellite pictures on Google Earth™, topographic and geological maps and, if available, the existing bibliography and pictures.

Historically, the best way to plan the exploration was always through photo prospections from light airplanes, just as Ardito Desio (Desio, 1950) and Laszlo Almásy (Almásy, 2004) did in the 1930's.

When comparing the aerial photo taken by Almásy over Wadi Ab El-Malik with today's Google Earth™ images, we easily see the huge progresses achieved by photography and, at the same time, notice the shrinking of the acacia groves over the last 85 years (Peroschi & Cambieri, 2018; Fig.1).

Thanks to the remarkable definition of modern satellite pictures, we can now distinguish the nature of the terrain and consequentially plan the best route; the georeferenced points define our journey during the on-site exploration. Using the same technology, one can also detect different kinds of stone structures or locate animal or human tracks, as a thin cover of contrasting aeolian sand accumulates over time on the trampled and slightly hollow ground of such paths.

Once at the designated spot, the on-foot surveys follow the predefined transects. Sometimes, when exploring hilly areas, we need to cross valleys or watersheds: this being the case, we meet the cars at the final point.

In this way we have explored not only the Unnamed Plateau but also several wadis in the Gilf Kebir and in the Jebel Uweinat (Peroschi & Cambieri, 2010; Cambieri & Peroschi, 2018; Peroschi & Cambieri, 2018; Peroschi *et al.*, 2018). Nothing is removed from the ground; all archaeological features are georeferenced, photographed and described. Shelters or stone structures are also measured.

## THE FIELD SURVEYS

We have been three times in and around the Unnamed Plateau. In 2007 we visited the northeastern part of the plateau, in 2009 the eastern side and in 2010 the southeastern and the western areas.

The five areas of our researches are illustrated in Figure 5: the description of our explorations and discoveries starts from the northern sector of the plateau.

### Area 1

When approaching the plateau from the northeast, i.e., from the Gilf Kebir, one comes across a sandy peneplain strewn with big granite boulders. They are the green-gray granitoids indicated on the geologic map (Conoco Coral, 1987) as "gg" (Fig. 2B; red color). Also in the desert environment granite shows its typical rounded exfoliation shape (Fig. S3). Proceeding to the west, one comes inside shallow wadis gouged into the Anatexite formation topped by patches of sedimentary cover. The area is characterized by wide dells and plains developing among exposures of volcanics or subvolcanic rocks, sometimes looking

porphyric. Along a narrow gull, a pistachio-green vein reveals itself as a pistacite quartz vein, a metamorphic hypabyssal rock. Quartz veins containing white-reddish geodes also are present. These veins probably supplied the raw material for artifacts lying in the vicinities.

Evidences of ancient people roaming this hilly region is everywhere.

On top, where the view sweeps towards the south (Fig. 6A), a few stone circles are ringed with blocks of different rocks, mainly sandstone (Fig. 6B); all circles have their openings to the south, i.e. downwind. In their vicinity, a few workshops exploiting quartz veins lay on the desert pavement. A narrow path leads eastward down to the wadi, passing by a large stone circle on a rocky terrace seemingly built to overlook the valley below. A line of artificially spaced stones (stone line) crosses the valley floor making up a simple bridle. Close to it, a broken grounding slab, bladelets (i.e., blades 2-4 cm long) and two tethering stones roughly touched up (Fig. 6C), plus other scattered pieces of grinding stones. The presence of the tethering stones is proof of the keeping of animals. Tethering stones are widespread in the Sahara and come in many different sizes, depending on the mass of the animal to be restrained, be it a game or a bred animal.

A little further, other grinding stones and bladelets are lying on the sandy ground. All evidences point to small groups of people.

### Area 2

Leaving the northern reliefs, we have skirted the plateau along its eastern flanks toward the south, until the entrance of the greater Wadi Handal, the E-W incision splitting the plateau in two which was roughly mapped by P. Clayton in 1932. This major valley puzzled us. In the area marked by the red pin with number 2 of Fig. 5, the old topographic map shows very approximately a few stone circles. Actually, the orography is more complex and richer of archaeological finds. In fact, our exploration of the area identifies at least 15 stone circles in the portion of the plateau corresponding to the map area.

The wadi mouth is very large and covered by varicolored pebbles and cobbles, with many colocynth plants and countless dried gourds (Fig. 4C). Moving inside, after a few kilometers the wadi splits in three. First, we entered the southern branch looking for the single evidence of rock art reported by A. Zboray in 2002 (Zboray, 2009) and the stone circles quoted by Clayton.

This branch is cut in a landscape of red granite peppered with bushes of acacias growing on the sandy deposits of this ephemeral stream (Fig. 4A). After 1.5 km, a rampart of heavily fractured red porphyry holds two petroglyphs of cattle (Fig. 6D), one much worn out by the desert weathering. After another kilometer a climb of the left side of the valley takes us to the top of the plateau. It is a flat, narrow mesa squeezed between the south and the central branch (Fig. 6E). The place ensured a strategical control over both valleys when this region was inhabited in the prehistory. The ground is covered by *desert pavement* with rare artifacts here and there and, as already said, at least 15 stone circles. Their diameter varies from 180

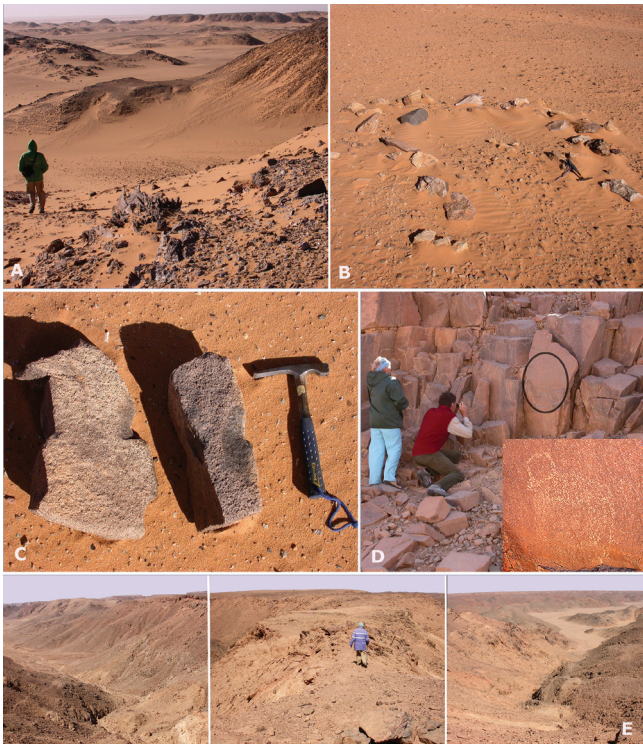


Fig. 6 - A) Landscape of Area 1 looking south. / Vista dell'Area 1 verso sud. B) Example of stone circle with the opening to the south. / Uno dei cerchi di pietre con aperture verso sud. C) Tethering stones. / Pietre da cattura. D) The rock panel with two engraved cows. / Pannello su parete di roccia con figure di vacche incise. E) Narrow passage on top of the plateau, between the two branches of Wadi Handal. This is the area with most stone circles documented so far on the plateau. / Stretto passaggio che separa le due testate delle vallette laterali di Wadi Handal. In quest'area è stato documentato il maggior numero di cerchi di pietre sull'altopiano.

to 260 cm and almost all have one or more big stones in the center (Fig. 7A). The circles are more numerous along the southern edge of the mesa and increasingly rare moving west along the northern edge. Only one stone circle is securely attributable to the Pleistocene, as it contains Middle Stone Age artifacts made from the local fine sandstone. A small biface, debitage pieces and some scrapers made of sandstone or quartz have been photographed. The sandstone outcrops on the mesa, while the quartz comes from thin veins in the vicinity, where traces of exploitation are still visible. Along the ridges a number of animal paths cut through the slopes and dung and urine of Barbary sheep show up inside a rock shelter. Having found a large path (human?) going down to the other side of the ridge, we decide to follow it: the course is steep, winding between big cobbles of granitoids, porphyry and gneiss and leading directly to the valley floor (Fig. 6E, left).

Next target of our field survey is the main branch, i.e. the central one, paralleling the ridge just visited. Our trail starts where the car cannot proceed any further because the riverbed becomes too rough. The wadi walls are porphyritic, while the alluvium is made up of beautifully colored gravel.

A large grinding stone is standing by the dried stream bed (Fig. 7B). It is a very carefully dressed artifact, with pecked transversal lines to improve the grinding action.



Fig. 7 - A) A stone circle of Area 2, along the edge of the plateau facing Wadi Handal. / Cerchio di pietre dell'Area 2 lungo il bordo dell'altopiano sovrastante Wadi Handal. B) Sandstone grinding stone. / Macina in arenaria.

After the first stretch covered by big fallen boulders and alluvia deposits, the trail becomes a well traced path going up the valley (Fig. S4). The valley walls, though smooth in places, do not show any occurrence of engravings. Some stone circles dot an ancient alluvial terrace. The path reaches the top of the plateau, where a well-defined pass still marks the passage to the western side of the relief (Fig. 8A). The downhill path is clearly visible and continues steeply toward the valley below (Fig. 8B), which we will describe later as Area 5.

In the strong daylight, the view on the plateau and its valleys is fascinating: the colors of the rocks vary from dark green to red, providing a sharp contrast with the blue sky and the yellow sands in the background. The view extends as far away as Jebel Babein, an intrusive “ring complex” across the Libyan border.

Some stone circles and semicircular shelters lay in the vicinities of the path. One oval-shaped structure is rather large (4x3.4 m). A few flakes, artifacts and undecorated pottery sherds are spread on the desert pavement. In our field notebook the valley is referred to as “Through Valley”.

### Area 3

The next step of our exploration of the eastern flanks covers the area already visited by Clayton in 1932. In fact, once on the flat summit, we come across his tire tracks still impressed into the gravelly surface (Fig. 9A). In this area the sedimentary cover (sandstone and, locally, conglomerate) overlies a weathered, eroded granite outcrop with its typical hips of rounded boulders (Fig.S5, left).



Fig. 8 - A) The well-defined mountain pass. / Passo di montagna ben evidente. B) View of the western valley (Area 5) from the pass. The downhill path is visible on the left. / Vista sulla vallata occidentale (Area 5) dal passo. Il sentiero di discesa è visibile sulla sinistra.

At the contact between the two rocks an alteration belt is present (Fig. S5, right). Archaeological evidences are of various kinds: stone circles, tumuli, Paleolithic and Neolithic artifacts with cores and microliths. Quartz, quartzitic sandstone, volcanic rock, jasper are the raw materials used for the tools.

The stone circles are numerous and of different dimensions but always with a central stone inside. Especially intriguing, is a structure with a crescent-shaped white stone in its center (Fig. 9B). A widespread typology of stone structure, common in Wadi Abd el-Malik and the Gilf plateau but rarer in the Unnamed Plateau, is the heavy stela fitted in the ground shown in Fig. 10. A few occurrences show up on this low relief area, possibly a sort of sacred place (shrine) or a cairn or *alam* (in Arabic), an orienteering mark visible from a distance of more than 1 km on these flat, sandstone highlands of the desert. Similar cairns are reported by Bagnold in his surveys on the Gilf Kebir Plateau (Bagnold *et al.*, 1938: 284).

#### Area 4

A fourth area of interest along the eastern boundaries is located at the foot of a conic hill towering the alluvial plain close to Peter & Paul twin peaks (Fig. 5: 4).

The hill is of volcanic nature; its slopes are covered by big rounded and unstable blocks difficult to climb but



Fig. 9 - A) Tracks of Clayton's vehicle. / Impronte lasciate dall'auto di Clayton. B) Crescent-like white stone inside a stone circle. / Pietra bianca in forma di crescente lunare al centro di un cerchio di pietre.

our party manages to reach the top. From there the view spans the whole massif and the wadis draining it, a truly magnificent landscape (Fig. S6).

The top rises 270 m from the bottom of the wadi and consists of tall boulders of a dark green-gray effusive rock. The hillock does not show any archaeological evidences.

On the contrary, the mouth of the small dry stream at its foot hosts a rich neolithic campsite. We proceed to a surface survey, taking several pictures for documentation. The site is a mix of functionally different activity areas: quartz and other raw materials workshops, fireplaces with



Fig. 10 - Fitted stone in an array of smaller stones. / Pietra fitta circondata da pietre più piccole.



bones and pottery sherds, processing places with a massive grinding stone and milling slabs.

Potsherds of different typologies are the prevailing kind of archaeological remains. Besides the many undecorated sherds, some samples show the typical decoration of Khartoum pottery (of Saharan-Sudanese tradition). Worth mentioning are the incised wavy-line decoration (Fig. 11A), the rocker stamp packed dotted zig-zag (Fig. 11B), a rarer, packed zonal, unpatterned rocker zigzag decoration (Fig. 11C), and other decorations (Figs. 11D, E and G).

The tools mostly take advantage of the blade technology as shown in Fig. 11I, L and M: the tools are made of quartzite (orthoquartzite). Broken grinding stones, a heavy anvil obtained from a boulder fallen from the volcanic hill, a bone spatula (Fig. 11F) and small pieces of ostrich egg shells are among the other findings. Interesting enough, the discovery of a set of eleven small stone balls: they must have been kept in a bag, perhaps made of leather,

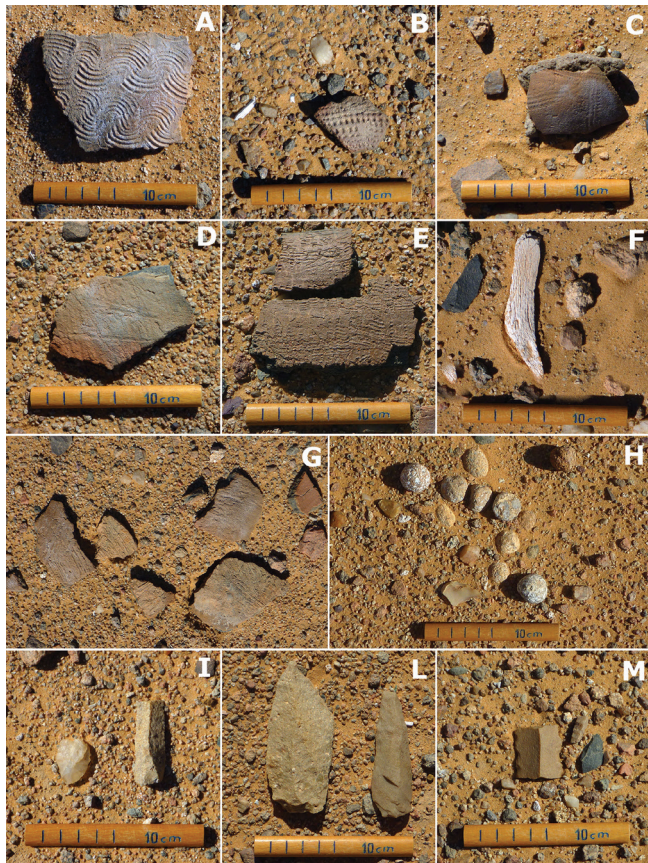


Fig. 11 - Area 4. Pottery sherds / Frammenti di ceramica. A) Wavy-line impressions. / Decorazione a impressioni di linee ondulate. B) Packed dotted zig-zag. / Decorazione con impressioni a zigzag puntinati serrati. C) Rocker packed dotted zigzag zonal and unpatterned. / Impressioni puntinate a zigzag a pettine oscillante zonate e sparse. D) Unpatterned stripe incisions. / Incisioni a strisce irregolari. E) Plant-tempered vessel, with the outer surface smoothed after decoration with horizontal packed dotted zig-zag bands. / Recipiente a degrassante vegetale con superficie esterna lisciata dopo decorazione a zigzag puntinati serrati, in bande orizzontali. G) Thick-walled vessel decorated with scratches after smoothing. / Recipiente a pareti spesse decorato con graffiatura dopo essere stato lisciato. Other artifacts / Altri manufatti: F) A bone spatula. / Spatola in osso. H) Set of small stone balls. / Dotazione di palline in pietra. I-M) Laminar industry. / Industria laminare.

now dissolved (Fig. 11H). This occurrence is not new nor rare in the ancient campsites of the Western Desert. Similar sets of balls have been already found by the authors in the Great Sand Sea and in Neolithic sites around Nabta Playa. The same occurrence is reported by András Zboray (pers. com.) in the Libyan Desert.

Splinters of bones (long and short) are scattered on the ground. Judging from the size of the vertebrae, they could belong to a small mammal.

## Area 5

After circling the southern fringes of the Unnamed Plateau, we explore its western side. Close to our overnight camp we photograph some artifacts (Fig. 12A) and later move them back to their original locations. The set consists of quartz flakes, a triangular point of dark sandstone, a blade of a greenstone, a Levallois point of a white quartzitic sandstone and a greenstone tool.

Quartz is available on site thanks to the numerous veins crossing the granite (Fig. 12B).

We travel on the plain between granite outcrops until the hilly area of the Anatexite Formation. Our plan is to explore the big catchment area of the stream which originates at the mountain pass of the Through Valley and used to flow into a presently fossil lake (Figs. 5: 5 and 13A, B).

This physiographic feature is very extensive and requires a long time for an on-foot survey. All in all, it is 15 km long as the crow flies, with a level difference of 280 m from the lake area and less than 200 m from the very start of the ascent to the top of the plateau: not a difficult task for the ancient people roaming this land.



Fig. 12 - A) Some artifacts found at our camp. / Alcuni manufatti rinvenuti presso il nostro campo. B) Quartz vein in the red granite. / Vena di quarzo nel granito rosso.

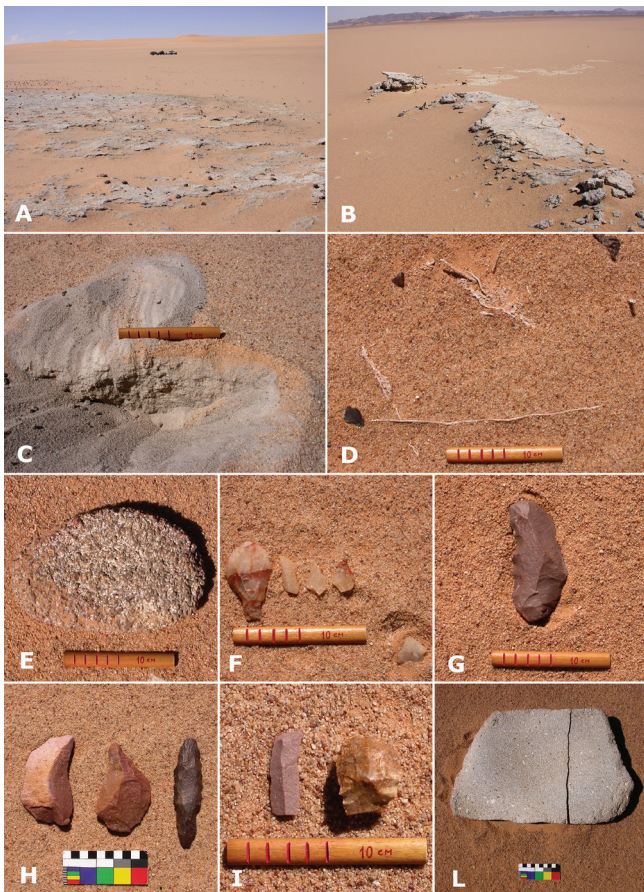


Fig. 13 - A) Bottom of the basin; in the background, the damming dunes. / Fondo del bacino formatosi alla base delle dune; le dune di sbarramento sullo sfondo. B) Cemented sands cropping out at the bottom of the basin. / Sabbie cementate sul fondo del bacino. C) Bleached sand. / Sabbia sbiancata. D) Thin rhizocretions. / Sottili rizoconcrezioni. E) A fine-grained conglomerate grinding slab. / Macina in conglomerato fine. F) Quartz artifacts. / Manufatti in quarzo. G-I) Blade industry on quartzite and a core. / Industria laminare su arenaria silicizzata e nucleo.

First of all, we want to discuss about the lake area at its western mouth. Located during our first expedition to the Small Gilf, it turns out to be an ancient body of water frequented by hunter-gatherers and pastoralists people until its progressive dry out.

Thin, broken rhizocretions dot the aeolian sand (Fig. 13D), a sign that some kind of vegetation (perhaps or typha phragmites) was growing along the ancient shores. Such presence is well known from previous researches both in the Western Desert (e.g., McHugh *et al.*, 1988: 5; Wendorf *et al.*, 2001: 43, Fig 2.31; Peroschi *et al.*, 2021: 131, Fig. 8) and in the sudanese Sahara (Hoelzmann *et al.*, 2001).

The area between the N-S stretching dunes and the former lake bottom is dotted with artifact scatters, some possibly slid down from their original open-air camp sites. Most sites are very small and showing either grinding places or workshops; probably short-time camps of small groups, as already reported by archaeologists in the Western Desert (Kuper, 1993).

At a first glance the quartz-based industry seems to prevail. The quartz has been exploited to produce sets of small tools (Fig. 13F) on blades.

Quartzite was the favorite raw material for the production of strong tools such as side and end-scrapers, denticulates, grinding slabs (Fig. 13L) and mullers but also perforators and blades (Fig. 13G, H, I). A palette (Fig. 13E) was obtained from a fine-grained conglomerate by careful smoothing of its edges (not a local stone, most probably coming from the Gilf Kebir).

The grinding stones (both mill stones and handstones) are more numerous in the upper sector of the slope, all of them broken (an Egyptian friend tells us that a few months before our visit she saw many intact ones, since disappeared).

A workshop site shows three cores with scattered debitage flakes of a grayish quartzite.

Chert, sandstone, a green stone (likely amphibolite) and igneous rocks (trachyte or dolerite) were also exploited for tool production.

At the lake bottom the findings include large flakes and broken grinding slabs of a red sandstone or a porphyritic rock and some quartz artifacts.

Only a few sherds from a single vessel are spotted during our brief survey. Their silty paste appears tempered by fine quartz sand while the walls show vegetal imprints. Small pieces of ostrich egg shells are a common finding.

Bones of a big mammal are scattered on the ground: among others, long bones, two vertebrae etc.

The top of a human skull crops out of the sand, with sherds of Islamic pottery around it. We are told that later on somebody subjected it to radiometric dating which yielded a date around 1000 years BP (K. Khalifa, pers. com.) but we don't know how this figure was obtained.

The exploration of the valley feeding the lake and originating at the pass already described (Area 2), produces other interesting results.

The many rivulets of the past have cut through the steep metamorphic rocks of the Anatexite Formation before merging into a main stream constrained by vertical walls. Where the valley begins to open up, a smooth greenstone rock face (probably amphibolite) is engraved with at least three giraffes; another smaller quadruped is too worn out to be identifiable (Fig. 14A). All animals head to the right, i.e. toward the pass. This is the only evidence of prehistoric rock art discovered so far in the western side of the Unnamed Plateau and the second occurrence in the whole massif.

A short distance away, a big sandstone boulder fallen from the sedimentary cover holds some imprints of a fossil plant (Fig. 14B).

Further downstream, the Anatexite Formation of the basement shows intercalations between two metamorphic rocks (Fig. 14C).

As the valley opens into an alluvial plain, some Holocene evidences of human presence start to appear. We walk among a few stone circles, scattered small workshops and a stone line artificially set across the valley (Fig. 14D); this could be a game trap, a very common hunting feature in the Western Desert of Egypt.

A geomorphological note: a left tributary has indented the thick playa deposits of the upper valley floor, showing up thin layers of sandy silts and occasional stone

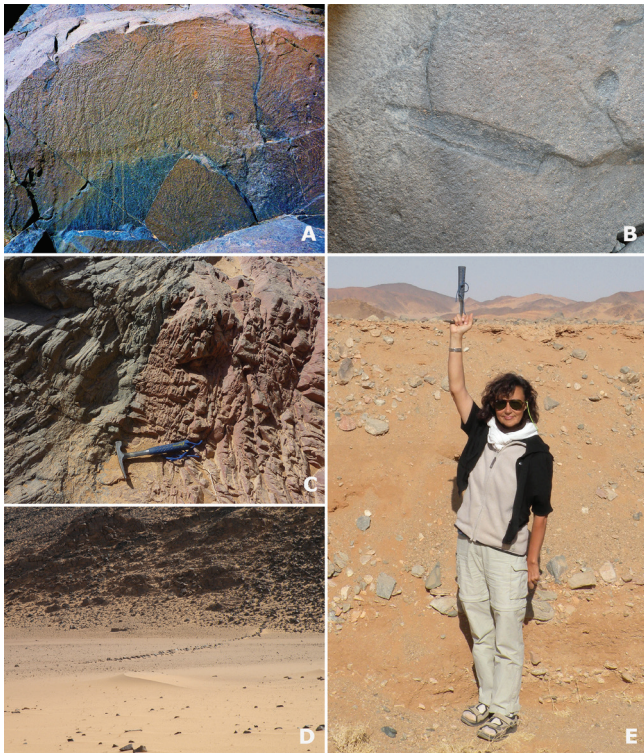


Fig. 14 - A) Rock panel with three engraved giraffes, plus an undefined quadruped, perhaps another giraffe. / Pannello su roccia raffigurante tre giraffe martellate, più altro quadrupede indecifrabile, forse una quarta giraffa. B) Imprint of fossil macroflora, possibly *Cordaites* sp. (30-35 cm). / Impronta di macroflora fossile, probabilmente *Cordaites* sp. C) Contact between two alternating metamorphic rocks pertaining to the Anatexite Formation. / Contatto tra due unità metamorfiche che si alternano nell'ambito della *Anatexite Formation*. D) Stone line crossing the riverbed of a tributary of the western valley. / Allineamento di pietre che attraversa l'alveo di un affluente della vallata occidentale. E) Thick *playa* deposits incised by a tributary; the author for scale. / Spessi depositi di *playa* erosi da un affluente; l'autrice come scala.

fragments (Figs. 5 and 14E). This typology of deposits indicates that the local water body was fed only by rainfall and runoff, with a sedimentation process of short duration.

Judging from the paucity of archaeological remains, this western valley must have been frequented mainly along the lake's western shore or used as a shortcut between the two slopes of the Unnamed Plateau.

## RESULTS AND DISCUSSION

The exploratory surveys carried so far do not give an exhaustive picture of the geology, geoarchaeology and human presence in the Unnamed Plateau in prehistory, but further expeditions were made impossible by the closure of all travels in the Western Desert. Nevertheless, the observations made during our three journeys in the area add new data to the scarce reports covering this remote corner of Egypt and provide some additional knowledge in those fields.

As far as geology is concerned, a more precise and thorough field study of both the Proterozoic lithostratigraphic units and the Phanerozoic sedimentary cover is

missing. As a matter of fact, we have ascertained the presence of pistacite quartz veins within the basement and, more important, of Paleozoic macroflora, thus confirming the indications of the 1981 Geological Map of Egypt. Furthermore, we ascertained that on the sections of the plateau visited by Clayton and by us the sedimentary cover varies remarkably, from siltstone to very fine to medium grained sandstone, to fine conglomerate, probably because of different heteropic facies present in the area. Unfortunately, we had no further chances to explore other outcrops of the sedimentary cover in nearby areas, which would have allowed us to have a more exhaustive picture of the Paleozoic sediments.

From a palaeobotanic point of view, the recovery of a fossil plant is also a notable discovery. Carboniferous (Vissean) flora is well known in the Wadi Abd El-Malik area, further to the north-west (Lejal-Nicol, 1990).

According to András Zboray (pers. com.), our fossil is a *Cordaites* sp. while Šimůnek (pers. com.) points out the difficulty of classifying a specimen lacking preservation of leaves venation and precise size. The fossil has not been measured on-site but it is approx. 30 cm long; therefore, also Šimůnek leans to the *Cordaites* sp. option. These seed plants (gymnosperms) appeared in the Late Mississippian and persisted into the Triassic, when they became extinct.

This finding complements other reports by desert travelers of Carboniferous fossil flora in the peneplains between the Gilf Kebir and Jebel Uweinat (Brügge, 2018).

From the geomorphological point of view, we have reported the existence of a convenient passage through the main structural valley which allowed a quick crossing of the mountain in the east-west direction, from and to the western lake, in prehistoric times.

The lake originated in past humid times thanks to the damming effect of a chain of high sand dunes blown in from the Gilf Kebir (Fig. 13, left). On the basis of Google Earth™ images it is possible to estimate that the catchment area may have covered approximately 200 km<sup>2</sup>. The lake-holding depression is roughly 16 km long, but its real size cannot be evaluated without detailed soundings. It must have had different water levels and extent during its life, following the different regimes of rains. Lacustrine sediments are cropping out in the lowest area (Fig. 13B). From our limited probes, the section looks as follows: on top about 10 cm of a gray sediment of cemented sands, underneath a higher level of green cemented sands, of undetermined thickness.

At present the altitudinal difference between the basin bottom and the crest of the dunes is about 35 m. In the most humid times, the lake level must have reached halfway up the slope as hydromorphic sand shows up just brushing sideways the aeolian sand and consist of alternating thin white and dark gray *laminae* (Fig. 23, left). Hydromorphic sand is known from other areas of the Sahara (Zerboni *et al.*, 2015; pers. obs.).

This lake was probably short-lived, at least in the Holocene; our observations are in accordance with the results achieved in the Neolithic sites around Abu Ballas, between the Gilf and Dakhla Oasis (Kuper, 1993).

Thick playa deposits, located upstream of the lake, are a widespread geomorphic feature of both the Western Desert of Egypt (e.g., Kröpelin, 1987; Kuper, 1993; Wendorf *et al.*, 2001; Hassan *et al.*, 2001; Linstädter & Kröpelin, 2004; Czekaj-Zastawny *et al.*, 2018; Peroschi, *et al.*, 2021) and the Eastern Sahara (Hoelzmann *et al.*, 2001).

From the archaeological point of view, the lithics reported both on the lake shores and in Area 3 seem to indicate a laminar and microlithic industry referable to the Gilf B cultural phase. The pottery is also consistently referable to the Gilf B, probably to the Gilf B1 (pottery with mineral-tempered fabrics) dated 6500-5500 calBC but extending to the Gilf B2 (plant-tempered fabrics) dated 5500-4400 calBC (Kuper & Riemer, 2010).

The campsite of Area 3 is particularly noteworthy, as it appears undisturbed after its abandonment, with artifacts still *in situ*. Interesting enough is the presence of the sherd illustrated in Fig. 13C, rarer than the other cited typologies and presently difficult to date.

As far as the rock art is concerned, the discovery of a rock panel with three engraved giraffes doubles the known sites.

We abstain from speculations about the symbolic role of the giraffe in the rock art currently discussed among scholars; it is not within the purpose of this paper, though we admit that the location of the panel at the beginning of the ascent may hold some special meanings.

Such giraffe representations are difficult to date, having appeared for millennia on engravings and paintings in the Sahara. In the area they show up on shelters and rocky walls of Jebel Uweinat before the pastoralists' cattle, in conjunction with cattle and well after cattle and goat disappeared from the rock art, at a time when hunting was again the main subsistence strategy, thus until c. 2000 BC (Zboray & Borda, 2010; Zboray, 2021).

The other rock art panel in Wadi Handal, with engraved cattle, may date to the Gilf C as, according to Riemer (2013), it is highly probable that the rock art of cattle pastoralists developed during this cultural phase (c. 4400-3500 calBC).

Concluding, the geomorphologic features of the Unnamed Plateau, i.e., its lithological structure and limited height, prevented its use as a highland refuge for Saharan peoples when the increasing aridity dried up the western lake.

The Gilf Kebir populations moved south toward Jebel Uweinat around 4400 BC, where they remained more or less continuously until about 3500 BC, returning to the Gilf only when the occasional winter rains allowed some grazing for their herds (Riemer *et al.*, 2017).

During the following millennia, only Jebel Uweinat witnessed the passage of hunters, caravans and herders from Chad or Libya exploiting the seasonal pastures of the area, which extended to the inner valleys of Gilf Kebir in the most favorable periods of rain.

Probably the man's skull buried in the sand and the animal bones also pertain to those people. Except for such remnants of Islamic age, we have not come across indications of human presence in the Unnamed Plateau after the cultural phase Gilf B (V millennium BC) or, in the

event of a confirmed Gilf C, not later than the mid-IV Millennium BC.

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S1-S6 - Supporting photographs to “The Unnamed Plateau (Western Desert of Egypt). New geological and geoarchaeological data from an exploration in a remote area”. / Fotografie supplementari per “Unnamed Plateau (Deserto Occidentale d’Egitto). Nuovi dati geologici e geoarcheologici da esplorazioni in una zona remota”.