The Constructed Desert: A Sacred Cultural Landscape at Har Tzuriaz, Negev, Israel

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Past and present cultures perceive their natural landscape as an integral and vital component of their complex worlds, while particular landscape features and associated monuments built in selected locales become sacred and revered through stories, legends and rituals embedded in mundane and ceremonial events. The hyper-arid Har Tzuriaz area in the southern Negev, Israel, offers a case study of culture-geographic continuities over a chronologically cumulative archaeological sequence. The large set of well-preserved structures located adjacent to water sources, a massive escarpment and a major desert crossroads includes campsites, cult sites, rock-art sites, cairn fields and one desert kite (a large game trap). Cultural continuities and change can be traced from the sixth millennium BCE through recent times, reflecting a dynamic system of meanings and interpretations of both the natural and the built landscape within one particular sacred area in the desert. These phenomena are exemplified in archaeological analyses of an open-air shrine, burial cairns, an isolated desert kite and a precise engraving of that kite dated 5000 years later, all in the general context of a dense concentration of surveyed sites.

Introduction

The role of landscape in structuring aspects of human culture and behaviour has long been recognized by archaeologists, geographers and anthropologists (e.g. David & Thomas 2008; Knapp & Ashmore 1999). In the contexts of such frameworks as environmental archaeology (e.g. Butzer 1982; Reitz & Shackley 2012), niche construction in evolutionary archaeology (e.g. Kluiving 2015; Smith 2011; 2013; Spengler 2021), and phenomenology (e.g. Johnson 2012; Tilley 1994), the impacts of changing landscapes and the development of sacred landscapes have been discussed and interpreted for several decades. Within this framework, new concepts are introduced; for example, the concept of cultural keystone places, borrowed from cultural keystone species, has been recently developed in order to document and preserve for future generations important indigenous landscapes that are under severe threats of current development (e.g. Cuerrier *et al.* 2015; Rick *et al.* 2022). Sacred landscapes are interpreted as specific examples of how people perceived the many components of their physical surroundings (e.g. Carmichael *et al.* 2013).

In rugged and barren desert terrain, perhaps even more than in fertile lands, people assign meaning to and impose structure on landscape features, both natural and built by them or by previous cultures. Functionally, landscape features and structures mark boundaries and territories, reflect exploitation zones and generally structure activities; ideologically or symbolically, mythologies and cosmologies are attached to landscape features, these too structuring cultural behaviours (Barker & Gilbertson 2000; Rick *et al.* 2022; A. Rosen 2007; Wilkinson 2003). Although archaeologists recognize long-term continuities inherent in cultural landscapes, these

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continuities are only partial, a backdrop to the re-use and reinterpretation of landscape over time, reflecting the new ideological frameworks of each succeeding cultural presence. Beyond the recognition of continuity, parsing out the reuses, revisions and re-meanings in archaeological landscapes may be more difficult.

The cultural landscape of the Har (Mount) Tzuriaz region of the southern Negev, Israel, offers a special case study of such continuities and reinterpretations. A cluster of well-preserved structures and features, located adjacent to water sources, a massive escarpment and a major desert crossroads, including ephemeral campsites, cult sites, rock-art panels, cairn fields and one desert kite (hunting drive trap of which, there are thousands in the arid zones of the Middle East, in various forms and sizes; see Nadel *et al.* 2021 and refs. therein; Fig. 1), reflects cultural presence, continuities, reuse and modification, beginning in the sixth millennium BCE and continuing through recent times.

Surveys and excavations show modifications to shrines, reuse of burial cairns, layers of rock art and a long-term picture of cumulative built features (Galili 2022). The landscape itself acquired multiple cultural meanings, beyond a mere crossing-point along the desert roads. Accordingly, the Har Tzuriaz landscapes, natural and constructed, were of special symbolic importance, marked for millennia by different cultures and integrated into a sequence of traditions with constant change and modification. Here we describe the landscape components of Har Tzuriaz, with several examples of repeatedly used cult and mortuary structures, and then focus on an isolated kite and its unique modelled depiction in a concealed location. On a broader level, this study offers a chronologically based examination of a hyper-arid landscape, which has seen substantially different cultures using the same landscape and the same features, but with distinct traditions incorporating old and new built features.

Our aim is to analyse cultural continuity and change from the sixth millennium BCE through recent times, in order to shed new light on cultural meanings and interpretations of both the natural and the built landscape within one particular desert area. We characterize the natural and built cultural components of the Har Tzuriaz landscape and highlight chronological trajectories in the area by focusing on three built components: 1) cult and mortuary structures; 2) the only kite in the region; 3) a detailed and unique kite depicted on a carefully chosen stone. We then discuss continuity and change as reflected in the constructed sacred landscape and compare the Har Tzuriaz region to several examples where ritual complexes encompass open-air shrines, burial cairns and landscape features in general.

Open-air shrines/sanctuaries (Avner 2002; Haiman 1992) are stone-demarcated, roofless, bounded spaces built in several repeated forms, found across large areas of the Middle East; in the deserts they are commonly annexed to cairns (tumuli) of various shapes used for burial and worship. Such structures have been intensively studied in desert areas and most researchers agree that they were used for ritual activity (Abu-Azizeh *et al.* 2014; Avner 2002: 101–2, 144–8; S. Rosen 2017). Open-air desert mosques in the deserts are similar in appearance and spatial layout to open-air shrines, and it has been suggested that these similarities reflect cultural continuity in the desert (Avni 2007).

The study area

The Negev is situated as a transition between the Mediterranean zone in the north, and the deeper deserts of Arabia and Sinai in the southeast and south (Fig. 1). Precipitation is low, depending on topography and mostly influenced by the north–south gradient and, to a much lesser extent, the monsoon system; in the area of Har Tzuriaz the average annual precipitation is *c.* 30 mm/year. The average daily summer and winter temperatures are 26°C and 16°C, respectively. Accordingly, plant communities are mostly of the Saharo-Arabian and degraded Irano-Turanian types, usually concentrated in the wadis (Danin 1983). Ungulates, a main subsistence source for human populations through the millennia, included gazelle, onager, oryx and ibex; the ostrich was also present in the past (Paz 2002). Domesticated goats and perhaps sheep were introduced in the seventh millennium BCE, and large herds are evident by the sixth millennium BCE, becoming a primary subsistence base for desert inhabitants (Goring-Morris 1993; Landau *et al.* 2020; S. Rosen 2017; for Jordan, e.g. Fujii 2013).

The study area around Har Tzuriaz was surveyed and studied in the past (e.g. Avner 1997; 2002; Avni 1989; Goring-Morris 1993) and recently explored again as part of ongoing projects by Galili, Schwimer and Rosen (Galili 2022). As permanent water sources are scarce, human activities concentrated around them. Accordingly, trans-desert routes were determined by water availability and topography. Har Tzuriaz is an elongated winding ridge, about 4.5 km from east to west; the highest peak is 555 masl, with a vertical, south-facing escarpment of *c.* 150 m (Fig. 1A, C). Nahal (Wadi) Paran forms the main drainage, entering the area from the southwest and breaking east through a narrow gap (the 'Paran Gate') before flowing east to the Arava

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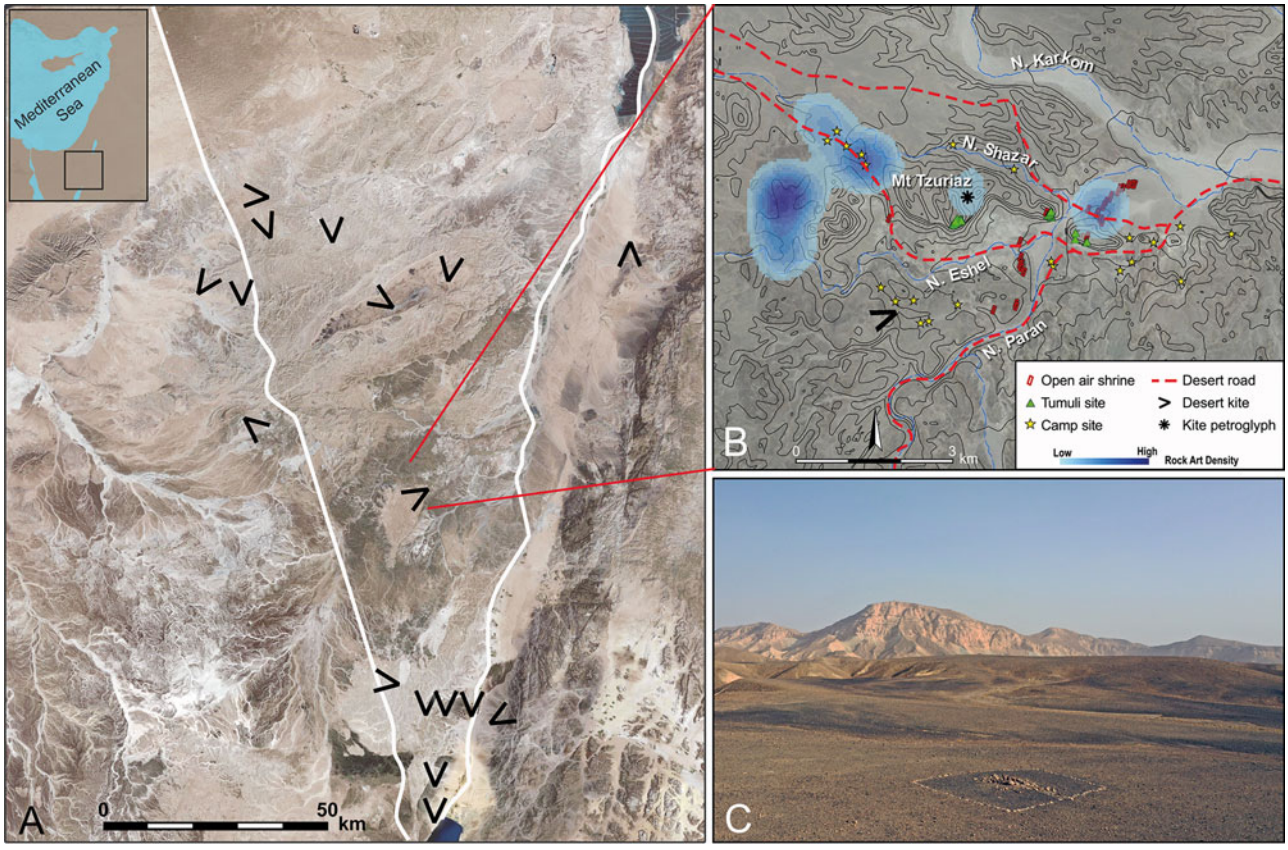

Figure 1. *(A) Location map of the Negev and study area, with all known kites in the area and their orientations (based on a Google Earth image); (B) map of the Tzuriaz area with major natural and built features, showing the desert roads and areas with high density of rock art; (C) the escarpment of Har Tzuriaz as viewed from the southeast, with a small open-air shrine at the bottom of the photo. Note the white cobbles and dark gravel used for construction and pavement; the cobbles were selected for their colour and transported from nearby wadis.*

Valley and the Dead Sea Rift. The 'Paran Gate' constitutes one of the most convenient east–west passages through the mountain range west of the Arava, a topographic gateway to the Negev Highlands and eastern Sinai. Three ancient roads are known to have used this pass in different directions. The combination of unique topography, a natural crossroads and water sources makes Har Tzuriaz and its surroundings an important locus for desert life. For example, the detailed Newcomb map from 1911 (Kadmon 1994; Zohar & Erickson-Gini 2020), a primary source for ancient roads in the Negev since it pre-dates the construction of motor roads, identifies the Tzuriaz Pass as one of the main routes connecting southern Jordan, the Arava and the southern Negev to Sinai and the northern Negev. It is clearly distinct today both in satellite images and in the field.

Human presence in the Negev is well documented from the Lower Palaeolithic onwards (e.g. Ginat *et al.* 2003; Issar *et al.* 1984), with much archaeological evidence for the presence of Neolithic and post-Neolithic cultures in the Negev, Sinai, south Jordan and north Arabia (e.g. Avner *et al.* 1994; Fujii 2013; S. Rosen 2017; Thomas *et al.* 2021). Thousands of camps of various sizes, cairns, rock-art sites, desert kites and open-air shrines have been documented in the southern Levantine deserts. In the Negev, the Holocene cultures include Pre-Pottery and Pottery Neolithic manifestations, the Timnian Culture Complex, and cultures contemporaneous with the Iron Age and later periods in the fertile lands, including Midianite, Edomite/Israelite, Persian, Nabatean, Roman, Byzantine, Umayyad, Abbasid and recent Bedouin sites (Table 1) (e.g. Avner 2002; 2018; Galili & Rosen 2021; S. Rosen 2017). It is important to note here that the Negev is not unique in these features or its long history, but is clearly a part of a larger general Saharo-Arabian desert cultural phenomenon (for parallels, e.g. Eddy & Wendorf 1999; Kennedy 2011; Rollefson 2022; Rosen & Rosen 2018).

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Table 1. *Cultures in the deserts of the southern Levant (after S. Rosen 2017).*

Absolute Chronology	Period	Desert Culture	Notes
Recent			
	Modern	**Ottoman**	infiltration of modern Bedouin tribes
1500			demographic decline
1000	**Middle Ages**	**Abbasid**	
	Early Islamic	**Umayyad**	ruralization, urban decline
500			
		Byzantine	desert urbanization
0 CE/BCE	**Classical Era**	**Roman**	run-off irrigation
		Nabatean	Nabatean Incense Route
500		**Persian**	
		Edomite/	early run-off irrigation?
1000	**Iron Age**	**Israelite, etc.**	introduction of the camel
		Midianite?	intensive copper mining
1500	*Late*		
	Middle		demographic decline
2000			
	Intermediate	*Terminal*	copper trade
2500	*Early III*		
	Bronze Age		
3000	*Early II*	*Late*	sheep/goat pastoral nomadism
3500	*Early I*	**Timnian**	introduction of domestic donkey
4000		*Middle*	
	Chalcolithic		early copper trade
4500			
5000			herder-gathering
	Late	*Early*	
5500	**Pottery Neolithic**		early cult centres, tribal organization
6000	*Early*		early distance herding
6500			
	PPNC	**Tuwailan**	introduction of domestic goats, sheep(?)
7000			
	Late PPNB		hunting-gathering bands
7500	**Pre-Pottery Neolithic**		
8000	*Middle PPNB*		

Materials and methods

The survey of Har Tzuriaz, covering some 50 sq. km and ranging in altitude from 290 masl in the alluvial plains to 550 masl on the mountain peak, was conducted as a part of a larger project (Galili 2022) exploring clusters of cairn fields and cult sites in the Negev. The region of Har Tzuriaz is bounded in the north and south by the ridges surrounding the Nahal Paran drainage basin. To the east and

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Table 2. *Site type frequencies found during the Tzuriaz area survey. The ephemeral camps and single habitation site vary in date from Late Neolithic through recent Bedouin. In the absence of reliably associated artifacts, most cult sites (and other sites such as stone lines) cannot be dated without excavation.*

Site type	Number	Assumed function	Notes
Open-air shrines	31	cult	few or no artifacts
Cairn fields	3	mortuary cult	rare artifacts in tombs
Total cairns	53	mortuary cult	rare artifacts in tombs
Stone circles	612	cult	few or no artifacts
Stone lines	17	cult	few or no artifacts
'Plaza' sites	8	unclear	few or no artifacts
Ephemeral camps	30+	very short-term habitation	ceramic scatters, hearths, no architecture
Bedouin graves	46	mortuary cult	no artifacts, standard Bedouin graves
Open-air mosques	3	Islamic cult	no artifacts
Habitation sites	1	seasonal occupation	ceramics, lithics, architecture
Rock-art panels	216	pastoral graffiti, cult, and more	no associated artifacts

west, the research area has no clear natural boundaries, and therefore they were determined by the landscape prominence of Har Tsuriaz (the ridge, the slopes and the foothills) and the density of archaeological sites, decreasing with distance from the escarpment. The survey was exclusively pedestrian, and site type frequencies are summarized in Table 2.

In the nearby Mount Karkom, some 15 km to the west, Anati surveyed the mountain and its environs covering about 200 sq. km (e.g. Anati 1986; Anati & Mailland 2009) and found a range of site types, including habitation and cult sites. Based on this work, he suggested that Mount Karkom served as a unique sacred place throughout the period he termed the Bronze Age Complex, tying it to biblical accounts (e.g. Anati 2013). Three points are relevant: 1) in contrast to the Har Karkom area, habitation sites are rare in the Tzuriaz area, and most of those present are ephemeral campsites lacking even rudimentary architecture, thus suggesting a functional difference between the two areas; 2) the concentration and density of cult sites around the base of Har Tzuriaz exceeds the density at Mount Karkom; 3) rock art (petroglyphs) is common at both regions.

In fact, such concentrations of cult sites are not unique to Mount Karkom but are found throughout the Levantine deserts (e.g. for the Negev, Avner 2002; Rosen *et al.* 2007; for Sinai, Eddy & Wendorf 1999; for Jordan, Rollefson *et al.* 2022; for Arabia, Kennedy 2011). The Har Tzuriaz region offers a case study of a particular configuration of geography and the built environment, with an emphasis on a variety of cult sites.

Excavations of an open-air shrine, cairns and the kite comprised high-resolution documentation of the sites prior to, during and after the excavation, including drone photography, and the construction of high-resolution 3-D models. Excavation provenance was controlled using a 1 m grid and 5 cm spits. Sediment samples were screened through a 1 mm mesh. Vertical sections were studied for stratigraphy and sampled for OSL dating.

Samples for OSL dating were collected from sediment sections excavated in the tumuli and open-air shrine. The samples from the kite were collected from the base of the two pits excavated in the kite's head, and from a thick sediment section behind the southern guiding wall. OSL dating was carried out on quartz grains extracted from the sediments using established protocols (Stavi *et al.* 2021) (Supplementary material A).

Samples for ^{14}C dating were retrieved from remains found in reliable contexts in the excavated tumuli. Here we include three dates obtained from identified faunal remains from T2 by DirectAMS radiocarbon dating service (https://www.directams.com/) (Supplementary material B).

The rock-art study included a pedestrian survey, a detailed characterization of the panels and a meticulous study of the elements on each panel, including the identification and documentation of patina hues and their relative chronology (Supplementary material C).

Results

The cult and burial sites

The Tzuriaz area is particularly rich in the number and variety of cult sites and ritual complexes. These include three burial cairn fields with 42 cairns, 16

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additional isolated cairns, 30 open-air shrines and ritual structures (including mosques), and hundreds of other installations deployed in clusters around each of the shrines. The cairns are clustered on the three prominent topographic summits, with a variety of ritual structures located on the slopes and terraces at their bases (Fig. 1B). Visual prominence is a clear and distinct characteristic of most of the structures and installations in the area, stemming both from their specific locations and from the conspicuous elements incorporated in them (Fig. 1C).

Of the 30 open-air shrines surveyed in the research area, 10 are characterized by a courtyard enclosed by two or three rows of cobbles sunk into the ground and a massive wall on the west-northwest side of the yard. The longitudinal axis of the walls was set at an azimuth of 6°–20° (cf. Avner 2018; Rosen *et al.* 2007; for south Jordan, e.g. Fujii *et al.* 2012; for Sinai, Miller 1999).

We excavated an open-air rectangular shrine (TS12), located on an alluvial terrace east of Har Tzuriaz (Supplementary material Fig. S1). A tumulus that was built as a later construction on the main wall of the shrine was also excavated, revealing the burial of an adult woman. OSL dates at the base of the main wall of the shrine indicate a date of construction in the sixth millennium BCE, or perhaps even somewhat earlier (samples TRZ-13 and TRZ-14, Supplementary material Table S1B). The OSL age of 1660±270 BCE obtained from sediment in the burial chamber in the tumulus (sample TZR-7; Supplementary material Table S1B) confirms the stratigraphic assessment that the tumulus was constructed much later than the wall. Additional ritual installations were discovered within the compound, including orthostats (*masseboth*), a stone basin, stone circles and stone lines. None could be dated using current techniques. All were constructed from specifically chosen local stones with outstanding colours, an architectural phenomenon that undoubtedly had symbolic meaning (Fig. 1C). Several dozen structures of this type have been surveyed in the southern Negev and Sinai (Avner 2018) and several have been excavated in the past, at Ramat Saharonim in the Ramon Crater (Rosen *et al.* 2007), Wadi Zalaka in east Sinai (Avner 2002, 109–10), and sites in Ḥashem el-Taref, in northeast Sinai (Miller 1999). Dates at these sites range from the early to mid sixth millennium BCE through the early fifth millennium BCE.

Thirteen burial structures of several types and an open-air shrine were surveyed on the eastern slope of Har Tzuriaz, and three of the structures were excavated. The first, a tumulus (T2; Supplementary material Fig. S2), shows three episodes of use: 1) a lower burial at the base of the original structure; 2) a later burial in the upper layers within the burial cist, containing human skeletal remains and teeth and pieces of linen fabric, perhaps a shroud; and 3) a unique assemblage of animal bones placed under stones inside the burial cist, but near its top: these include two ibex (*Capra nubiana*) horn cores, three desert gazelle (*Gazella dorcas*) horn cores, a skull and jaw of a rock hyrax (*Procavia capensis*) and six bones of an unidentified medium ungulate (Supplementary material Fig. S3; Table S2). Episode 1 (the oldest burial) was dated by ^{14}C to 1829–1687 BCE (sample 041010). Episode 2 (the later burial) was dated by OSL to 1020±130 BCE (sample TZR-2), and by ^{14}C to 1261–1100 BCE (sample 041006), the Iron Age (Supplementary material Table S1A, C). The horn cores from the third episode were radiocarbon-dated to 1724–1883 CE (sample 043007), attributable to the recent Bedouin tribal infiltrations into the region.

The second structure somewhat resembles a 'Tower Tomb' (N2; Supplementary material Fig. S4), with a human tooth dated by ^{14}C and sediments dated by OSL to the thirteenth and fourteenth centuries CE, respectively (1370±50 CE; sample TZR-3; Supplementary material Table S1).

The third structure is also a tumulus (T1), excavated by Avni (1989), and excavated and sieved again in the renewed project. A few poorly preserved animal bone fragments and teeth were found, attributable to sheep/goat, gazelle, or ibex.

These examples show the variety of adjacent burial structures used in different periods, and how these structures were re-used intermittently over long periods. In addition to dates falling into periods of Islamic hegemony, Muslim presence is also reflected in several open-air mosques and apparently associated ephemeral camps in the area. Although the mosques have not been directly dated, they are similar to the Early Islamic mosques in the central Negev (cf. Avni 1994).

The Nahal Eshel desert kite

The Nahal Eshel desert kite is of the V-shaped type common in the Negev (Bar-Oz & Nadel 2013; Bar-Oz *et al.* 2011; Nadel *et al.* 2010; 2013), with two built walls (guiding arms, drive lines) converging downhill like a funnel to a small head (Figs 2, Supplementary material S5). The head of the kite is set within a small wadi channel at the base of a series of vertical steps created by a geological fault, and takes advantage of the steep topography and the availability of natural stone blocks for construction. The head comprises a massive round wall. Two

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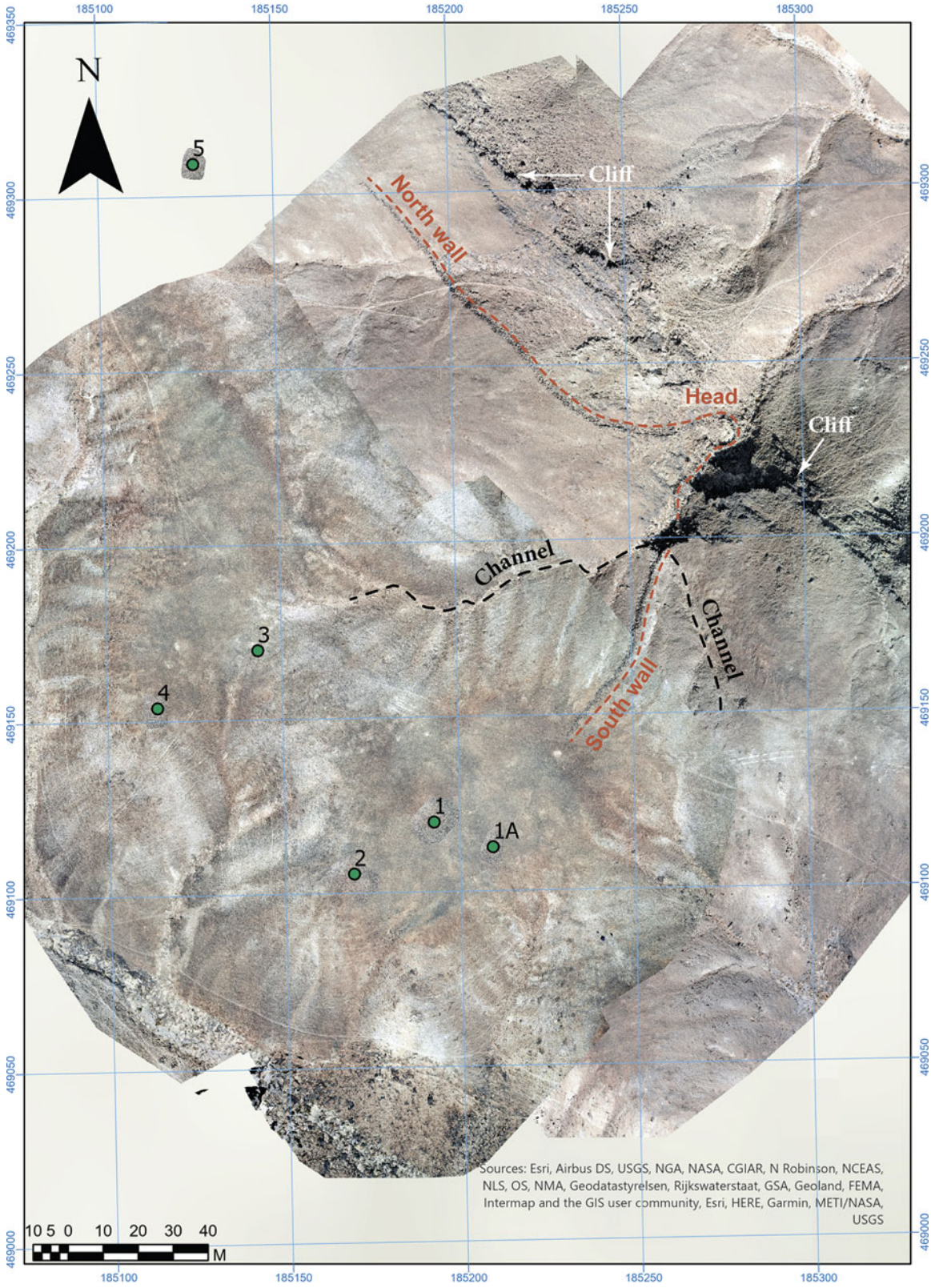

Figure 2. *Orthophoto of the Nahal Eshel kite, with marked stone features.*

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trenches within the head were excavated, showing a preserved inner construction height of almost a metre. Although most of the sediment was fine-sieved, only a few flint artifacts were retrieved.

There are no visible archaeological features within the area between the funnel walls, although there are six small stone features to the west and beyond the arms' ends (Fig. 2). The walls are built of undressed local stones, commonly two–three courses high. Very few collapsed stones are found along the walls, indicating that they were not much higher at the time of use. The southern wall crosses a channel before descending into the head enclosure. Here we excavated behind the wall to study and date the accumulated sediment. No animal bones were found at the site.

The OSL ages from the bottom of Trench A in the head enclosure (5730±480 BCE; sample ESL-6) and near the bottom and behind the southern guiding wall (5460±680 BCE; sample ESL-5; Supplementary material Table S1) are very similar, representing the earliest sediments that accumulated inside the head and behind the guiding wall after their respective construction, thus giving the best estimate of the time of construction (Supplementary material Figs S6, S7) in the early to mid sixth millennium BCE. The OSL ages from the base of Trench B and mid-section of Trench A are 3680±330 and 2110±230 BCE (samples ESL-2 & 1), representing accumulation of run-off debris, as the kite head enclosure was gradually filled by sediments.

The flint artifacts found in the kite head include a heavily patinated tabular scraper and a broken pointed tool (Supplementary material Fig. S8). The first can be attributed to the Timnian Culture Complex, sixth–third millennia BCE, although a more precise assignment is not possible. Tabular scrapers most likely functioned as knives (Manclossi & Rosen 2022).

Rock art

Fifty-two rock-art clusters have been documented in the Tzuriaz survey, encompassing 216 panels that contain 1014 elements (Fig. 1B). The motifs were divided into six groups that include abstracts, zoomorphs, inscriptions, anthropomorphs, varia and unidentified (engravings that could not be defined) (Supplementary material Fig. S9). There is also evidence for post-production modifications such as retouching and renovation of specific elements, and the destruction of others.

The depicted elements in the different panels can be divided into five categories according to the hue of the patina (the rock crust), which is primarily dictated by the density of manganese (Supplementary material C, Figs S9, S10). Only 2.6 per cent of the elements have dark brown or black patination (category 1, the oldest). The elements in categories 2–4 are common and similar in frequencies, while elements with the light-coloured patination, the most recent, are less abundant (category 5).

Using the text inscriptions as a chronological anchor, category 2 includes five inscriptions, four of which are Thamudic, an ancient north Arabic dialect used in the area from the Hellenistic through the late Roman periods (Macdonald 2000), and one is Cufic Arabic, attributable to the early Islamic period (Sharon 1990). The remaining inscriptions are in categories 3–5 and are in modern-day Arabic, or are Bedouin *wasums* (identity/tribal markers). A general trend through time is also evident, with iconographic motifs replaced by non-iconographic, thus zoomorphs and anthropomorphs in the darker (older) categories are replaced by abstract elements in the light-coloured (younger) categories (cf. Eisenberg-Degen & Rosen 2013).

There are three main concentrations of rock art sites around Har Tzuriaz (Fig. 1B). The first is east of Har Tzuriaz, the second is to the west of the main ridge, and the third is along a northern tributary of Nahal Eshel. All three are adjacent to ancient roads or trails, some of which are clearly visible nowadays. One, passing through two of the rock-art concentrations, connects the Paran area with Nahal Shazar, and then continues westwards to the western Negev Highlands and Sinai.

The panel depicting a desert kite is unique and particularly relevant here. It is located in a small wadi within the Har Tzuriaz range, in an area with hardly any rock art. The 70×120 cm stone slab with a single panel encompasses a wealth of elements. It was carefully selected to match, in its proportions and topography, the planned depiction of the kite. Although weighing *c.* 100 kg, the slab was shifted somewhat from its original location, lifted and set in place, supported with a smaller stone giving it a slight inclination to the east with the vertical eastern side of the stone set above the ground (Figs 3, S11).

The hue and super-position of the elements on the panel indicate at least two episodes (layers) of engraving (Supplementary material Table S3; Figs 3, S12, S13). The main motif (the older, category 2) is a desert kite (the guiding walls, Fig. 3, #2, #6) accompanied by what appears to be a hunting blind (Fig. 3, #9). Above the kite there is an ungulate (#10). The younger episode (lighter, category 3) is comprised of three anthropomorphs (#18, #19, #20) in the entrance to the kite; one of them is a male

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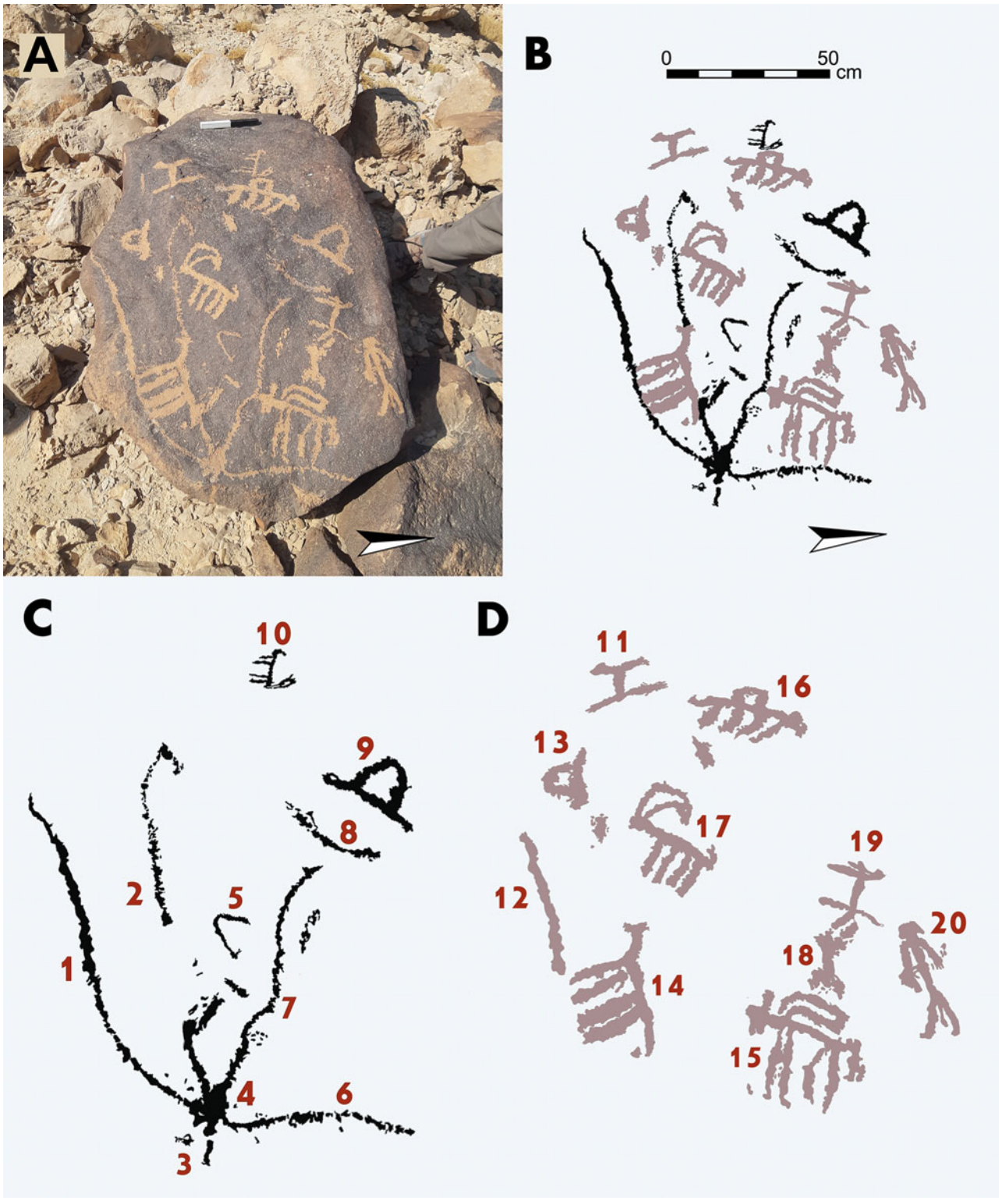

Figure 3. *The Har Tzuriaz rock-art panel with a kite. (A) The panel: top black-and-white scale = 20 cm; (B) Tracing of the elements according to the two engraving episodes: the black is older than the grey; (C) Tracing of the older episode with numbered elements; (D) Tracing of the younger episode with numbered elements. Note that the back of the ruminant (element 14) is indistinguishable from the kite's arm (element 2) and the older line is thus missing in C.*

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with an exaggerated phallus carved in a realistic style, while the other two are schematic figures. A camel, an ibex and two unidentified ungulates are depicted inside the kite. Some of the older elements have been reworked and thus became part of younger elements (e.g. Fig. 3, the back of #14).

The closest known desert kite in the area is the Nahal Eshel kite, some 3 km from the panel as the crow flies. Setting the tracing of the panel on the plan of the kite at the same scale shows high similarities between the two, especially in three main aspects (Fig. 4): 1) the orientation and angles of the guiding walls of the two are identical; 2) the head of the kite is located topographically below the funnel, in a cliff, and the stone was set with a slight inclination to the east, where the vertical side of the stone imitates a cliff; and 3) there are two short channels (shallow wadis) within the area of the kite, both in the field and in the engraved panel. The angles between the walls and the channels are identical, with a wide angle between the northern wall and the main channel, and two narrow angles between the southern wall and the two channels (Fig. 4). We also found six stone features beyond the wide entrance to the funnel (Fig. 2). Features 2 and 4 are stone circles (Supplementary material Fig. S14), located in the engraved depiction approximately in their field position. They may have served as the bases for blinds made of perishable materials, anchors for hunting nets or for flags of cloth waving in the wind to scare the game into the funnel.

Differences seem minor. Thus, the southern channel does not reach the head of the kite; the location of Feature 2 is beyond the funnel while in the engraving it is within it; and finally, the southern wall begins with a hook-like feature in the engraving, with no counterpart in the field. Such discrepancies are perhaps due to the distance of the panel from the kite, and without direct view of it. Also, once some features were incised on the stone, there may not have been enough space left for placing the rest of them accurately. It may also be that the memory of the engraver failed in several details. Another option is that some features were not made of stone (nets, perishable stakes/posts, etc.) and thus were not preserved in the field. Of note is that discrepancies between kites depicted in rock art and the postulated function of kites have been detected for the engraved stone from the Cairn of Hani' (Harding 1953) and the Har Michiya engraving (Eisenberg-Degen 2010, and see discussion there). Addressing a similar issue, Chambrade and Betts (2021) review general differences between ethnographic eye-witness accounts and the archaeological records of kites in Syria, Turkey and Iraq.

Importantly, the Nahal Eshel kite is unique in its wide asymmetrical funnel and the cliff to the east; there are no similar kites in the region. Thus, the documented resemblance of the kite and its representation is remarkable and unequivocal. It seems that the depiction was part of an accurate model of this kite, incorporating the topography of the slab and the vertical eastern side imitating the kite's cliff.

Discussion

The constructed landscape of Har Tzuriaz

Har Tzuriaz served as a major crossroad in the desert due to its geographical location and characteristics, accompanied by a steep escarpment visible from afar. People living in the area, or passing through it, built a wide variety of sites through the millennia. Many were used, reused, or modified more than once, intermittently or in a continuous manner. These phenomena emphasize the significance of the place over a long span of time.

Human presence here was most likely seasonal or ephemeral, and undoubtedly in large part related to trade and pastoral seasonal migrations. Possible spatial associations between cult sites, ephemeral camps and camp sites have been discussed for both the proto-historical periods (e.g. Abu-Azizeh 2013; Abu-Azizeh *et al.* 2014; Galili 2022, 287–8) and in the early Islamic period (Nevo 1985; Sharon 1990); it has been suggested that the associations reflect seasonal migrations, seasonal trade and periodic pilgrimage.

The resultant visible and enduring anthropogenic imprints on the local landscape can be divided into three main categories. The first is desert roads, in the form of clusters of trails following the same routes for many millennia, even if used only intermittently. The second type comprises various stone constructions such as tumuli, cairns, open-air shrines, camps and other features. Among these, the Nahal Eshel kite is by far the largest single construction. These, together, reflect a cumulative constructed landscape, preserved with their structural elements, to a great extent intact, for thousands of years. The third imprint, the rock art, is less conspicuous from afar, although the location of major concentrations or particular elements are far from random. Together these three imprints form a multilayered cultural landscape, with the oldest constructed sites dating to the sixth or seven millennia BCE and the youngest to recent times.

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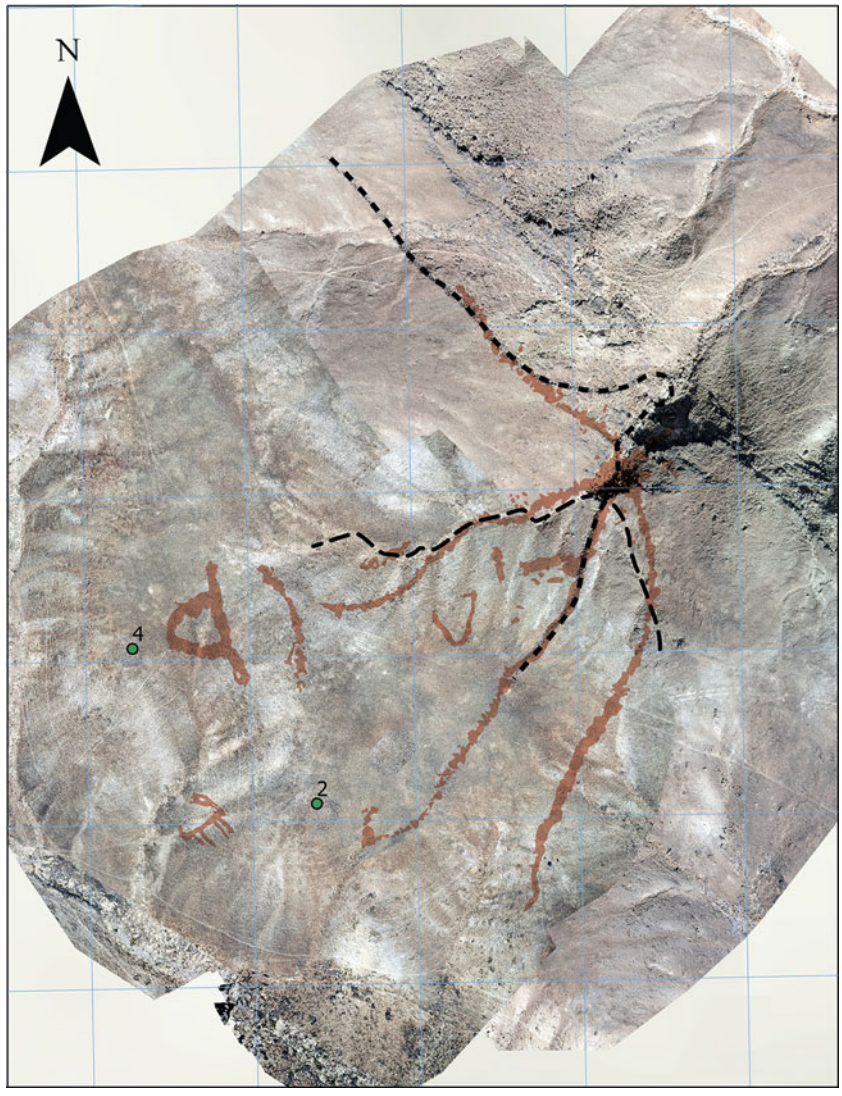

Figure 4. *Tracing of the kite depiction and similarly patinated elements (brown) set on the aerial photo of the Nahal Eshel kite (dashed black). Note the resemblance in the orientation and angles between the long lines. We used the angles between the arms and wadis for scaling and overlaying the images.*

Milestones in the evolution of the constructed desert: phases of use, abandonment and change of function

Long-term perceptions, memories and beliefs are evident in a range of site types composing the constructed landscape in the Tzuriaz area and elsewhere in the Middle East deserts (e.g. Fradley *et al.* 2022; Haiman 1992; Hill *et al.* 2020; Thomas *et al.* 2021). Examples according to the types of construction and imprint are discussed below.

Cairns, of various types, are perhaps the most common and conspicuous component of the constructed desert landscape. This is due to their physical height and abundance, with many thousands found in the Negev (e.g. Haiman 1992). They were commonly built on ridges or prominent locations, visible from afar and with excellent visibility of their surroundings (Galili & Rosen 2021). When studied in detail, it is common to find phases of use, abandonment and changes of function in individual structures. Thus, tumuli were opened and modified inside, with a newly constructed chamber, or by other means, and then used again for burial or for stashing animal horn cores, as in the case of T2 in the Tzuriaz area where there are three episodes of use (Fig. 5). This is evident in other sites in the Negev. For example, tumulus 28 at the Ramat Saharonim complex (Rosen *et al.* 2007) in the central Negev was used for burial in two distinct periods separated by *c.* 5000 years. The cairns at Ramat Tamar 1 in the northeast Negev show clear long-term use, from the base of the cairn through layers within the accumulated loess inside the burial cist, reflecting changes in mortuary behaviours such as placement of burial goods (Galili & Rosen 2021). These are but a few of many examples; they show multiple burials at different times in the same structure, both within a

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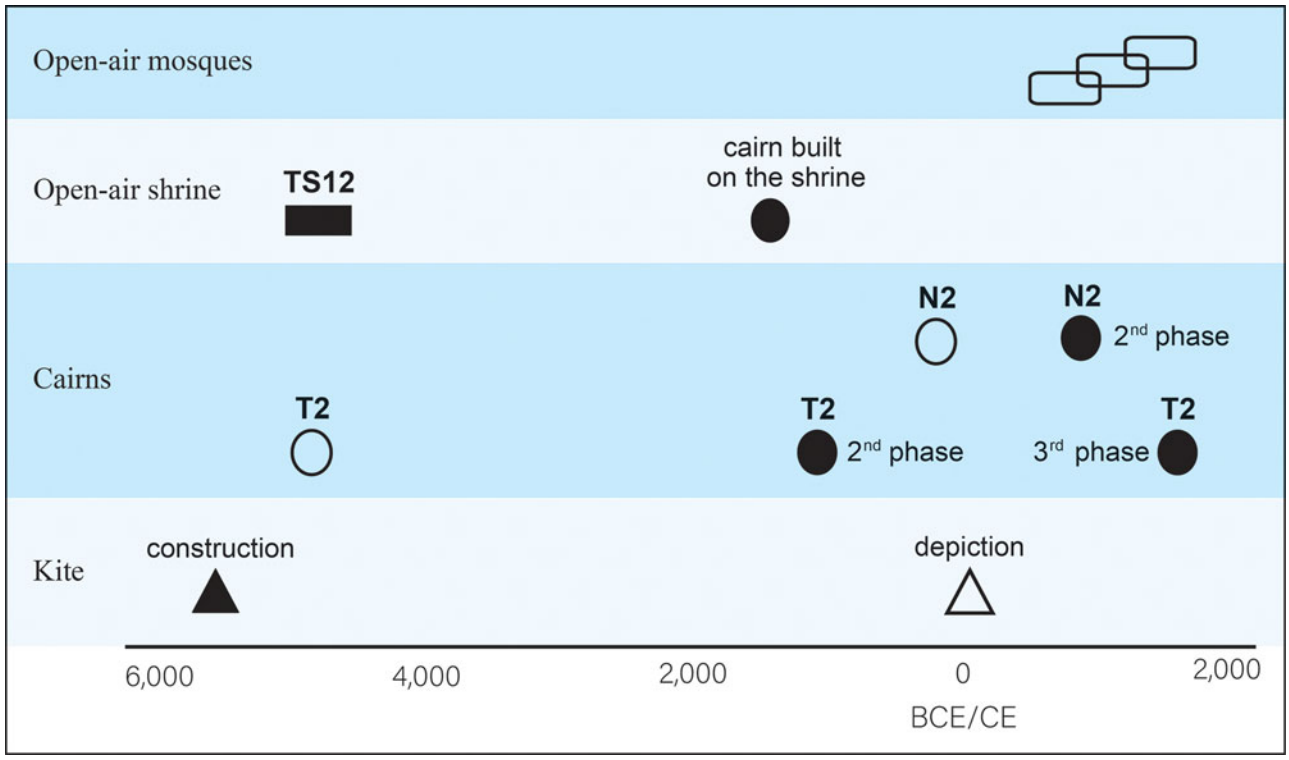

Figure 5. *A chronological chart with the identified construction phases of the studied sites in Har Tzuriaz. Bold symbols = radiometrically dated sites or phases; open symbols = no direct dates are available and thus their chronological assignment on the chart is only schematic and relative: they are earlier, and perhaps much earlier, than the dated phases in T2 and N2. The depiction of the kite was dated by relative chronology of rock art (see text). The open-air mosques could not pre-date the seventh century* CE.

single cultural sequence as well as by different cultures with different practices (Galili & Rosen 2021; Haiman 1992; Rosen *et al.* 2007).

Notably, cairns in the Negev are commonly found on top of other structures, or associated with them as contemporaneous or later additions. This is true for open-air shrines such as the TS12 example in the Tzuriaz area (Fig. 5). The case of the Eilat burial complex is also relevant. Here, several of the 20 burial cairns contained human remains, one with the secondary burial of six human skulls; two small open-air shrines were integral elements of the complex (Avner *et al.* 1994; Eshed & Avner 2018). ^{14}C dates cautiously suggest use of the complex for about 1200 years.

Cairns have also been found on kites such as Jabel Hamra in northeast Sinai (on one of the guiding walls: Eddy & Wendorf 1999; Kobusiewicz 1999), Samar West A (at the bottleneck of the kite, above the head: Nadel *et al.* 2010) in the Arava, and probably at Achshuv (not excavated, possibly at the bottleneck towards the head: Nadel *et al.* 2021) in the Negev Highlands. In these cases, it is clear that the cairns were built on the previous structures, and at least in some cases (the kites cited here) ending the original function of the structure and using it as a burial place or at least as a symbol on the landscape reflecting the kite's new status.

As stated above, the kites are huge constructions and larger than any other structures in the desert. It has been suggested that their size and complexity were meant to reflect monumentality, as sometimes they were larger than the functional needs and thus 'an expression of status, identity and territoriality' (Fradley *et al.* 2022, 10). The kites were territorial expressions during their use, and the construction of tumuli on them reflects symbolic continuity even after their abandonment as hunting devices.

Open-air shrines represent the remains of ceremonies, spiritual traditions, beliefs and historical memories of desert peoples. These structures are sometimes low, not more than one course high (Fig. 1C), although in certain cases their main wall was at least 1–1.5 m high (Rosen *et al.* 2007); they were not always visible from afar on flat or slightly

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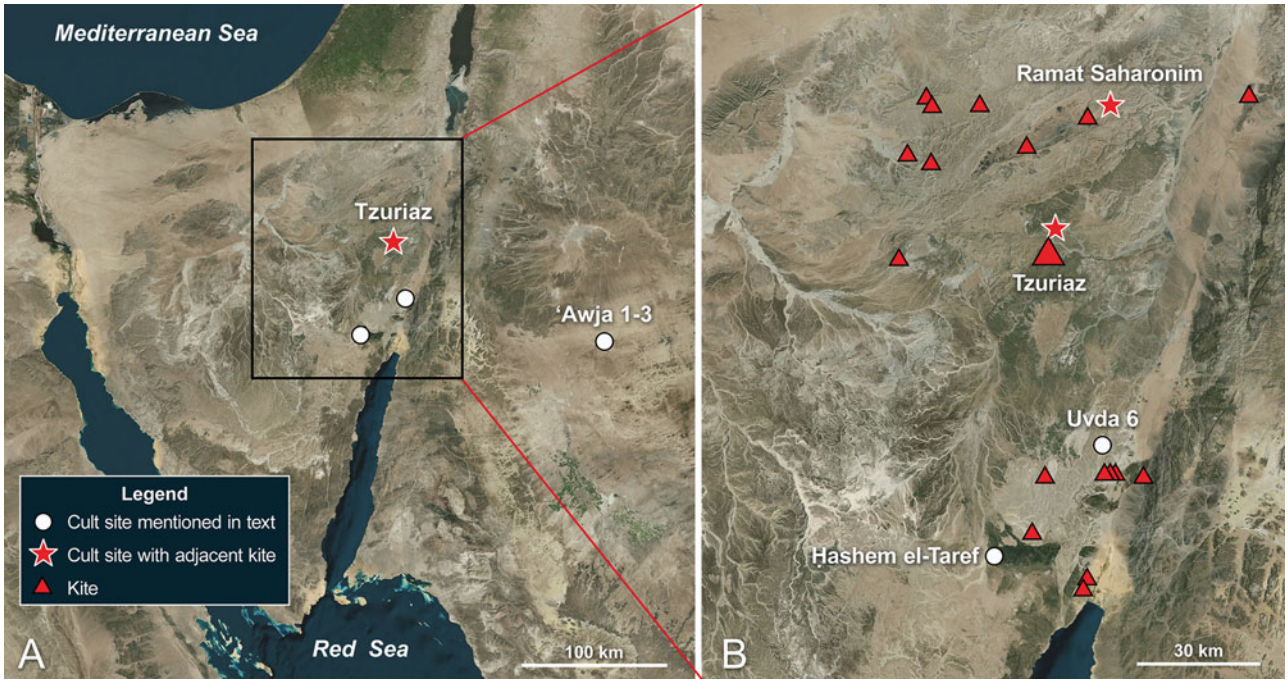

Figure 6. *Map of the Negev, Sinai and southwestern Jordan deserts, showing locations of cult sites, and cult sites with adjacent kites mentioned in the text. Note that there is an impressive escarpment at Har Tzuriaz and Ḥashem el-Taref, as well as near Ramat Saharonim. The three are located on major desert roads.*

undulating terrain. They have a wide range of shapes and sizes, and the use of several types of distinct stones for specific structural components is common (Fig. 1C). These sites also frequently show phases, additions and changes in plan (Rosen 2023). As examples, there are two construction phases at each of the four Ramat Saharonim open-air shrines (Miller 1999; Porat *et al.* 2006), and there are several construction phases at 'Awjā 3 in south Jordan (Fig. 6) (Fujii 2013; Fujii *et al.* 2012). Interestingly, three ceremonial sites include feline geoglyphs: 'Awja 3 (Fujii *et al.* 2013), Ḥashem el-Taref (Avner 2002, figs 5.18, 5.140–41; Banks *et al.* 1999), and the 'Uvda shrine of the leopards (Yogev 1983) (Fig. 6).

The direct association of open-air shrines and kites is not trivial. Within the Negev and Sinai deserts (Figs 1, 6), kites are usually not found directly associated with concentrations of cult sites. In this regard, the setting of the Nahal Eshel kite is unusual, with a wide variety of open-air shrines, cairns and other cult sites located within a radius of a few kilometres from the kite. Another example is the small Harut kite, in the Ramon crater (Negev), found only about 1 km from the Ramat Saharonim Neolithic precinct (Porat *et al.* 2006; Rosen *et al.* 2007), and the nearby Mount Ardon 200 m high vertical cliff is visible from both the precinct and the kite (but the latter two are not visible from each other). A third case with many open-air cult sites and cairns near a vertical cliff is the Ḥashem el-Taref site in northeast Sinai (Fig. 6), although the nearest kite is about 20 km away (Avner 2002, 100–101; Eddy & Wendorf 1999, 189–91).

Of note, out of 12 kites in the Negev, the Nahal Eshel kite is the oldest dated kite (Holzer *et al.* 2010; Nadel *et al.* 2021) and the most isolated. It is found between two loose clusters of kites, those in the Negev Highlands (the nearest about 30 km away) and those in the southern Negev/Arava (the nearest about 55 km away) (Fig. 1A).

Rock-art depiction of kites: distant memory or first-hand experience?

The interwoven combinations of structured landscape features also include, apparently in rare occasions in the Negev and Sinai, kites and rock art (Eisenberg-Degen 2010; Hershkovitz *et al.* 1987). Desert kites were known and used throughout millennia, and their function—harvesting ungulates—did not change. The kites served to catch the animals, either for mundane consumption or for ritual feasting. However, cases where there is depicted evidence associating kites with use in different periods in the same area are rare. The first such case ever published

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is an engraved stone found in association with the burial cairn of Hani' in eastern Jordan (Harding 1953). The depiction on the stone includes a corral-type kite, several ungulates—most likely gazelles—driven into it by human figures, and an incorporated Safaitic inscription that dates it to the Roman period.

Within a radius of 5 km from the Hani' cairn, there are many more cairns and tens of kites, as well as other stone-built structures (Kennedy 2012, figs 7, 8). It has been suggested that kites in east Jordan were first constructed as early as the seventh millennium BCE (e.g. Abu-Azizeh *et al*. 2021; Betts & Burke 2021; Crassard *et al.* 2022a,b), although many kites in southwest Asia were probably constructed only during the Early Bronze Age (Abu-Azizeh & Tarawneh 2015; Holzer *et al.* 2010; Nadel *et al.* 2021). Whichever is the case for the kites in east Jordan, the depiction of a kite on the cairn of Hani' stone seems to be thousands of years later than the period of construction. As is the case for Har Tzuriaz, two interpretations seem reasonable: the depiction reflects a distant memory or describes an event witnessed by the engraver. Recent work in the Wisad Pools area in east Jordan has provided more examples of the corral-type kite depicted on boulders; however, they have not been radiometrically dated (Hill *et al.* 2020).

In the Tzuriaz area, the engraved kite is a remarkably precise rendering of the Nahal Eshel kite. As such, it is an unusual case where a specific kite was engraved on a rock surface. Furthermore, the location of the kite panel is intriguing, as it is not on a main road, not on a summit, nor in a place from which the kite is visible. The stone is too heavy to suggest that it is not in the original location where it was engraved; the orientation is parallel to the kite and the topography of the stone mimics that of the kite.

We suggest that the depiction reflects some kind of hunting ceremony, as is common in the ethnographic, ethno-archaeological and archaeological records (e.g. Brown 2009; Hill 2011; McCreedy 1993; Zeder *et al.* 2013). The addition and renovation of certain elements are reflected in patina variability and may suggest more than one event focusing on the kite. Alternatively, although less likely, the modelled kite may have been used as a functional apparatus, for instructing the hunting participants how to operate the trap. It should be noted that the engraved stone was set away from the kite, in a secluded place where dozens of people could gather around it for functional or ceremonial purposes. Furthermore, the depiction of desert kites in the Negev and Sinai is rare (see below), and the vast majority of rock art consists of various animals, anthropomorphs, or abstract symbols. The kite engraving would then seem to reflect a different function than the common rock art in the region. Thus, the specific selected location of the stone and the symbolic depiction it conveys, set within the sacred mountain and surrounded by the many shrines, cairns and rock-art sites, apparently reflects an important and special component of a past culture.

However, it is difficult to place the depiction in related cultural context. Taking time depth into consideration, many of the rock-art panels in the area are roughly from the Classical period and they are located along or near the main desert roads; the depicted kite is also of the Classical period, according to patination hues (categories 2 and 3). Thus, the Har Tzuriaz kite reflects millennia of landscape perception and memory, from the kite construction in the sixth millennium BCE through the engraved panel about 5000 years later (Fig. 5).

Although rock-art panels are very common in the deserts discussed here, they mostly depict selected animal species, abstract forms, anthropomorphic figures and, in later periods, camels (and camel riders) and inscriptions (Anati 1999; 2015; Avner *et al.* 2017; Charloux *et al.* 2022; Eisenberg-Degen & Rosen 2013; Eisenberg-Degen & Nash 2014; Schwimer & Yekutieli 2021). Rock-art depictions of kites are rare, and seem not to be specific to a particular trap (e.g. Hill *et al.* 2020). In the Negev and Sinai, for example, out of many thousands of documented rock-art panels, there are only two published depictions of kites. One in south Sinai presents a simple schematic kite (Hershkovitz *et al.* 1987), and one in Har Michiya in the Negev depicts two schematic drive lines with associated animals (Eisenberg-Degen 2010); there is a handful of kite depictions in Wisad Pools (Hill *et al.* 2020) (Supplementary material Fig. S15A–E) and other locations in the vast expanses of east Jordan and Syria (e.g. Betts & Burke 2021; Betts & Helms 1986). The depiction from Har Tzuriaz is of particular interest; it is very detailed, and it clearly and precisely portrays the nearby Nahal Eshel kite. Such a rare combination, where a rock-art panel accurately portrays an adjacent kite is, in the meantime, unique, especially as it was engraved and modelled an actual kite thousands of years after the kite was built.

Not only is the Har Tsuriaz kite depiction rare in its specifics: it pertains to the most isolated kite in the Negev (Figs 1, 5). Obviously, the depiction reflects intimate knowledge of kite function, a first-hand experience of its use for hunting, and thus it may have been the focus of related pre- or post-hunt ceremonial events.

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Conclusions

The Tzuriaz area includes sites dated from the sixth millennium BCE through various phases of the Timnian Culture Complex, cairns used during Late Bronze and Iron Ages and rock art dated to the Classical era, two open-air mosques to be dated to the late first millennium CE or later (reflecting a totally new cosmology also accompanied by inscriptions in Arabic). These sites indicate repeated use of the area, seen in the construction of a varying set of stone features that reflect changing traditions, beliefs and religions of desert peoples. During the evolution of desert cultures through the millennia, the spiritual significance of Har Tzuriaz persisted due to a combination of the geographical and topographical settings and the crossroads of desert migration and trade routes.

This evolving constructed landscape acted as a mnemonic thread, preserving themes and motifs as cultures changed, but maintaining the underlying continuities. The Har Tzuriaz area provides a rich case study as one of the largest concentrations of ritual complexes in the deserts of the southern Levant, encompassing open-air shrines, cairn fields, hundreds of other built sites and abundant rock art. Archaeological studies indicate that many of the structures were built, used, modified, re-used repeatedly or intermittently and restructured in different periods. Rock-art panels, too, show evidence of repeated use and modifications on the same panel and sometimes even of the same motif.

Within this general framework, the place of hunting and seasonality appears to have been pivotal for the desert cultures from the Early Holocene onwards, and the kite and its depicted model reflect the importance of these aspects. An operating kite is not only a meat provider; it is also a monumental territorial symbol. It indicates seasonal communal gathering and hunting, undoubtedly with the ceremonial accoutrements that accompany such gatherings, all within hyper-arid desert conditions where adaptation to seasonal fluctuations in resources is essential for survival. Thus, the variety of structures and cultural remains presented here reflect not only the local long-term continuities in the use and reverence of the natural and constructed sacred landscape, but also cases of cultural modification and re-interpretation, with focus on spiritual life on the one hand and seasonal game harvesting on the other.

The ever-growing body of aerial and field survey results in the deserts of the Middle East provides a detailed picture of varied structural remains away from the cultural centres in the fertile lands. Focal areas in the deserts, such as the Har Tzuriaz example studied here, are apparently numerous, and of scales almost unimagined previously, especially by experts studying cultural processes in the fertile lands. The specifics of these structural complexes and their landscape settings have yet to be fully analysed, and places where the constructed desert was—and still is—a sacred cultural landscape deserve particular research attention.

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Supplementary material

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Steven A Rosen is the emeritus Canada Chair of Near Eastern Archaeology at Ben-Gurion University. He received his doctorate from the University of Chicago. He has excavated numerous sites in the Negev, ranging from prehistoric through modern times, focusing on the pastoral societies of the region. His has also pioneered the study of stone tools in the Metal Ages. Recent books are *Revolutions in the Desert: The Rise of Mobile Pastoral Societies in the Negev and the Arid Zones of the Southern Levant* and *Flint Trade in the Protohistoric Levant* with Francesca Manclossi.

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