PRELIMINARY REPORT ON THE WĀDĪ ḤAFĪR PETROGLYPH SURVEY, 2005-2006, WITH SPECIAL COMMENT ON THE DISTRIBUTION OF SELECTED THAMUDIC E / ḤISMAIC INSCRIPTIONS AND ROCK DRAWINGS

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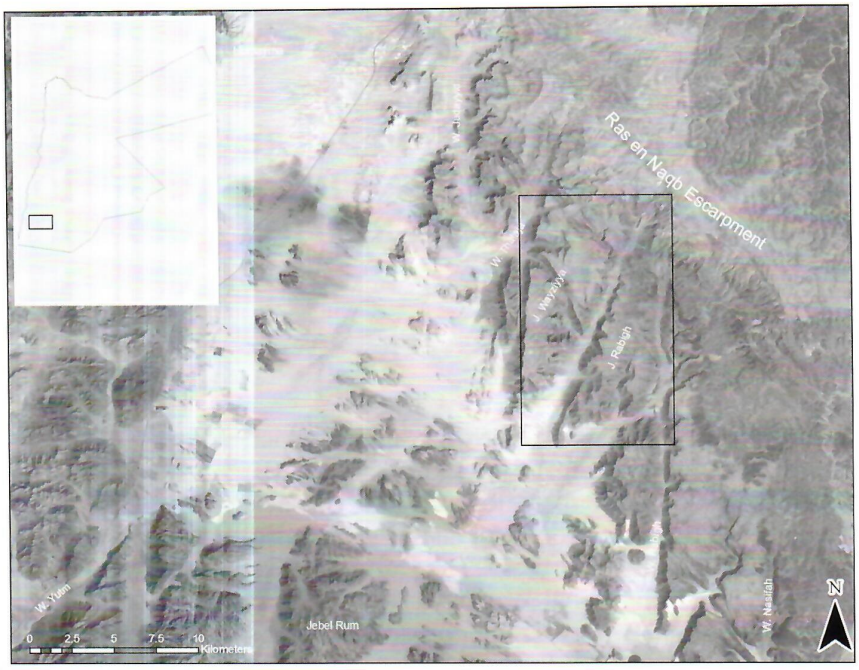
The Wādī Ḥafīr Petroglyph Survey (WHPS) was conducted over the course of three, two-week sessions from October 2005 to April 2006. Field work was funded by research grants from the American Center of Oriental Research and the Council of American Overseas Research Centers, with the formal approval and recognition of the Department of Antiquities and its then Director General, Dr. Fawwaz al-Khraysheh, to whom I am most grateful. The project was ably assisted in the field by departmental representatives Ahmad al-Shami, Manal Basiouni, and Suleiman al-Shuqairat, as well as by the author's wife, Elena D. Corbett, Ph.D. During field work, the project was based in the Zawaydeh Tourist Camp located near the village of ad-Dīsī.

The WHPS had two primary aims: first, to revisit and re-record petroglyph and ancient rock carving sites in the Wādī Ḥafīr recorded by the late William Jobling of the University of Sydney during the 'Aqaba-Ma'an Archaeological and Epigraphy Survey (AMAES), 1979-1990; and second, to determine if these Jobling sites, as well as newly-recorded petroglyph sites, show any meaningful patterns of spatial distribution, both in terms of their locations and their epigraphic and artistic content. The latter goal was accomplished and facilitated through the development of a Geographic Information Systems (GIS) database of site locations, which ultimately formed the basis of the author's dissertation on the distribution of Thamudic E/Ḥismaic inscriptions and rock drawings in the Wādī Ḥafīr (Corbett 2010).

Overview of Topography, Climate, and Hydrology

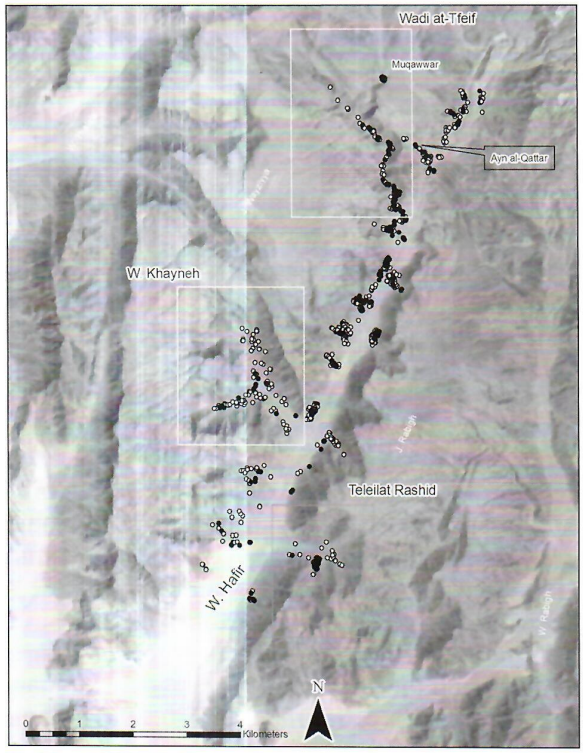
The steep-sided Wādī Ḥafīr gorge is a long and narrow canyon which stretches approximately 18 km from the Rās an-Naqab Escarpment towards the Qā' ad-Dīsī mudflat in the center of the Ḥismā Basin in southern Jordan (**Fig. 1**). The Ḥafīr is flanked on the west by Jabal Wayziyya and on the east by Jabal Rābigh, two rather broad and flat sandstone mesas, or inselbergs, which form part of the distinctive and erosion-resistance geological shelf between the Rās an-Naqab escarpment and the desert floor of the Ḥismā. Between these two gently-eastward-sloping tabletop mesas, the deeply-incised Ḥafīr cuts into the escarpment like a dagger, beginning in the south as a 2 km wide sandy plain at 860 masl but then narrowing dramatically to the north as it gradually rises in elevation and relief towards the escarpment and its head at Rās Khawr al-Jam (elev. 1400 masl). A number of tributary wadis of varying size enter the main wadi from the adjacent inselbergs, the largest being Wādī aṭ-Ṭufayf and Wādī Khāynah from Jabal Wayziyya, and Tulaylāt Rāshid from Jabal Rābigh (**Fig. 2**).

While the floor of the Ḥafīr alternates between patches of sand and undulating, rocky terrain, the canyon's slopes, along with its tributaries, are littered with hundreds of thousands of blackened sandstone boulders that have broken off or eroded down from the walls of the canyon and flanking mesas over the millennia (**Fig. 3**). Along much of the wadi, these boulders occur in fairly regular bands of talus that have accumulated at the base of the adjacent jabals. Erosion and drainage along the wadi's tributaries, however, have resulted in extensive though heavily-dissected alluvial fans that litter their drainage areas with irregularly-shaped "boulder fields." These sandstone boulders, which range



1. The Northern Ḥismā of southern Jordan (with Wādī Ḥafīr highlighted).

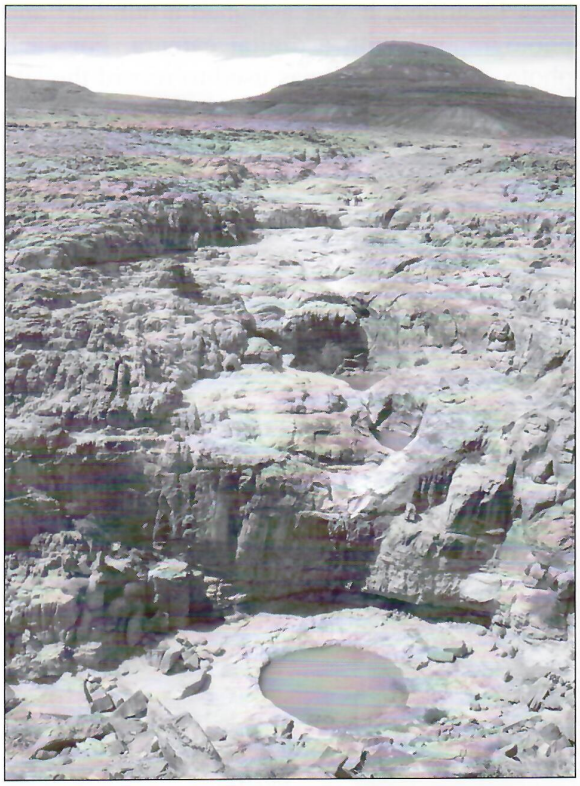
in size from less than a meter to as much as 5-10 m long, are often covered with a heavy coat of shiny black desert varnish or patina, thereby transforming the rocks into ideal canvases for would-be artists and authors. Likewise, the more gradual relief of the tributaries' alluvial fans made these areas fairly accessible to past human populations, as evidenced not only by the amount of rock art and inscriptions found in these areas, but also by the regular occurrence of built features, including stone circles, clearings, and low walls.



2. The Wādī Ḥafīr and its main tributaries with WHPS marked in white (located Jobling/AMAES sites appear in black).

The Ḥismā region is subject to a hot, dry climate throughout most of the year, with a much shorter but colder and wetter climate from December to March. On average, the Ḥismā receives less than 50-80 mm of rain per year and nearly all of that rain falls during a handful of torrential winter downpours that produce powerful flash floods. Locally, the topography of the Ḥafīr and its adjacent flat-topped mesas allows for the potential capture and exploitation of these winter flood waters. A prime example is the Muqawwar cascades located at the head of the Wādī aṭ-Ṭufayf (**Fig. 4**). Here, an extensive network of seasonal drainages flowing both from the escarpment and atop Jabal Wayziyya converge at a single point before making their final descent into Wādī aṭ-Ṭufayf. The cascades are marked by a series of natural collection pools formed in the bedrock, the last and largest of which was intentionally widened and deep-

3. The boulder-strewn slopes of the Ḥafīr.



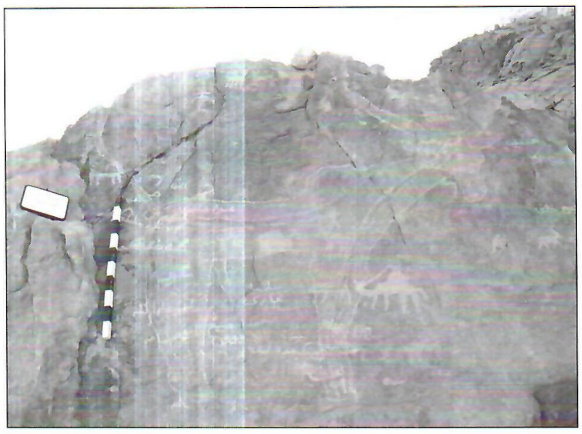
4. The cascades of Muqawwar.

ened in antiquity. Elsewhere in the Ḥafīr, rain waters collect in small, ephemeral pools along the natural drainage of the wadi, especially in areas of more gradual relief. The Ḥafīr has only one perennial water source, a drip-spring located at the northern end of the wadi variously known as Qaṭṭār Ḥafīr or ʻAyn al-Qaṭṭār.[1]

Survey Methodology

Initially, the WHPS focused on surveying areas of the Ḥafīr that the author suspected would have had some social, cultural, or economic "significance" to the Ḥafīr's ancient populations—those areas or features of the landscape that *may* have attracted particular attention from ancient carvers. Examples of such places included prominent hills, springs and water sources, monumental stones, unusual rock formations, and manmade features like cairns or stone circles. While this "purposive" survey methodology did reveal several unique and notable natural and manmade features within the Ḥafīr, including the prominent "bull stone" near the entrance to Wādī Khāynah (**Fig. 5**)[2] and the small but fascinating al-Batuh rock arch (**Fig. 6**), it was soon

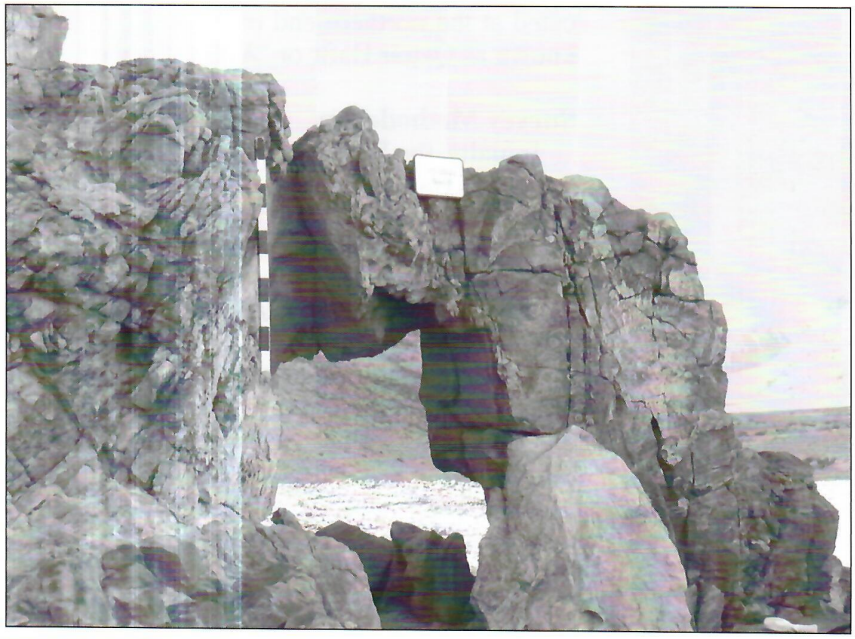
1. This spring was first recorded by Jobling (1985: 219–220) and has since been revisited by Saba Farès-Drappeau and Fawzi Zayadine (2004: 359–362), as well as the author's survey. The spring was outfitted in antiquity (perhaps during the Nabataean period) with an 8 m x 3 m x 1 m cistern that is still utilized today.
2. This stone was previously visited and photographed by both Jobling (1987a: pl. 55) and Farès-Drappeau and Zayadine (1997: 42, Arabic section).



5. The "bull stone" (06-0001) near the entrance to Wādī Khāynah.

realized that these locations, in most cases, were neither unique nor exceptional in their rock art or epigraphic remains. In fact, as the project ventured into the Ḥafīr's many tributaries searching for sites that had been photographed by Jobling, it became clear that most petroglyph sites—particularly those inscribed with Thamudic E/Ḥismaic inscriptions and drawings—were found deep in the wadi interiors in areas that generally lacked obvious topographic prominence or cultural/economic significance. As such, most of the survey's second session and all of the third session were devoted to a general "reconnaissance" survey of the Ḥafīr's primary and secondary tributaries, especially Tulaylāt Rāshid, Wādī Khāynah, and Wādī aṭ-Ṭufayf.

For both the purposive and reconnaissance survey methodologies, team members (usually numbering two to three) walked broadly across an area looking for inscriptions and rock carvings from all periods. Each survey was conducted in an orderly and planned fashion with an emphasis on covering as many different parts of the study area as thoroughly as possible. Where feasible, team members separated by about 75-100 m would walk a series of cardinally-oriented transects back and forth across an area until all significant topographic features had been surveyed. Once a site ("site" being defined here as an individual stone/boulder or rock face) had been identified, it was assigned a number[3] and photographed with a digital camera. For each photo, a whiteboard was used to record the site number and, in most cases, the direction of the



6. The al-Batuh rock arch (05-0026).

3. As part of the initial "purposive" survey strategy, the Ḥafīr was divided up into various zones (numbered 1–10), and each stone or rock face recorded within a particular zone was given a unique site number. So, for example, the first site recorded within the area of the Muqawwar cascades (designated Zone 7) was numbered 07-0001. By contrast, sites recorded as part of the broader "reconnaissance" survey strategy were simply given the prefix "R" followed by a unique site number (for example, R001), with no specific reference to the area of the Ḥafīr in which they were found.

photograph. The location of the stone or rock face was then recorded with a handheld Global Positioning System (GPS),[4] while any relevant observations about the site and its situation were noted on recording forms.

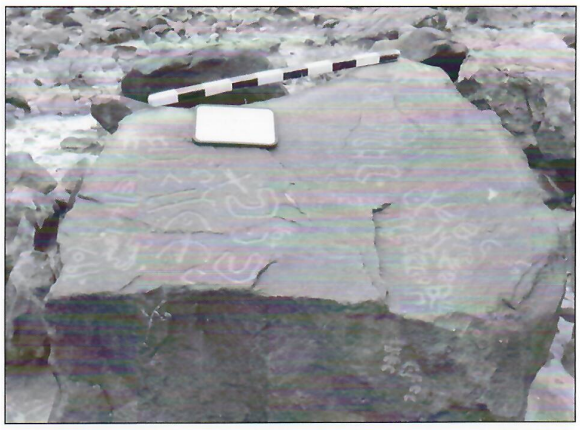
Locating Sites Photographed by Jobling's Survey

Jobling's AMAES spent the better part of four field seasons working in the Ḥafīr, where he photographed and recorded nearly a thousand petroglyph sites of all types and periods (Jobling 1983, 1985, 1987a, 1987b, 1988a, 1988b, see also Jobling 1986, 1989, 1990). Although Jobling was unable to map the location of his discoveries with exact precision, the project's notes, photographs, photographic log, and field maps allow one to determine the relative location and/or topographic position of many sites.[5] This is particularly true for sites that were recorded within specific tributaries, around the Ḥafīr's major natural and manmade features, and in the vicinity of its principal water sources (namely Muqawwar and 'Ayn al-Qaṭṭār). In exceptional cases, the project's field maps and notes even allow one to determine the specific area of the Ḥafīr where a site was located, sometimes within less than 100 m.

With this information in hand, the WHPS set out to relocate as many of Jobling's sites as possible and pinpoint their location with handheld GPS units, for subsequent inclusion in a GIS database of site locations. As the WHPS progressed through the Ḥafīr and its various tributaries and located more and more Jobling sites, it became increasingly easier to determine where exactly Jobling's team had worked and, more important, where we could expect to find sites from the Jobling photographic record that lacked a clear locational context. Ultimately, the WHPS was able to locate 268 of the petroglyph sites photographed by Jobling (**Fig. 2**), this representing between a quarter and a third of the estimated number of sites Jobling recorded in the Ḥafīr.[6] These data have given us a much better understanding of where precisely Jobling did (and did not) survey within the Ḥafīr, as well as important insight into the possible locations of sites from Jobling's photographic record that were either missed or not located by the WHPS.

Preliminary Findings

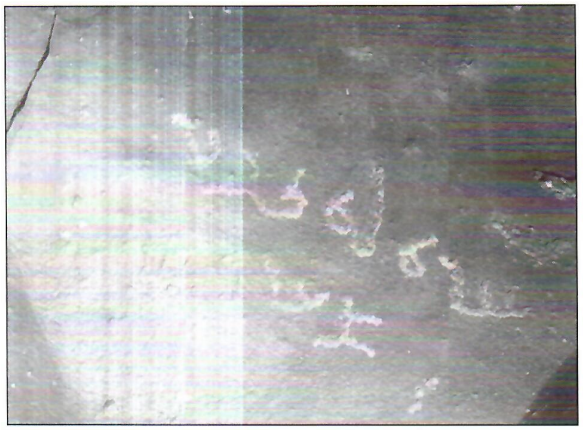
During the course of the WHPS, it became very clear that the Ḥafīr contained many more sites than just those that had been photographed by Jobling. During the six-week survey season, a total of 1,200 carving sites were photographed, recorded, and mapped (**Fig. 2**), and it is estimated that several times that number still await discovery. Just under half of the recorded sites (547) include one or more Thamudic E/Ḥismaic inscriptions (**Fig. 7**). While a precise count of recorded Thamudic inscriptions will only come with detailed analysis of the survey's photographic record, a preliminary examination identified more than 1,800 inscriptions on the



7. Boulder covered in Thamudic E/Ḥismaic inscriptions (R445).

4. Three handheld GPS receivers were used by the WHPS: a Garmin GPS 12, a Garmin E-Trex Legend Cx, and a Magellan eXplorist 200. Although these handheld receivers generally guarantee an accuracy of at least +/- 15 m, the WHPS regularly received better results of +/- 7 m accuracy.
5. I would like to thank Prof. Jobling's widow, the late Lee Jobling, as well as his long-time field assistant and photographer Richard Morgan, for permission to use the archived records and notes of the AMAES.
6. A review of the Jobling photographic record shows that the AMAES likely photographed between 750 and 1,000 individual petroglyph sites within the Ḥafīr. The ambiguity arises from the fact that the AMAES did not assign unique site numbers to the stones it recorded, preferring instead to document the progress of the survey (and the sites it recorded) with a photographic log, noting only the general location where a particular roll of film had been shot. Because the photographs often focus on individual carvings/inscriptions and not entire stones, it can sometimes be difficult to determine how many shots from a roll were taken of a single site (as opposed to multiple sites), unless the stone happened to be re-recorded during the WHPS.

stones and rock faces recorded by the survey. By contrast, only seven inscriptions in Nabataean script and/or with Nabataean lexical features were recorded (**Fig. 8**),[7] while a slightly larger number (27) of unpointed Kufic and/or early Arabic inscriptions were found (**Fig. 9**).



8. Nabataean inscription from Muqawwar cascades (07-0001).

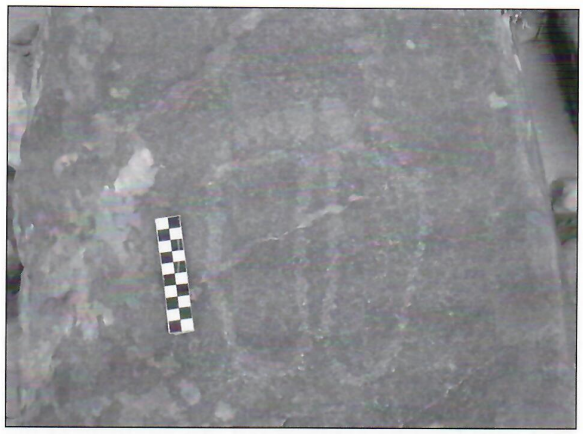
9. Kufic inscription (05-0004).

It is far more difficult to meaningfully categorize or describe the numerous and varied rock drawings that are found on the Ḥafīr's stones. While it is clear that many of the drawings are contemporary with the Thamudic E/Ḥismaic inscriptions (many of which often sign drawings of camels and hunt scenes—**Figs. 10 and 11**), there are countless others that—lacking inscribed signatures or identification—defy any straightforward dating, categorization, or explanation. Among the Ḥafīr's drawings are numerous examples of darkly-patinated, unsigned drawings of ibex, bulls, hunters, and hand and footprints (**Fig. 12**) that certainly date anywhere between several hundred and several thousand years before the Thamudic inscriptions. Perhaps equally numerous are more lightly-patinated de-

10. Thamudic camel drawing signed by zdmnt son of rm²l (R222).

11. Thamudic hunt scene signed by bglt son of zdlh (R348).

7. Several of the survey's Nabataean inscriptions (including three Thamudic E/Nabataean bilinguals), most of which are found in the vicinity of the Muqawwar cascades, have already been studied and published by Hani Hayajneh (2009). Additional Nabataean inscriptions from the Ḥafir were also published by Jobling (1990).



12. Footprint carvings (01-0003).

pictions of horse- or camel-mounted warriors or hunters armed with long lances and spears (**Fig. 13**) that, not being accompanied by any texts, would seem to post-date the Thamudic inscriptions. Then there are the drawings of hunters or camel-mounted Bedouin armed with rifles or muskets (**Fig. 14**) which certainly date to the mid- to late-Ottoman period. Unfortunately, while these broad temporal categorizations of the drawings can easily be discerned when looking at the collection as a whole, it can be very difficult in any particular case to decide how a drawing should be categorized and/or what criteria should be used to give a relative "date" to a drawing. As such, further categorization and description of this large corpus of drawings awaits more detailed analysis and study.

13. Riders on horseback armed with lances/spears (R090).

14. Hunter armed with rifle aiming at pair of ostriches (R130).

A Case Study: Using GIS and Landscape Data to Analyze the Distribution of Thamudic E/Ḥismaic Inscriptions and Rock Drawings

Using the spatial data recorded from the WHPS, the author's dissertation sought to better understand the distribution of one of the most common types of ancient petroglyphs found in the Wādī Ḥafīr: Thamudic E/Ḥismaic inscriptions and the signed rock drawings which often accompany them (see **Figs. 7, 10, and 11**).[8] These distinct carvings, which potentially number in the tens of thousands, are found across the deserts of southern Jordan and northwestern Saudi Arabia and can be imprecisely dated to the last few centuries B.C. and the first few centuries A.D., a period when the Nabataeans of Petra held economic and political sway over much of Transjordan and northern Arabia (Bowersock 1983; Taylor 2001). The study focused on identifying distribution patterns among these carvings within the Ḥafīr's three main tributaries: Wādī Khāynah, Tulaylāt Rāshid, and Wādī aṭ-Ṭufayf, as well as the cascade pools of Muqawwar located at the head of aṭ-Ṭufayf (see **Fig. 2**). In all, the locations of 740 inscriptions and 95 signed rock drawings (recorded from 200 individual stones and rock faces) were mapped and analyzed.

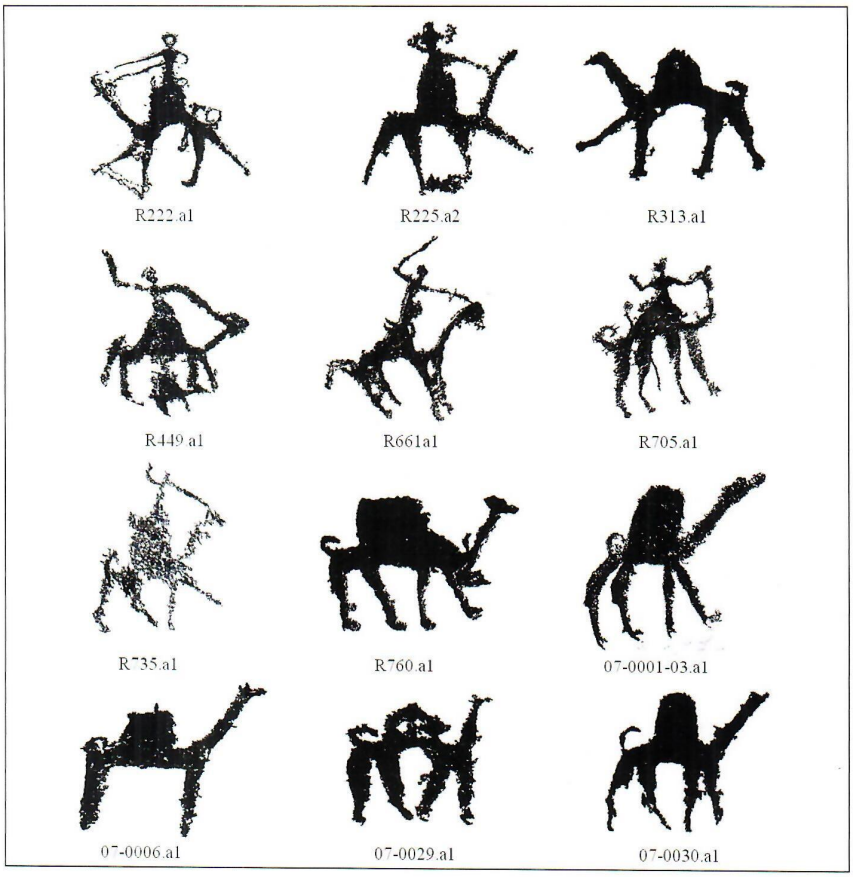
Describing the Inscriptions and Drawings

Almost all of the inscriptions included in the

8. A preliminary locational analysis, which provided an overview of the strengths and potentials of using GIS to query and analyze inscriptional data, can be found in *Studies in the History and Archaeology of Jordan* 10 (Corbett 2009).

study (707, or 96%) were carved in the Thamudic E/Ḥismaic script.[9] Also included in the analysis, however, were five Nabataean inscriptions, as well as three Thamudic C texts and one written in Thamudic D. The vast majority (68%) of the 740 recorded texts can be categorized as simple authorship expressions, where the author typically gives only his name (introduced by the particle *lam*) and, less frequently, the names of his forbearers. In only 11 examples does the author explicitly give the name of his tribe. About 13% of the texts can be described as drawing signatures, where the author takes credit for an accompanying drawing, often employing the verb *ḥṭṭ* ("he carved"), and less often, the name of the depicted animal, to describe his creation. An even smaller number of texts can be characterized as short prayers/curses to Arabian deities, including *ḏs²ry*, *lt*, and *mnwt* (6%), or as emotives (4%), where the author writes short, enigmatic expressions of love, longing, and grief. The attested personal names reveal that the inscriptions were carved by at least 420 different individuals, although nearly a quarter of the texts could have been carved by just a few dozen authors. Among the latter, individual members from several different families can be identified, which allows for the reconstruction of four distinct lineages: the families of *s²hr*, *rm ʿl*, *ʿnʾl*, and *nht*.

Among the 95 drawings that were clearly signed by inscriptions, there are 39 camel drawings, 50 drawings of the hunt or hunted animals, three drawings that focus on the horse, and three that could not be categorized. An analysis of the signed camel drawings indicates that nearly all of the artists chose to depict young she-camels (*bkrt*) rather than male camels (*bkr*, *gml*). Generally, both sexes were depicted realistically and proportionally, with particular emphasis on the animal's slender build, long legs, and prominent hump (**Fig. 15**). In many cases, a rider was



15. Selection of Thamudic she-camel drawings.

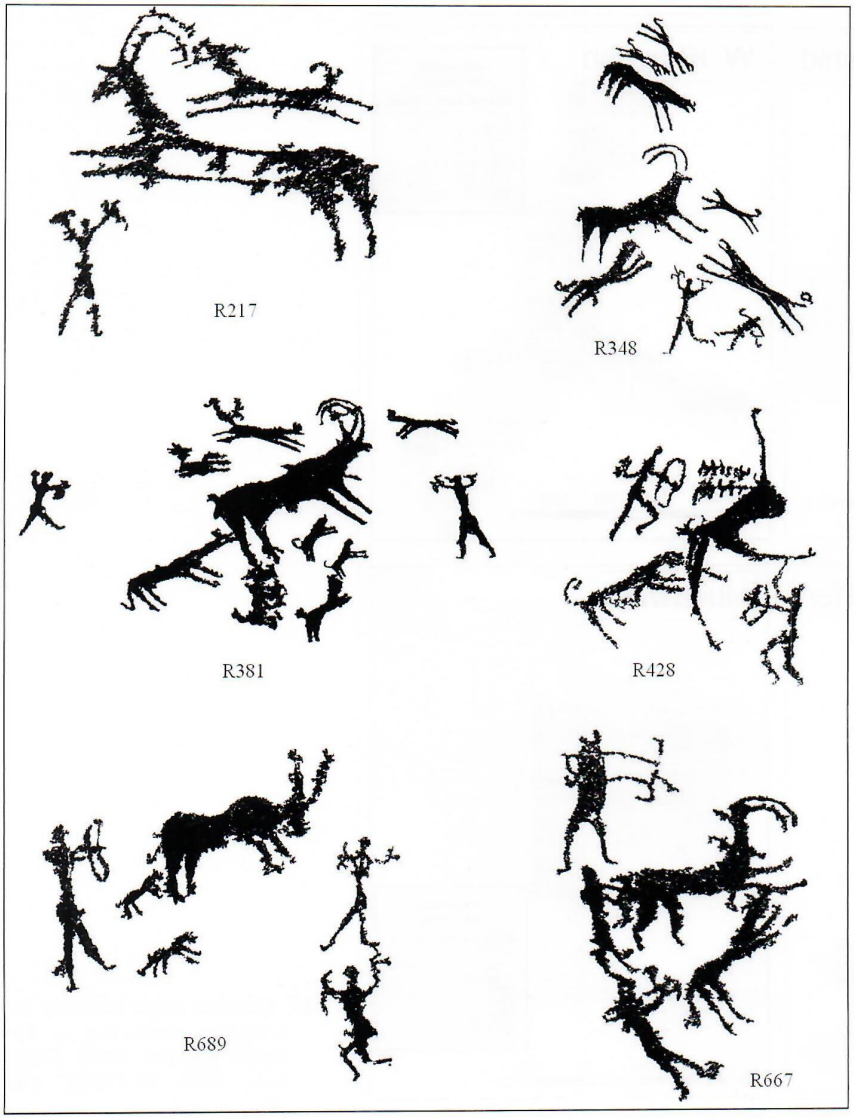
9. The best and most thorough review and analysis of Thamudic E/Ḥismaic inscriptions remains Geraldine King's unpublished dissertation of texts and drawings recorded from the nearby Wādī Judayyid (King 1990).

drawn atop the camel's hump, usually shown holding the reigns and a riding stick. More rarely, camels were drawn outfitted with saddles or swords. Almost always, the camel (or camel and rider) was drawn alone, without accompanying visual elements. This stands in marked contrast to the hunt drawings, the majority of which depict hunted animals like the ibex (*wʿl*), the oryx (*ṯr*), and the ostrich being attacked by hunters armed with bows and trained dogs (**Fig. 16**). Although there is great variety in the style and complexity of hunt drawings, most narrative scenes tend to show the animal at the center of the scene (often at a considerably larger scale), with the other actors and elements of the hunt drawn around the margins.

Analyzing the Distribution and Location of the Inscriptions and Drawings

Using various GIS tools and spatial analyses, the author's study aimed to: 1) detect and measure areas of inscription and drawing clustering within each tributary, 2) map the location of these clusters relative to each tributary's drainage network, and 3) discern meaningful distribution patterns in the content of the inscriptions and drawings. For the latter, particular attention was given to analyzing the distribution of script types, inscription types, drawing types, tribal names, as well as specific members of identified lineages.

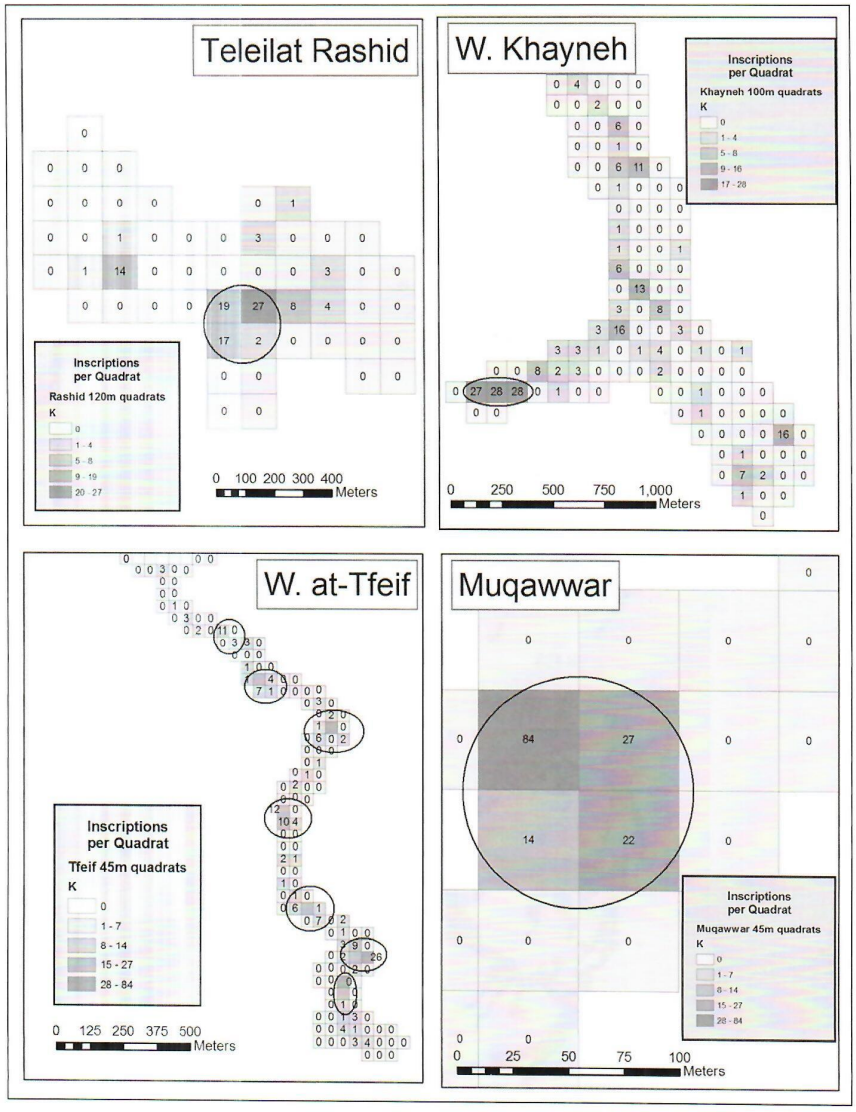
In analyzing the spatial and landscape context of the inscriptions and drawings from each



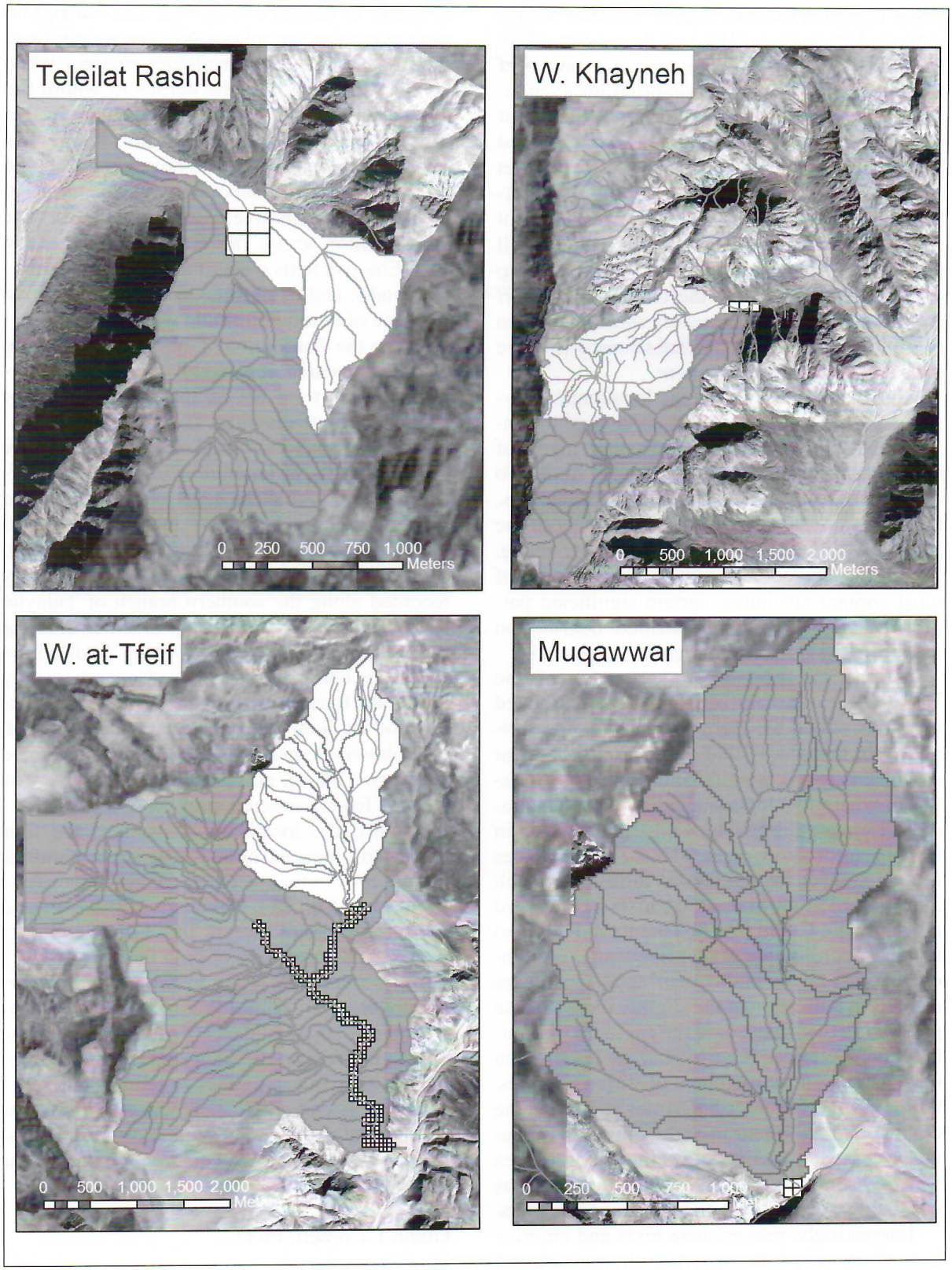
16. Selection of Thamudic hunting scenes.

tributary, it is clear that certain distribution patterns prevail across all three study areas. First, the cluster analysis revealed that there are specific locations within the tributaries that show far more inscription and drawing activity per unit of area (**Fig. 17**). In Tulaylāt Rāshid, for example, 65 of the 100 recorded inscriptions were found near the confluence of the wadi's south and southeast branches. Likewise, in Wādī Khāynah, more than a third of the 228 recorded inscriptions (83, or 36%) were found along a narrow stretch located at the far end of the wadi's southern branch. In Wādī aṭ-Ṭufayf, just less than half of the wadi's 412 recorded inscriptions (199, or 48%) were found among seven identified clusters of various sizes, nearly all occurring at bends along the wadi's sinuous path. And perhaps most telling, more than a third of the inscriptions recorded in aṭ-Ṭufayf (147, or 36%), and nearly a fifth of all inscriptions in the study, were found in and around the cascade pools of Muqawwar. These distributions make it clear that authors and artists were actively seeking out certain locations within these tributaries. But why?

Through the hydrological analysis, it was found that almost every major inscriptional cluster within each wadi is situated at or in close proximity to the drainage point of a significant watershed (**Fig. 18**). In Tulaylāt Rāshid, over half (1.74 km^2, or 56%) of the wadi's 3.08 km^2 total drainage flows through the area of highest inscription density. Likewise, the far end of



17. Quadrat maps showing inscription clustering in Tulaylāt Rāshid, Wādī Khāynah, Wādī aṭ-Ṭufayf, and Muqawwar.



18. Watershed maps for Tulaylāt Rāshid, Wādī Khāynah, Wādī aṭ-Ṭufayf, and Muqawwar.

Wādī Khāynah's south branch receives nearly a third (3.23 km^2, or 31%) of the wadi's 10.38 km^2 total catchment. The cascade pools of Muqawwar receive direct runoff from a catchment area of more than 3.0 km^2, with much of that drainage originating from the well-watered Rās an-Naqab escarpment. Finally, the outlet of the extremely narrow and sinuous Wādī aṭ-Ṭufayf receives runoff from a total catchment area of 12.70 km^2, the largest catchment of all the Ḥafīr's tributaries. Given the wadi's steep slopes and narrow bed, the cumulative runoff that drained through the valley must have been one of the main factors that led so many to carve their names and drawings here.

Somewhat surprisingly, the locational analysis of the textual and artistic content of the inscriptions and drawings shows that many of their key attributes are not localized or limited to identified clusters or specific landscape features, but rather are widely dispersed across both the individual tributaries and the Ḥafīr as a whole. Yet despite the overall scattered distribution of most content attributes, certain significant patterns do emerge when the attribute distribution data from the three tributaries are compared.

Despite the near total dominance of the Thamudic E/Ḥismaic script, there are isolated locations within the Ḥafīr that show some variability in the scripts that authors used. A clear example is found around the cascades of Muqawwar, where five texts (including three Thamudic E/Ḥismaic bilinguals) were either carved in Nabataean or show clear Nabataean influences in their syntactical and lexical forms (Hayajneh 2009). In addition, at least two texts were carved in Thamudic C and one in Thamudic D. Given that these scripts appear so infrequently throughout the rest of the Ḥafīr, their appearance here may be an indication of the slightly more diverse population that frequented the cascades. A similar pattern emerges if we look at the distribution of texts carved by members of different tribes. Of the eight different tribal names attested in the corpus, five are found in and around the Muqawwar cascades, again suggesting that this area was frequented by a diverse population, perhaps consisting of both local and non-local elements.

Interestingly, prayer/curse texts and emotive texts show very little patterning in their overall spatial distribution. Not only are prayers/curses found in almost every wadi and inscription cluster, but the formulas used vary widely from stone to stone. A similar picture emerges when we map the names of the deities to whom the prayers and curses were offered (**Fig. 19**). No tributary (nor any specific location within any of the tributaries) appears to have been reserved for prayers to a particular deity. The distribution of the various emotive expressions is likewise quite diffuse across the entirety of the study area. Emotive texts were found in all three tributary wadis, and in all three locations, more than one type of emotive formula was used.

When the distribution of the different drawing types is compared, it is readily apparent that particular wadis were not exclusively reserved for certain types of drawings (i.e. only hunt drawings, only camel drawings). In fact, in all three tributary wadis, different drawing types were often recorded within the same cluster. But when we take a closer look, two interesting—if still inexplicable—patterns emerge (**Fig. 20**). First, camels were depicted in all nine of the drawings recorded along the southern branch of Tulaylāt Rāshid, to the total exclusion of other drawing types. Second, the drawings from Wādī Khāynah, when compared with those from other study areas, are focused disproportionately on depictions of the hunt and hunted animals. Although other drawing types are present (four camel, three horse, two other), no fewer than 21 hunt drawings are found scattered throughout the wadi.

Finally, the locational analysis of the four identified lineages shows that these families did not restrict their activities to certain areas or tributaries (**Fig. 21**). Members of the *rmʿl* and *nht* lineages were present in all three tributary wadis, while members of both the *s²hr* and *ʿnʾl* families were each found in two of the three areas under study. Within Wādī Khāynah, however, there is some evidence that members of the *s²hr* family visited the wadi somewhat more frequently than other families or groups. Of the 13 inscriptions carved by members of known lineages, nine were carved by five different members (representing three generations) of the *s²hr* family.

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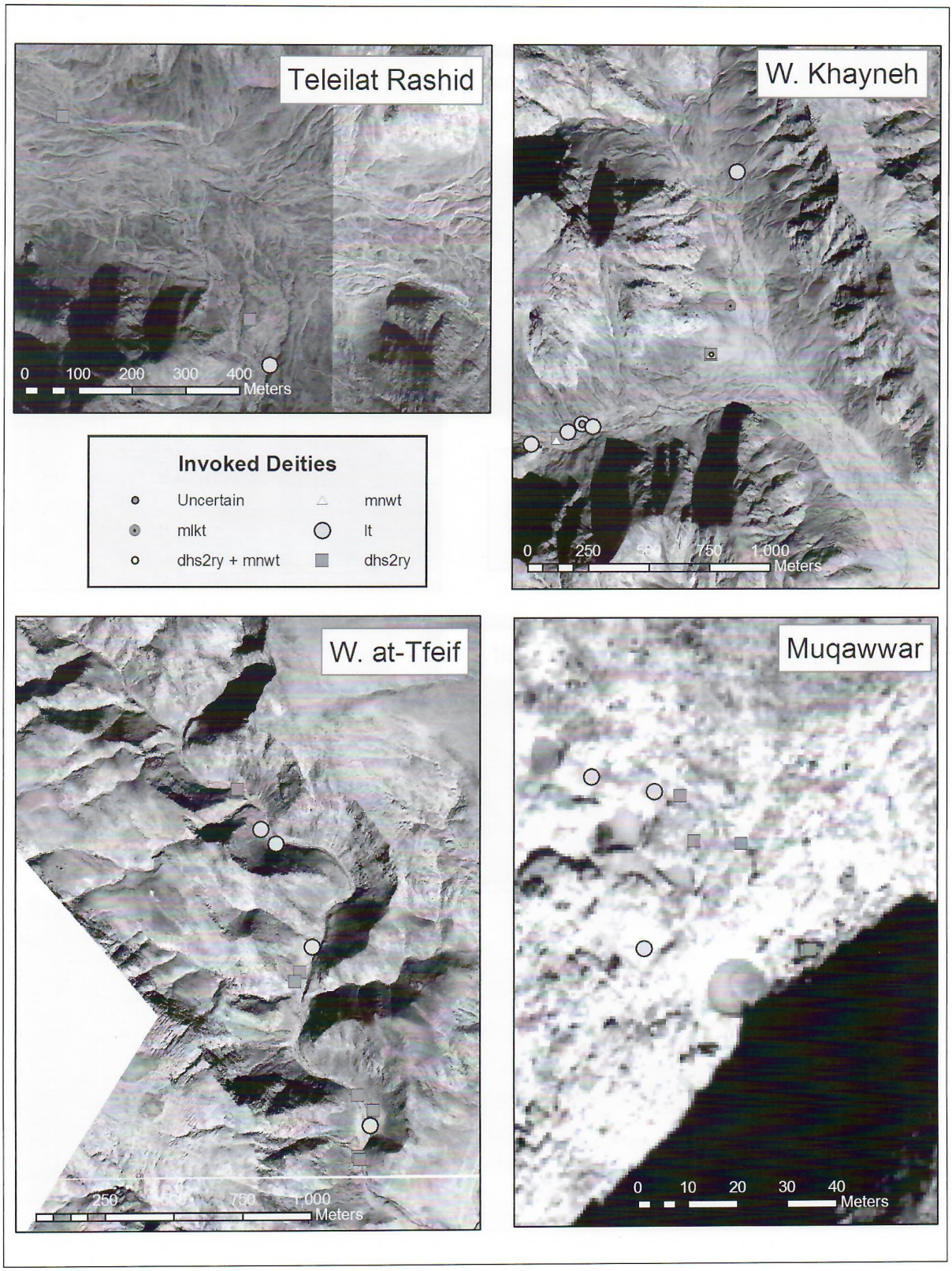
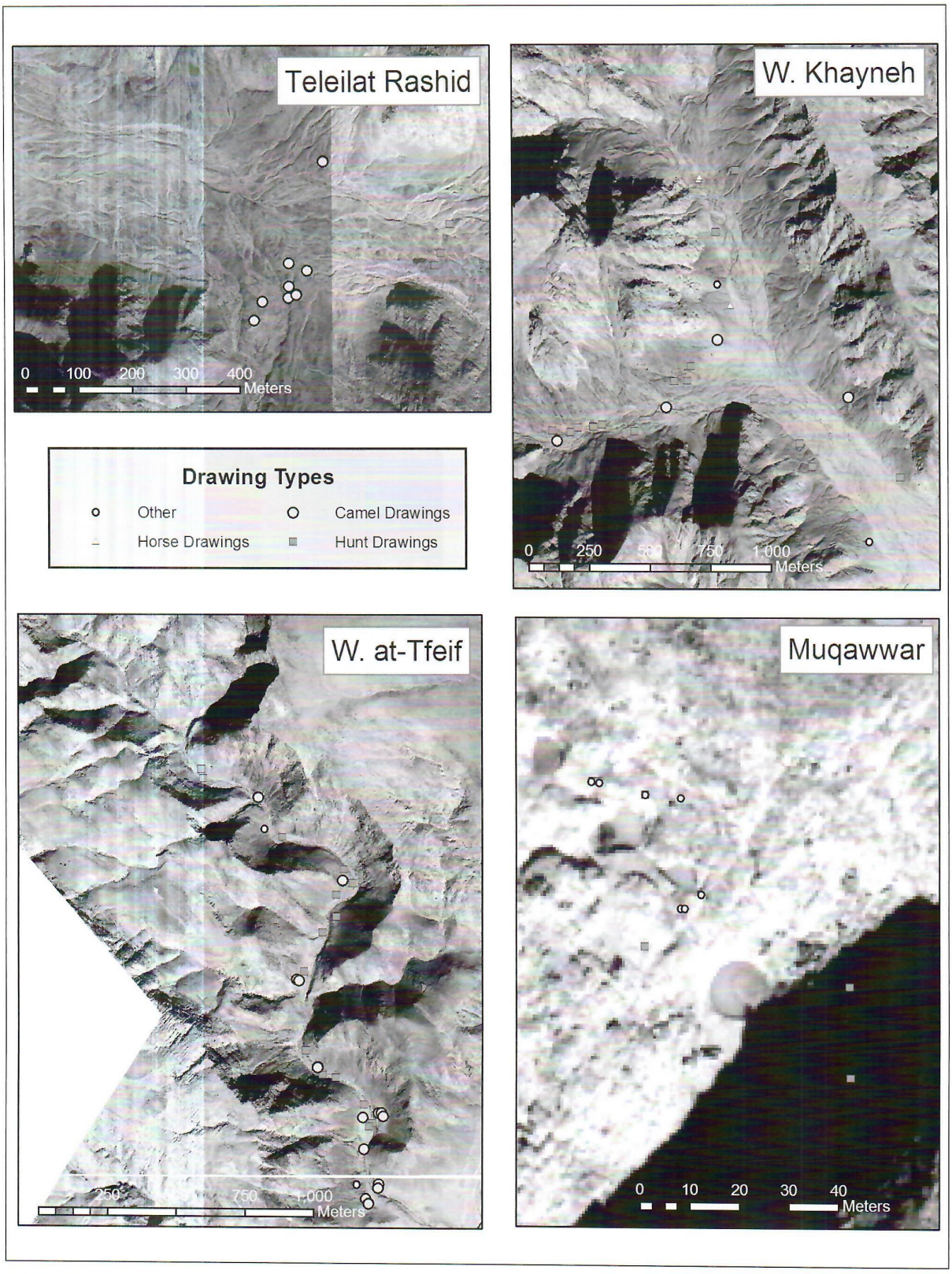
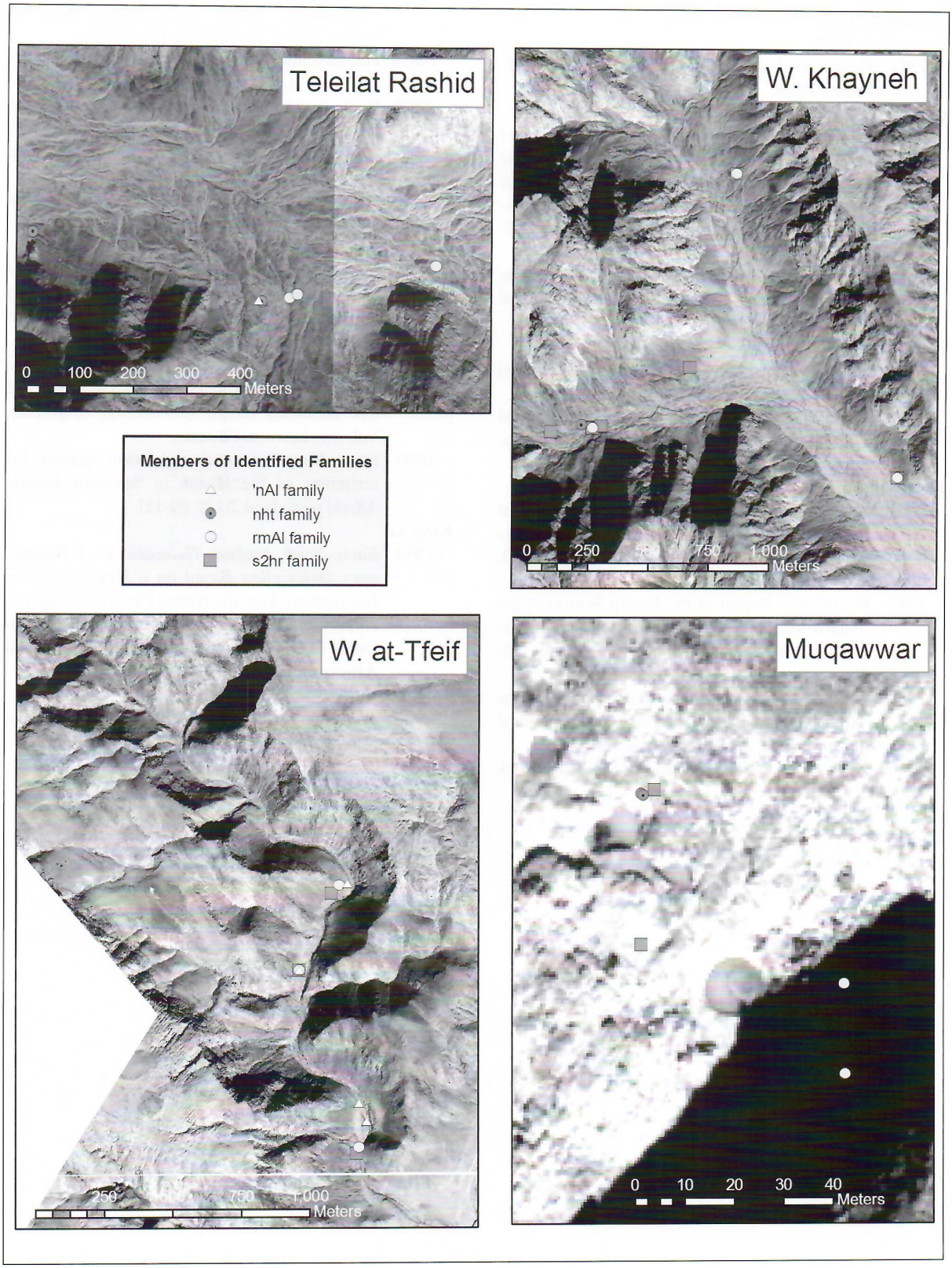


19. Distribution of prayer/curse texts and invoked deities by wadi.



20. Distribution of camel drawings vs. hunt drawings by wadi.



21. Distribution of identified families by wadi.

Bibliography

Bowersock, G.W.

1983 *Roman Arabia*. Cambridge, MA: Harvard University Press.

Corbett, G.J.

2010 *Mapping the Mute Immortals: A Locational and Contextual Analysis of Thamudic E/*Ḥismaic *Inscriptions and Rock Drawings from the Wadi Hafir of Southern Jordan*. Unpublished PhD dissertation. University of Chicago, Chicago, Illinois.

2009 A Landscape/GIS Perspective on the Thamudic Inscriptions and Rock Drawings of the *Wadi Hafir*, Southern Jordan. *SHAJ* 10: 339-346.

Farès-Drappeau, S. and Zayadine, F.

1997 Epigraphic Survey in Wadi Iramm (Jordan) 1996. *ADAJ* 41: 37-44 (in Arabic).

2004 Preliminary Report of the Sixth Archaeological and Epigraphical Survey at Wadi Ramm/Iram. *ADAJ* 48: 357-371.

Hayajneh, H.

2009 Ancient North Arabian—Nabataean bilingual inscriptions from southern Jordan. *Proceedings of the Seminar for Arabian Studies* 39: 203-222.

Jobling, W.J.

1983 Preliminary Report of the Fourth Season of the 'Aqaba-Ma'an Archaeological and Epigraphic Survey, 1982/1983. *ADAJ* 27: 197-208, pls. 22-46.

1985 Preliminary Report of the Sixth Season of the 'Aqaba-Ma'an Epigraphic and Archaeological Survey. *ADAJ* 29: 211-220, pls. 43-50.

1986 North Arabian (-Thamudic) Inscriptions & Rock Art from the 'Aqaba-Ma'an Area of Southern Jordan. *ADAJ* 30: 261-284, pls. 48-55.

1987a The Seventh Season of the Aqaba-Ma'an Survey. *Liber Annus* 37: 376-379, pls. 55-56.

1987b *Preliminary Report of the Seventh Season of the 'Aqaba-Ma'an Epigraphic and Archaeological Survey*. Unpublished archival report. Amman: Department of Antiquities.

1988a Prospection archéologique et épigraphique dans la region d' 'Aqaba-Ma'an, 1986. *Syria* 65: 427-434.

1988b *Preliminary Report of the Eighth Season of the 'Aqaba-Ma'an Epigraphic and Archaeological Survey*. Unpublished archival report. Amman: Department of Antiquities.

1989 'Aqaba-Ma'an Archaeological and Epigraphic Survey. Pp. 16-24 in D. Homès-Fredericq and J.B. Hennessy (eds.), *Archaeology of Jordan*, Vol. 2.1. Leuven: Peeters.

1990 Some New Nabataean and North Arabian Inscriptions of the Hisma in Southern Jordan. *ARAM* periodical 2.1/2: 99-111.

King, G.

1990 *Early North Arabian Thamudic E: A Preliminary Description Based on a New Corpus of Inscriptions from the Hisma Desert of Southern Jordan and Published Material*. 3 vols. Unpublished PhD dissertation. School of Oriental and African Studies, University of London.

Taylor, J.

2002 *Petra and the Lost Kingdom of the Nabataeans*. Cambridge, MA: Harvard University Press.