Burton MacDonald
St. Francis Xavier University
Antigonish, NS
B2G 2W5 Canada
bmacdona@stfx.ca

Burton MacDonald

Human Presence / Absence in the Southern Segment of the Transjordanian Plateau

Abstract
The paper considers the archaeological and literary evidence for human presence/absence — from the Pottery Neolithic to the Modern period — in the territory from Wādī al-Ḥasā in the north to Rās an-Naqab in the south, i.e., the southern segment of the Transjordanian Plateau. The literary evidence is the Egyptian, Assyrian, Babylonian, and biblical as well as the epigraphical material from the territory itself. The archaeological evidence for this paper comes, primarily, from the findings of four survey projects that I carried out in the area between 1979 and 2007. The goal is to attempt to understand why there were periods during which there is evidence for seemingly intense occupation while in others there appears to be little human presence in the area.

Introduction

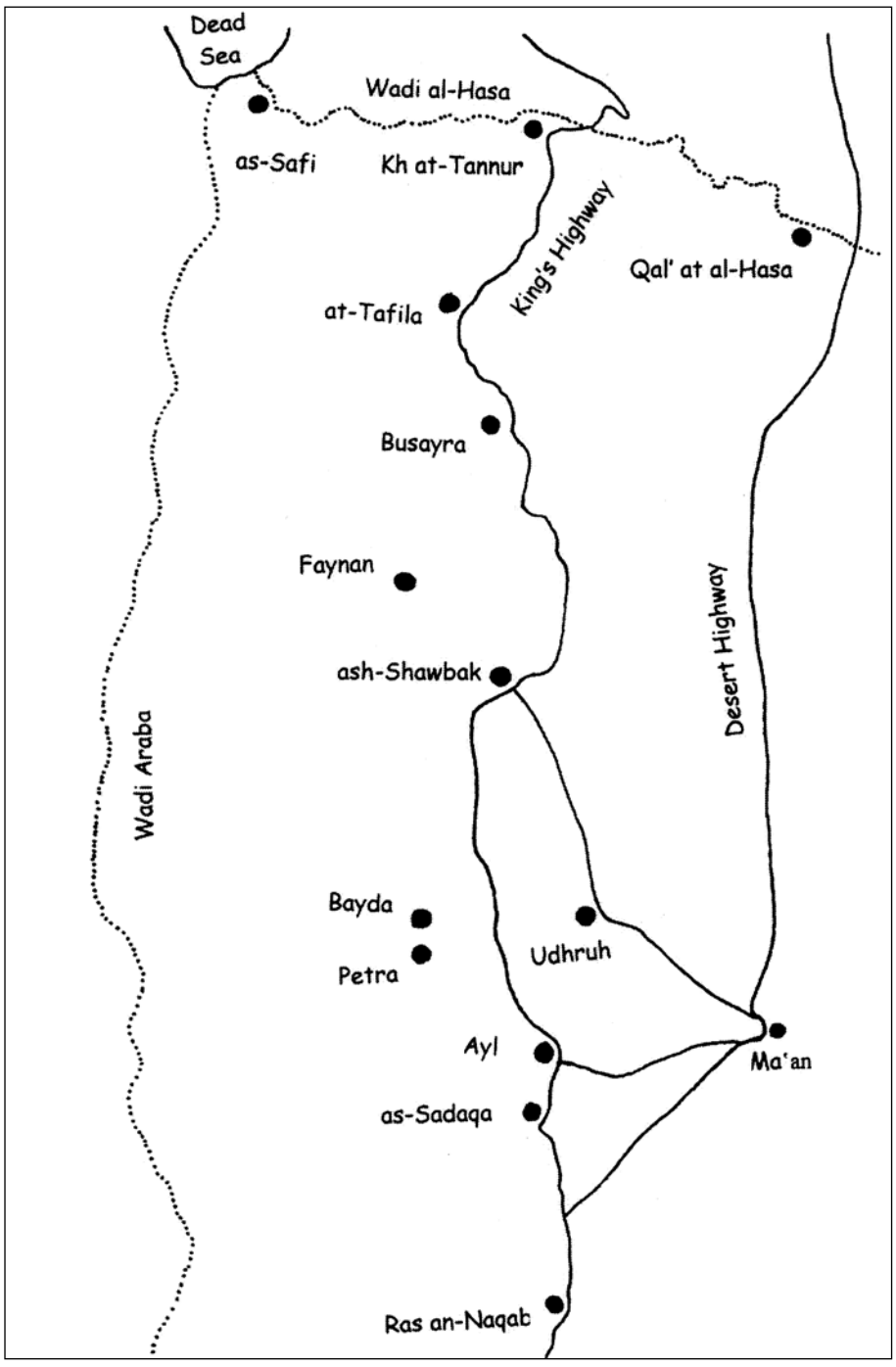
The area of interest is from Wādī al-Ḥasā in the north to Rās an-Naqab in the south, a distance of ca. 90km (FIG. 1). West-to-east the distance is ca. 55km in the north to ca. 39km in the south. The west-to-east distance in the north includes that portion of the southern Ghawrs and northeast ʻArabah between the western end of Wādī al-Ḥasā at aṣ-Ṣāfī in the north to the area of Wādī Fīdān in the south. Thus, the distance from west-east is much greater in the north than in the south. The entire area thus includes the southern segment of the Highlands at the Eastern Rim of the Wādī ʻArabah-Jordan Graben and the northeast segment of Wādī ʻArabah or a central-eastern section of the Wādī ʻAraba-Dead Sea-Jordan Depression (Bender 1974, 1975) (FIG. 2).

Between 1979 and 2007, I directed three survey projects, namely, "The Wadi al-Hasa Archaeological Survey" (1979-1983) (WHAS) (MacDonald *et al*. 1988), "The Tafila-Busayra Archaeological Survey" (1999-2001) (TBAS) (MacDonald *et al*. 2004), and "The Ayl to Ras an-Naqab Archaeological Survey" (2005-2007) (ARNAS) (MacDonald *et al*. 2005; 2006), in the southern segment of the Highlands at the Eastern Rim of the Wādī ʻAraba-Jordan Graben (Bender 1974: 6-11) or in the area that is known as the Edomite Plateau, i.e., the area between Wādī al-Ḥasā in the north and Rās an-Naqab in the south. In addition, I directed a fourth project, namely, "The Southern Ghors and Northeast ʻAraba Archaeological Survey" (1985-1986) (SGNAS) (MacDonald *et al*. 1992), on the east side of the Wādī ʻAraba-Dead Sea-Jordan Depression (Bender 1974: 6-11), between aṣ-Ṣāfī and Wādī Fīdān, the territory which is immediately to the west of that covered by the first two of the three, above-listed surveys.

Many others have carried out archaeological survey work and excavations in this same region. The results of their work will be considered peripherally. However, it is so vast that to include it all would require a book-length report rather than an article for a publication such as this one.

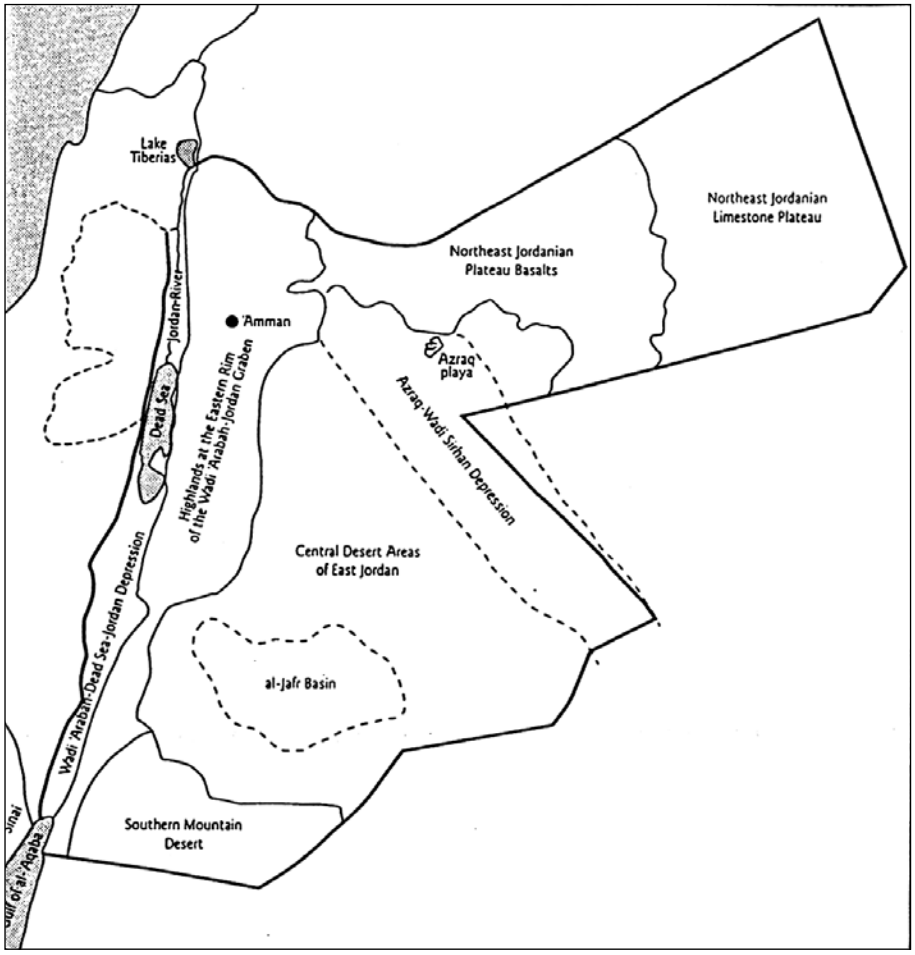
The intention is to say something about the evidence — literary and archaeological — for human presence/absence in the territory of interest for the periods from the Pottery Neolithic to the Modern period, i.e., from ca. 5500BC to the end of the Ottoman occupation of Jordan in AD 1917. The evidence for the earliest periods of that time span comes from archaeology. It is only in the last 4000 years that there is literary evidence for some of this long period of time.

The three plant geographical territories or regions of Jordan are present in the area of interest. They are the Mediterranean, the Irano-Turanian, and the Saharo-Sindian (FIG. 3). Each of these ter-



1. Area of Interest from Wādī al-Ḥasā to Rās an-Naqab.

ritories is characterized not only by its flora and vegetation but also by its climate and soils (Zohary 1962: 51). The Mediterranean territory is characterized by its sub-humid Mediterranean climate. Its average annual rainfall is 300mm or more. It is readily recognized by its flora and vegetation. It includes a long belt of the Highlands at the Eastern Rim of the Wādī ʻAraba-Jordan Graben. Its boundaries with the adjoining Irano-Turanian territory cannot be precisely drawn because the Mediterranean vegetation of the eastern and southern margins, which border on the steppes and deserts, has been subject to heavy human devastation. The Irano-Turanian territory encircles the Mediterranean from south, east and west. Its annual precipitation varies from 350 to 200mm. Agriculture in this territory is very poor, unstable, and almost entirely confined to plains and valleys (Zohary 1962: 51). The Saharo-Sindian territory includes areas in the east and south of the Transjordanian Plateau as well as a



2. Major Morphological Units.

narrow spur within Wādī ‘Araba, protruding northwards from the Gulf of al-‘Aqaba. The boundaries this territory shares with the Irano-Turanian territory are vague. The Saharo-Sindian has a typical desert climate with a short rainy season and a long, hot, dry summer. Annual precipitation varies from 25 to 200mm. Agriculture is altogether lacking except in oases or flooded wadis. Vegetation is extremely poor and mainly confined to depressions, wadis and runnels.

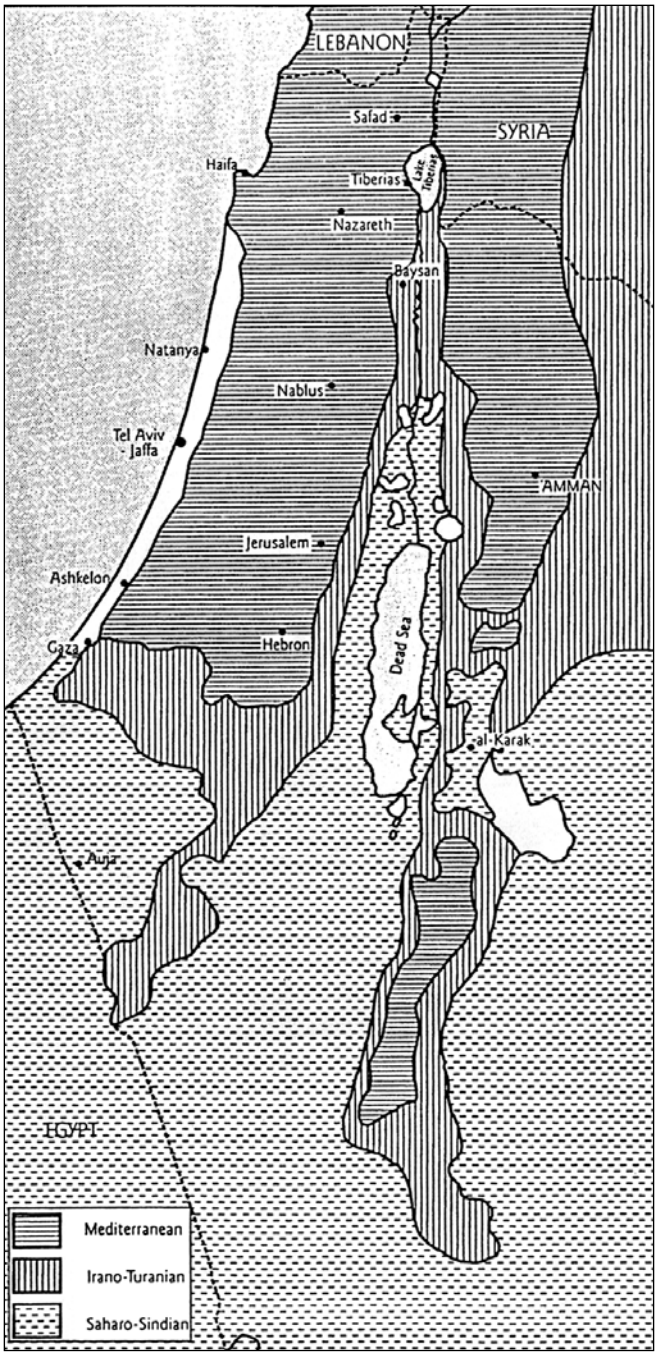
What must be noted relative to the above is that through time and with changes in climate there would have been shifts in the distribution of African vs. Asian biotypes. Thus, hunter-gathers, pastoralists, and farmers may have moved with these shifts in plant distribution.

If land use leads to degradation of resources such as arable soils, sites would be moved periodically to new areas with less-degraded resources (Hill 2006: 6). According to Kohler-Rollefson, it was landscape degradation that eventually led to the abandonment of ‘Ayn Ghazāl in the Neolithic period (Kohler-Rollefson 1988; see also Rollefson and Kohler-Rollefson 1989, 1992).

Relative to Jordan as a whole, the area of interest is a peripheral one. And the findings of my various survey projects indicate this in the fact that “there were periods of ‘filling up’ and ‘emptying out’ in terms of human occupation” (Harlan 1988: 40). What we are probably witnessing today is what the area looks like when it is ‘filled up’ (Harlan 1988: 45). But as the archaeological evidence shows, there were certainly periods, and these will be also be highlighted, when this segment of southern Jordan was “emptying out”.

Since the area of interest is one in which the natural resources are scarce, what is concluded about the presence and absence of human populations in it will not hold true for Jordan as a whole. As a result, the settlement patterns of the area for the various archaeological periods are not representative of the country.

A number of reasons/influences are generally set forth to explain shifting settlement patterns. These



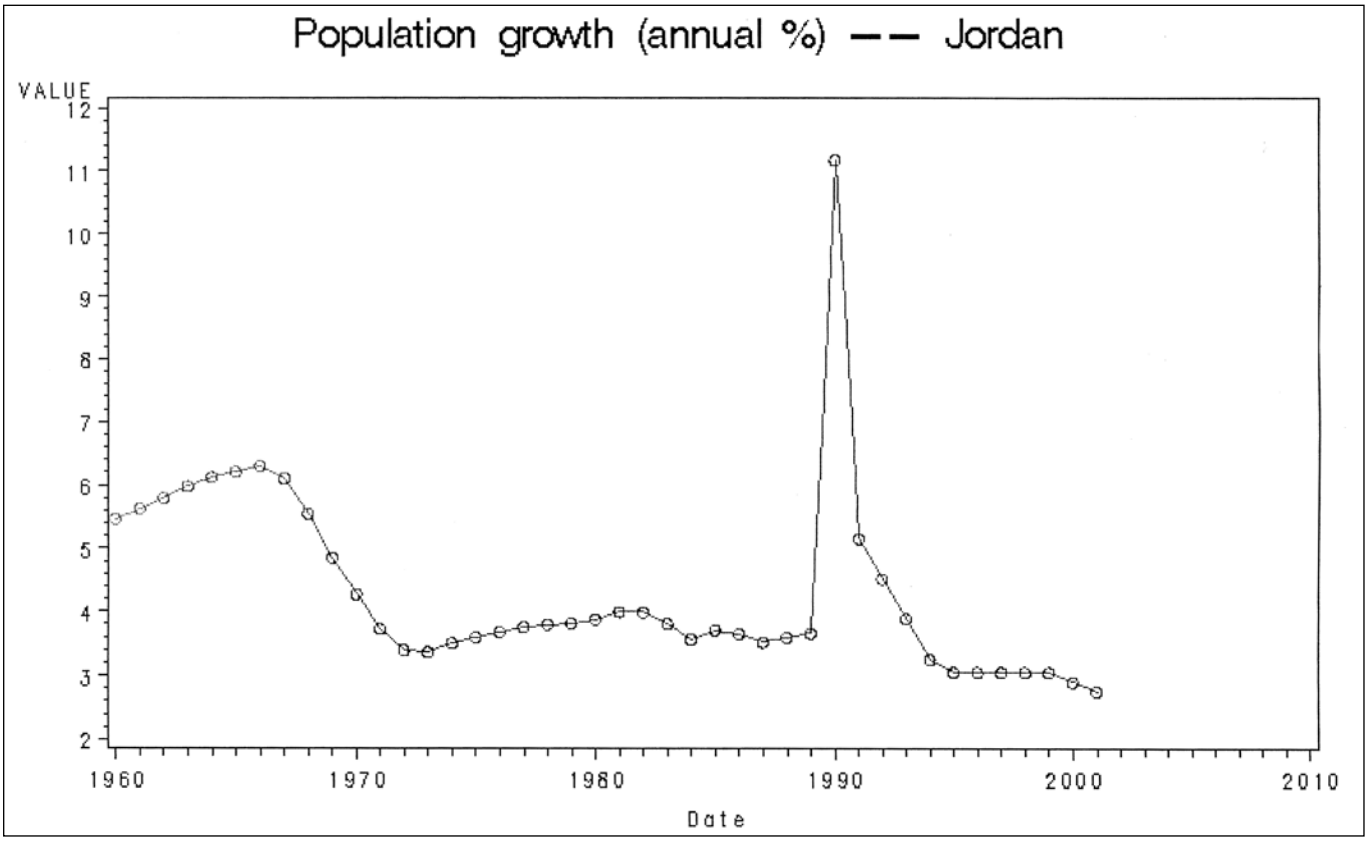
3. Plant Geographical Territories.

include climate, biotypes, changes in technologies, and availability or the lack of resources. However, other reasons/influences are also said to explain this shift. They include "attenuation of the socio-political organization", "commercialization", and "warfare" (Levy 1995: 241-43). Nevertheless, it was probably a combination of factors that led to periods of changes in human presence/absence in the area of interest.

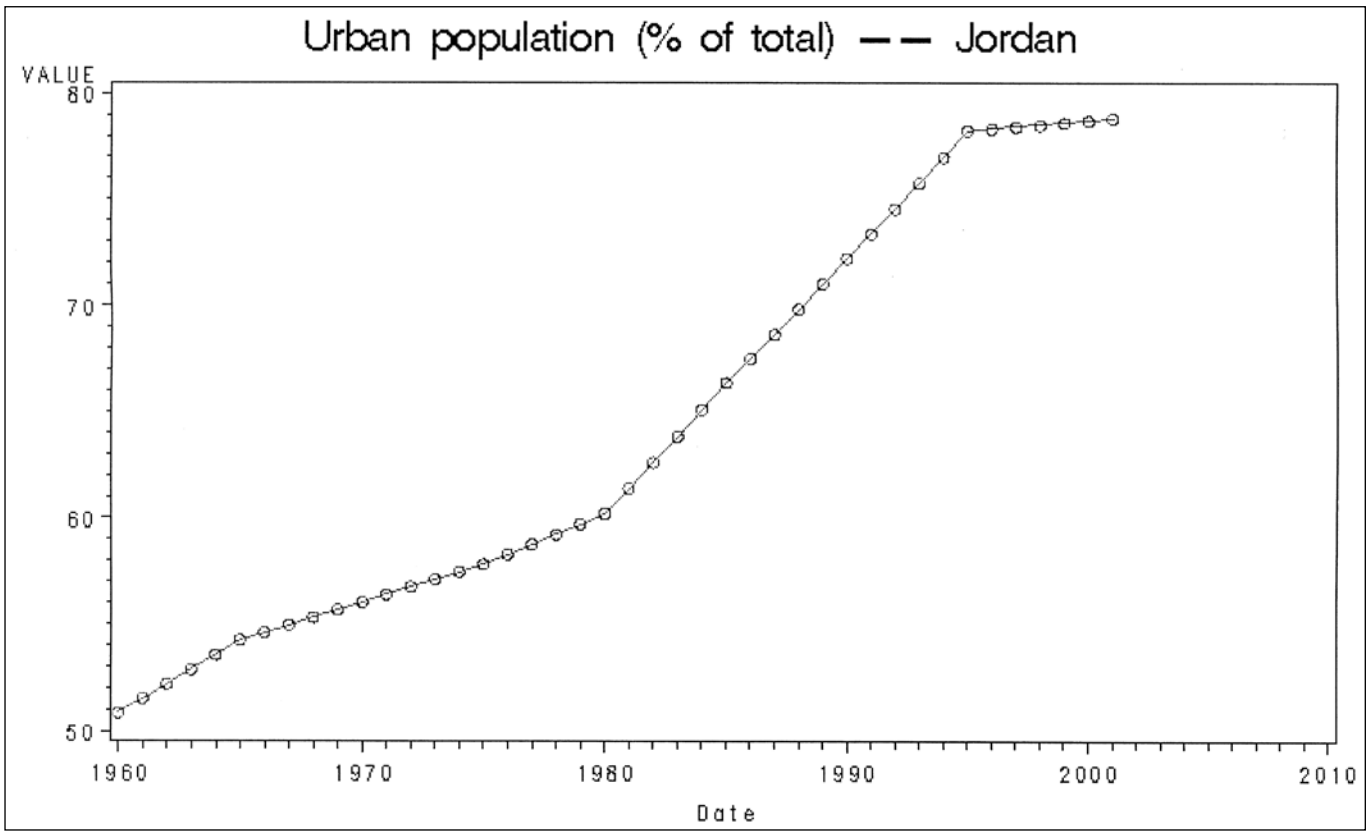
We may use the situation of the increase in population in Jordan over the past 200 plus years to help us understand why at certain times in the past there appears to have been an increase in population. For example, according to Kark (1984: 539, fig. 1.1), in the period from 1800-1914 the population of Salt increased from 10,000-19,990 while that of ʻAmmān from 5,000-9,990. Thus, the population in both places doubled in a period of a little more than 100 years. But the increase in Jordan's population in the last 100 years is even more dramatic. The population of Jordan was less than 400,000 in the 1920s (Salibi 1998) while the city of ʻAmmān, which was confined to two wadis in what is today the downtown area of the city, in 1914 had a population of ca. 10,000. In contrast, the population of Jordan is presently more than 6,000,000 while that of ʻAmmān is more than 2,500,000. These increases are due, to a large extent, to circumstances elsewhere. For example, the creation of the State of Israel in 1948 and the Six-Day War of June 1967 brought large numbers of refugees to Jordan. This increase in population continued with the civil wars in Lebanon in the 1970s and 1980s, the Iraq invasion of Kuwait in 1991, and the U.S.-led overthrow of Saddam Hussein in 2003 (FIGS. 4 and 5). Specifically, the number of refugees who came to Jordan in the period between 2003 and 2007 due to the situation in Iraq is estimated at 700,000-1,000,000. All these situations, outside the borders of Jordan and over which Jordan as a nation had little control, resulted in huge increases in population. Thus, in the recent past, the increase in Jordan's population is not due to improved environmental conditions, e.g., climate, improved technologies, and an increase in the availability of resources, but to other factors.

The Pottery Neolithic Period (ca. 5500-ca. 4500 BC)

For the Levant in general, the period of the Pottery Neolithic is a time when there is the re-establishment of population that had suffered a crisis at the end of the seventh and the beginning of the sixth millennium BC (example of ʻAyn Ghazāl; see, e.g., Kohler-Rollefson 1988; Rollefson and Kohler-Rollefson 1989, 1992). There appears to have been a slow recovery towards stability throughout the sixth and fifth millennia BC. The reason for this change does not appear to be climate alone since there is no evidence for a significant change in climate in the second half of the sixth and in the fifth millennia



4. Population growth (annual %) – Jordan (Source: World Bank World Development Indicators).



5. Urban population (% of total) – Jordan (Source: World Bank World Development Indicators).

BC. Gopher (1995: 221) sees the change due a restructuring of society in combination with external influences and local environmental conditions.

As for the area of the southern segment of the Transjordanian Plateau and the Southern Ghawrs and the northeast ʻAqaba, the Pottery Neolithic has so far been identified in the former just to the south of Wādī al-Ḥasā and in the latter region at Fīfā in the Southern Ghawrs and in the Wādī Fīdān region of the northeast ʻAqaba. But the evidence recovered to date cannot be said to be extremely impressive as far as an increase in population is concerned.

Chalcolithic Period (ca. 4500-3500 BC)

The substantial amount of Chalcolithic alleviation in the Western Negev points to wetter conditions about 6000 to 7000 years ago (Goldberg 1987). Although there are no specific studies on climate for the southern segment of the Transjordanian plateau for the Chalcolithic, it may be that wetter conditions also prevailed there as well (for a contrary position see Hill 2006: 38).

The Chalcolithic presence in the area is characterized by the presence of so-called "circular enclosures" (Hill 2006). These features are located throughout southern Jordan (MacDonald *et al.* 1988, 1992, 2004, 2005). However, they are more frequently seen in both the western and eastern segments of the survey territories and specifically in what are today arid zones. Thus, they are encountered in both the Mediterranean and Irano-Turanian, plant-geographical territories. (Development could have destroyed such structures in the central segments of the Transjordanian Plateau). But, it must be noted, that none of these "circular enclosures" have been excavated and published. As a result, any comments about their date and purpose must be made with extreme caution and, in any event, are tentative. Thus, until further studies are carried out relative to the transition from the Chalcolithic to the Early Bronze period, little can be said. But, for the area of interest, there is no evidence of this Chalcolithic population in southern Jordan increasing dramatically and developing even villages let alone urban centers.

The archaeological evidence for the period seems to indicate pastoral activity and probably seasonal camps as herders moved from one area to another depending upon climate — hot-cold and wet-dry — and availability of water and pasturage for their flocks.

Chalcolithic/Early Bronze Period (ca. 3700-3500 BC)

There is evidence that the transition from the Chalcolithic to Early Bronze I corresponds with the onset of more arid conditions which approximate those of today (Rosen 1995). Correspondingly, occupation in the study area appears to have intensified during the Chalcolithic/Early Bronze period since survey-team members found evidence of human presence, in the form of both lithics and sherds, from Wādī al-Ḥasā in the north to Wādī Fīdān in the south. Many of the "circular enclosures" that team members of my four projects recorded may date to this time period. Moreover, it is also during this period that slag is associated, for the first time, with lithics and sherds in the Wādī Fīdān region.

Here again, as for the previous period, human presence in the area of interest seems to have been by pastoralists, miners, and metallurgists. If, indeed, there was an increase in population, climatic conditions were probably not the cause. However, interest in the copper resource of the area and the development of the technologies needed to mine and smelt it was probably factors in leading to an increase in population.

Early Bronze I-IV Period (ca. 3500-2000 BC)

EB I-III (3500-2350 BC) is generally recognized to have been the moistest period during the last 6000 years. During this time, there was increased precipitation throughout the Dead Sea basin. It was followed during the EB IV period (2350-2000 BC) by an arid climate that was similar to, or maybe even more arid than, the present one.

The EB IV period (ca. 2350-2000 BC) is generally recognized to have been a non-urban interlude between the first urban horizon in the third millennium BC and an urban renaissance in the Middle Bronze Age in the second millennium BC. This period saw the abandonment of talls, a population shift to rural areas, and "a change in socio-economic strategies from intensive agriculture, industry and trade to pastoralism and small-scale mixed agro-pastoralism" (Dever 1995: 282). In other words, there was a "collapse" from an urban to a rural and pastoral nomadic pattern of social organization (Dever 1995: 295).

In the territory of interest, however, the above does not hold true. No EB I-III urban centers have been identified. One must look to the north to the area of Bāb adh-Dhrāʻ, in the southeast plain of

the Dead Sea, and to al-Lajjūn, also in the north on the Transjordanian Plateau, for this phenomenon (Chesson *et al*. 2006). However, Early Bronze presence is found in the northeast ʻAqaba from Wādī al-Ḥasā to Wādī Fīdān. Specifically, Early Bronze I-III period evidence is especially evident in the Southern Ghawrs. There are EB I-III cemeteries in the area, specifically at aṣ-Ṣāfī and Fīfā, as well as vast EB IV cemeteries in the Wādī Khunayzīr-Wādī al-Nukhbār region at the limits of the Southern Ghawrs and the beginning of the northeast ʻAqaba (MacDonald *et al*. 1992: 66-69). In addition, there is evidence of metal working in the Wādī Fīdān region during this period. On the Transjordanian Plateau, immediately south of Wādī al-Ḥasā, both EB I-III and EB IV sherds have been found. However, there is nothing about their presence that would indicate more than probable pastoral presence. In fact, team members of both the TBAS and the ARNAS projects identified not one EB IV sherd during six years (1999-2001 and 2005-2007) of infield work.

In Wādī Faynān, Wright *et al*. (1998) documented a large, late fourth millennium or EB I site suggesting domestic activities, including metallurgical activities. Moreover, in the same area, there is evidence of metal production from the Early Bronze Age (Hauptmann and Weisgerber 1987, 1992; Hauptmann 2000; Levy *et al*. 2004; Grattan *et al*. 2007).

An improved climate may have played a role in the increase in population, especially in the southern Ghawrs and northeast ʻAqaba, evidenced by the cemeteries dating to the Early Bronze period. Moreover, improved technologies for extracting and smelting the copper ore may have been a factor. In addition, the development of urban centres to the north and west of the area of interest may also have been a factor in interest in the resources of the area and a consequent increase in population.

Middle and Late Bronze Periods (ca. 2000-1200 BC)

It is thought by some that a warm, dry period, similar to the present climate, perhaps even more arid, contributed around 2000 BC to the collapse of the empires of the Middle East (Weiss *et al*. 1993; Issar 1995: 354). This climatic situation continued until ca. 1200 BC and was probably one of the contributing factors to the end of the Late Bronze Age.

Kitchen finds evidence from the Middle Bronze period for the presence of mainly nomadic pastoralists in what later became the land of Edom. This evidence comes from the story of Sinuhe (ca. 1900 BC) and from the Brussels series of Egyptian "Execration Texts" (ca. 1800 BC). In the texts, Kitchen sees reference to "chiefs" of clans of (the territory) of Kushu (Kushan), that is, the territory south of Wādī al-Ḥasā and east of Wādī ʻAraba (1992: 21-23; 2003: 473).

Egyptian literary evidence from Tall al-ʻAmarna (early 14th century BC) refers to the "lands of Seir" (Pritchard 1969: 488). Thus, the Egyptian scribes knew of a land of "Seir" at this early date (Kitchen 2003: 473).

The term "Edom" appears for the first time in Egyptian literary texts during the time of Merneptah (1236-1223 BC) in Papyrus Anastasi VI (British Museum 10245) in a group of letters, which served as models for schoolboys. One communication presents the form in which an official on the eastern frontier of Egypt might report the passage of Asiatic tribes into the better pasturage of the Delta. Specifically, the text indicates that "the Bedouin tribes of Edom" are permitted to pass the fortress of Merneptah "to keep them alive and to keep their cattle alive" (Pritchard 1969: 259). The picture is one of pastoralists with their livestock (Kitchen 1992: 27, 2003: 474).

Thus, according to the Egyptian literary evidence, there is some evidence for an inhabited Edom/Seir and at least intermittent relations with Egypt from the early Middle Bronze and into the Late Bronze period (Kitchen 1992: 21-27, 2003: 473).

While the Hebrew Scriptures identify the land of Seir with Edom (Gen 32.3; 36.8-9, 21; Num 24.18; etc.), we have no certainty as to just what territory the Egyptian writers had in mind when referring to both "Mount Seir" and "Edom". Are they one and the same territory? Is it the same region as the biblical writers had in mind? Is it the one that is traditionally designated as the "lands of Seir" and the "land of Edom", that is, territory to the east of Wādī ʻAraba and south of Wādī al-Ḥasā?

Archaeological evidence for both Middle and Late Bronze occupation/settlement in southern Jordan is lacking. One must go north of Wādī al-Ḥasā in the Southern Ghawrs at and in the area of Dayr ʻAyn ʻAbāṭa to find even evidence for Middle Bronze tombs (Politis 1993: 505-06, 518, Pl. VI.1-2, 1995: 483-89, 1997: 342, 344-47). Several

sherds from the WHAS were identified as both Middle and Late Bronze. However, they came from sherd scatters and were not associated with architectural remains. As a result, the best that can be said, on the basis of the Egyptian texts, is that pastoralists were in the area during at least some of this time-span of around 800 years.

Was a deteriorating climate responsible, at least in part, for the decrease in population in the southern part of Jordan? Moreover, was the breakdown of international trade and commerce at the end of the Late Bronze Age also a factor?

The Iron Age (1200-539 BC)

Around 1300-1000 BC there is evidence of a series of narrow tree rings, indicating poor growing conditions and a change from Mediterranean to Saharan vegetation. This suggests a shift from a relatively moist to a much drier climate. In Gratten *et al.*'s (2007: 89) words, the first millennium BC was characterized by "a grass-dominated steppe … essentially the modern climate and geomorphic regime". Danin's (1995) study of the Dead Sea sediment levels indicated that this body of water dropped to -400m asl. In addition, Rosen (1995) points to the extinction of oak in Galilee as indicating dryness during the Iron Age period. This trend continued since studies indicate a slightly drier climate during the tenth and seventh centuries BC relative to preceding ones (see, for example, Goodfriend 1990 and Goldberg 1995).

There does not seem to be a correlation between improved climatic conditions and "filling up" during the Iron II period. The indications are that the period was one during which a dry climate prevailed. However, as we shall see below, the region "filled up" rather than "emptied out" under these less favorable climatic conditions. Thus, we must look for factors other than an improved climate to explain the situation in Edom during the Iron II period.

At the beginning of the period, Ramesses III (1198-1166 BC) claims: "I destroyed the people of Seir among the Bedouin tribes. I razed their tents: their people, their property, and their cattle as well, without number, pinioned and carried away in captivity, as the tribute to Egypt. I gave them to the Ennead of the gods, as slaves for their houses" (Pritchard 1969: 262).

Here again, as for the earlier Egyptian literary evidence for the end of the Late Bronze Age, there is evidence for an inhabited Seir — at least by pastoralists — and at least intermittent relations with Egypt at the beginning of the period (Kitchen 2003: 474). But the question must again be asked as to where was the geographical area that the Egyptians had in mind when they used the terms "Seir" and "Edom". The answer to this question is relevant since the area generally referred to as "Idumea" of New Testament times (Mark 3.8) is not generally identified with the traditional homeland of the "Edomites".

Assyrian and Babylonian texts refer frequently to Edom. First the Assyrian and then the Babylonian ones are considered.

Adad-Nirari III (810-783 BC), relative to an expedition to Palestine, claims to have subdued the land of Edom, along with other lands, and imposed tax and tribute upon it (Hallo and Younger 2000: 276; similarly Pritchard 1969: 281).

In a text, which was likely composed in or shortly after his 17th regnal year, Tiglath-Pileser III (744-727 BC) claims, relative to campaigns against Syria and Palestine, to have received the tribute of Qaušmalaka, the Edomite (Hallo and Younger 2000: 289; Pritchard 1969: 282). Sargon II (722-705 BC) makes a similar claim without naming the ruler of Edom (Pritchard 1969: 287).

A cuneiform text summarizes the campaign of Sennacherib's (704-681 BC) siege of Jerusalem in 701 BC. In it, Sennacherib claims that Ayarammu of Edom brought him sumptuous presents as his abundant audience-gift … and kissed his feet (Hallo and Younger 2000: 302-03). This indicates that the ruler of Edom visited the Assyrian ruler.

Relative to his Syro-Palestinian campaign, Esarhaddon (680-669 BC) claims that he called up a number of kings, among them Qaushgabri, king of Edom (Pritchard 1969: 291). The same Edomite king is also found in a list of kings from the time of Ashurbanipal (669-633 BC) (Pritchard 1969: 294). (The king's name also appears on a bulla found in the excavations of Umm al-Biyāra, within Petra [Hallo and Younger 2000: 201]).

In Ashurbanipal's campaign against the Arabs, the ruler states that he inflicted countless routs on, among other towns, those of Edom (Pritchard 1969: 297-98). Finally, from the time of the same ruler there is a record of receipt of tribute from Palestine: "Two minas of gold ….; [… mi]nas of silver from the inhabitants of [Edom] (*mat* [*U-du-ma*]-*a-a*)…." (Pritchard 1969: 301).

It is evident from the texts that the Assyrians knew of the land of Edom and its kings and had entered into a relationship with them — that of master to servant. The Assyrians claim to have subdued the land of Edom, imposed tax, and received tribute from it. Specific Edomite kings are named who brought sumptuous presents to and kissed the feet of their overlords.

Nabonidus (556-539 BC), the last Babylonian king, laid siege to the "town of Edom" (Pritchard 1969: 305), probably Buṣayra, the Edomite capital. He probably captured it in the third year of his reign. In the same vein, a Babylonian stela, located high in the cliffs as one begins the climb to the top of as-Sal', an Edomite place of refuge to the northwest of Buṣayra, probably alludes to the same event. The person depicted on the relief appears to be Nabonidus, who, as indicated above, is believed to have besieged Busayra and annexed Edom on his way to Tayma in Arabia (Dalley and Goguel 1997; Zayadine 1999).

The biblical writers are aware of inhabitants in the land of Edom. They trace the ancestry of these people, i.e., the Edomites, to Esau, the son of Isaac and the elder-twin brother of Jacob. They have them settled, at an early date, in the hill country of Mount Seir (Gen 36.9; Deut 2.4, 5, 8, 12), which is identified with the country of Edom (Gen 32.3; Judg 5.4).

The Edomites are said to have caused problems for the Israelites on their way from the land of Egypt to the land of Canaan (Num 20.18-21) — traditionally dated to the end of the Late Bronze/ beginning of the Iron Age period. From then on, the biblical writers generally depict the people of the land of Edom as the enemies of the Israelites (see, for example, 2 Sam 8.11-12; 1 Kings 11.15; 2 Kings 8.20-22; 14.7). Thus, throughout the period of the Old Testament, the land of Edom appears to have been populated by enough people to have cause a threat to Israel.

Relative to the early Iron Age, there is archaeological evidence for human presence in the northwest extremity of the WHAS territory (MacDonald *et al*. 1988: 171-78). Similarly, in the Southern Ghawrs and northeast 'Aqaba, there is evidence for Iron I presence (MacDonald *et al*. 1992: 73-76). Specifically, Iron I period presence appears to be associated with mining and smelting activities in the Wādī Faynān region, especially at Khirbat an-Nuḥās (Levy *et al*. 2004). Farther south, and on the plateau, Iron I sherds have been identified in the northwest segment of the TBAS territory (MacDonald *et al*. 2004: 56-58).

There appears to have been an increase in population in all of the territory of interest during the Iron II period (1000-539 BC). In fact, this period, is in third place in the four survey projects that the writer carried out relative to the number of sites from which team members collected sherds from a particular period. Moreover, the majority of Iron Age sites, for example, Ghurayra (Hart 1988), Ṭawīlān (Bennett and Bienkowski 1995), Busayra (Bienkowski 2002), Umm al-Biyāra (Bennett 1966), Khirbat ad-Dabbah (Whiting 2005) that have been excavated in the area all date to the Iron II period, specifically the eight-sixth centuries BC. Moreover, the extensive survey work that Lindner carried out in the southern part of Jordan over the past 25 years identified a number of mountain-top and other types of "Edomite" sites, e.g., , Ba'ja III, Jabal al-Quṣayr, Khirbat al-Mu'allaq, as-Sal', Umm al-'Ala, and Umm al-Biyāra (Lindner 1992; Lindner *et al*. 1996a-b). In addition, Levy *et al*. (1999) excavated a tenth-ninth century BC cemetery in Wādī Fīdān.

The excavations, surveys on the part of Hart (1987a-b; 1988; see also Hart and Falkner 1985) and Lindner (1992) as well as the work that I have done in the area all indicate the large number of agricultural villages, hamlets, and farms in the area of the southern Transjordanian Plateau during the Iron II period. The precise dating of these sites within the period needs to be made specific by way of excavations.

There is the possibility that there were a number of fortresses and/or watchtowers in the area during Iron II and there are indications of increased mining and smelting activity in Wādī Fīdān/Faynān at this time. The date of Levy's fortress at Khirbat an-Nuḥās is still a matter of dispute (Levy *et al*. 2004; Finkelstein 2005). However, the work of Fritz (1994; 1996) at Barqat al-Ḥuṭayya, close to Wādī Fīdān, and north of Wādī Fīdān at Khirbat an-Nuḥās indicates a probable Iron II date.

The present evidence favors a change from mainly pastoralism to a combination of pastoral/ agricultural activity as one goes from the early Iron Age into the Iron II period. Of course, the Iron II period, sedentary way of life would have been supported by the Assyrian control, beginning with Adad-Nirari III's (810-783) "Expedition to Pales-

tine" where Edom is mentioned as one of the areas conquered.

The Iron II period, as noted above, in southern Jordan appears to be a time of "filling up". And the best explanation for this phenomenon would be the movement of people into the area. With increases of population in areas to the north and west, this peripheral region would become one where a surplus population would have settled. Knauf sees this increase as the result of the migration of Canaanite agriculturalists that fled their homeland after the collapse of the Late Bronze Age Canaanite city-state system. He equates these newcomers with the Horite tribes of Genesis 36 (1992: 49). These newcomers would have intermingled/intermarried with those — probably pastoralists — already in the area. In Bartlett's (1989: 64, 65) and LaBianca and Younker's view (1995: 402, 406), however, the increase in population on the highland plateau of Transjordan is to be sought in the preexisting population. I do not think that the increase in population can be explained by an exceptionally high birth rate during the time period from Iron I to Iron II.

The Edomites were undoubtedly involved in the mining and smelting of copper since it was one of the most important metal resources of the Ancient World. Control of this mineral resource was important and it would have fallen within the economic and political control of both the Edomites and, at times, their overlords the Assyrians during the Iron II period (Grattan *et al*. 2005: 654).

Furthermore, the Edomites were also involved in the spice trade, the caravans of which would have passed through their land on their way to both Damascus in Syria and to Gaza on the Mediterranean (Singer-Avitz 1999; Bienkowski and van der Steen 2001: 24). The domestication of the camel would have been important for this activity on the part of the Edomites.

Miners, metallurgists, and traders require services. Those so involved would have looked to the population of the country in which they worked, and/or passed through for water, food, security, and so forth. Thus, entrepreneurs would have been attracted to the area to provide these needs. The providing of these services would have also required greater agricultural production and thus more people would have been employed in this service industry and this too would have led to an increase in population. Involved in this would have been new technological advances such as the development of agricultural terraces (Hill 2006: 46) and the expansion of plow agriculture (LaBianca and Younker 1995: 399). Moreover, the Assyrians brought peace to the area and a stable political situation would have resulted in an increase in population since such a situation attracts people to an area.

Thus, a number of factors appear to have been responsible for the increase in population in Edom during the Iron Age. These factors include mining and smelting, the caravan trade, technological advances such as agricultural terraces and plow agriculture, a stable political situation, and the need for a service industry. It appears that the Iron II period was the first one in prehistory and history in which the Edomite plateau would have been "filled up".

Persian (539-332 BC) and Hellenistic (332-63 BC) Periods

The climate became colder between 300-200 BC. However, this does not appear to have had an immediate effect on increased population in the area. In fact, on the basis of our present understanding of the archaeological evidence, it can be posited that this period witnessed a decline in human population in the southern part of Jordan.

Frumkin *et al.*'s (1991; see also Frumkin 1997) comprehensive climate record for the Holocene, derived from the salt caves of Mount Sedom near the southwestern boundary of the Dead Sea, indicates that an arid climate characterized the third century BC as the average Dead Sea level stood at ca. -400 metres. In their opinion, a change towards increased humidity began at the beginning of the second century BC.

Both the Persian and Hellenistic periods are poorly represented in the territory of interest. Nevertheless, in the first cuneiform tablet, which is dated to the accession year of one of the Achaemenid kings named Darius (Darius I [521 BC], Darius II [423 BC], or Darius III [335 BC]), ever found in Jordan, the name and patronymic of the man who writes about the sale of two rams are compounded with the name of the Edomite god Qos (Bienkowski 1997:157). The tablet, which is a legal document from Harran in Syria, indicates some activity and, thus, inhabitants, in Ṭawīlān, where the tablet was found, during the Persian period (Bienkowski 1997:158).

There also appears to have been occupation of Buṣayra during the Persian and possibly the Hellenistic periods. The evidence comes from pottery

sherds that date to the fourth and third centuries BC (Bienkowski 2002: 477). Moreover, there is evidence for the extraction of bitumen from the Dead Sea during the Hellenistic period (Hammond 1959; MacDonald *et al*. 1992: 20; MacDonald 2006: 78).

Was this period of "emptying out" due to a deteriorating climate and/or to the fact that following the destruction of Jerusalem and the Babylonians' deportation of Judeans from their homeland better land resources became available to the northwest and thus a migration on the part of the population of southern Jordan there? There is ample evidence for Edomite-speaking people in the Negev beginning in the seventh century BC (MacDonald 2005: 234).

Roman (and Nabataean) Period (63 BC-AD 324)

As indicated above, a change towards increased humidity began at the beginning of the second century BC. This trend continued during the first half of the Roman period. Thus, in the southern Levant, the Early Roman period (63 BC-AD 135) coincided with a relatively wet phase (Frumkin *et al*. 1991: fig. 12; Frumkin 1997: 244), which reached its average peak ca. AD 90. In the second century AD, the climate began its drier trend (Frumkin *et al*. 1994: fig. 6; Frumkin 1997: fig. 22-4).

There is a substantial increase in both the literary and archaeological evidence for this period. For example, Diodorus (in 312 BC) reports about an Arab tribe — Nabataeans who appeared in Edom and established its centre in Petra (Rosenthal-Heginbottom 2003: 15).

The evidence from work within and in the Petra area are a support for this position. The Roman road /*Via Nova Traiana*, connecting Bostra in southern Syria to al-'Aqaba on the Red Sea, was built in AD 111-114. It cuts through the territory of interest and many forts and watchtowers are associated with it, e.g., Rujum al-Farādiyyah (MacDonald *et al*. 1988: 226-28); Khirbat at-Tuwānah (MacDonald *et al*. 2004: 348-54); Udhruḥ (Parker 1986: 94-98; Killich 1989); and to its east such structures as Umm 'Ubtulah (MacDonald 1984; Kennedy and Bewley 2004: 92-93); ar-Ruwayḥī (MacDonald *et al*. 1988: 210-12); Jurf ad-Darāwīsh, a *castellum*, and Qaṣr al-Bint, a watchtower, nearby (Parker 1986: 91-93; MacDonald *et al*. 2004: 284-85); ad-Da'jāniyah, a *castellum* (Parker 2006); etc.

In the Southern Ghawrs and northeast 'Aqaba there is ample evidence for occupation / settlement during this period. For example, a fort high in the hills to the southeast off aṣ-Ṣāfī, Umm aṭ-Ṭawābīn (MacDonald *et al*. 1992: 86-87), and farther to the south Rujm 'Umruq (MacDonald *et al*. 1992: 89) and Khirbat aṭ-Ṭilāḥ (MacDonald *et al*. 1992: 89, 91-93). Even father to the south, Khirbat Faynān appears to have been the only community existing in the wadi in the later Roman period and seems to have been inhabited almost totally by slaves and Christians sent to work the mines (Freeman and McEwan 1998: 68).

During the Roman period there was an increased emphasis on agriculture, especially irrigation agriculture (Hill 2006: 50). A large foreign power affected settlement location and types as well as production demands (Hill 2006: 52). There was an interest in maintaining the flow of Arabian trade in eastern commodities that was developed by the Nabataeans (Hill 2006: 53).

Moreover, there is evidence for numerous agricultural villages/hamlets and farmsteads dating to the period as evidenced from the work of the WHAS (MacDonald *et al*. 1988), SGNAS (MacDonald *et al*. 1992), and TBAS (MacDonald *et al*. 2004) projects that I carried out on the plateau. All these would be necessary to feed the increased population in the south of Jordan and especially the metropolis of Petra and its involvement in the caravan trade.

When the direction of the incense trade shifted to Egypt — the first century BC-early first century AD — the Nabataeans lost their monopoly of this trade and became agriculturalists. Both Aretas IV and Rabbel II were enthusiastic supporters of agricultural development and water-supply systems. Rome annexed Nabataea in AD 106 and the inhabitants of the area accepted Christianity in the fourth and fifth centuries AD (Rosenthal-Heginbottom 2003).

After an "emptying out" at the end of the Iron II period, which continued throughout the Persian and Hellenistic ones, the Roman (and Nabataean) period was one when the southern segment of the Transjordanian plateau was again "filling up". A number of factors are responsible for this. Among them would have been an improvement in climate, improved technologies for the mining and smelting of the available ore and in the field of hydraulic engineering, continued interest in and promotion of

the spice trade and agriculture, and a stable imperial power.

Byzantine Period (AD 324-640)

The Byzantine period is considered to be a time in the Levant when there was maximum settlement or a period of "filling up". There was continuity with the previous one, an expansion of settlement, a peak of population and desert agriculture, a shift in the local economy from international exchange and caravan traffic towards agriculture and local exchange, and diminishing importance of the Arabian trade network (Hill 2006: 53-54; see also Hirschfeld 2004: 133). This period, like the one before it, was marked by technological ability, especially in the field of hydraulic engineering and by a high level of organization (Hirschfeld 2004: 144).

Issar sees climatic change as the main factor in the expansion of settlement (1995. 1998; Issar and Govrin 1991; Issar and Makover-Levin 1995). A second position minimizes the influence of climatic change and emphasizes the role of human abilities as the main agent of the expansion of settlement in this period (Hirschfeld 2004: 133). For example, Frumkin *et al*. (1994: 323, fig. 6) see the beginning of the Byzantine period as one in which the climate was significantly drier than during the first century BC and the first century AD. In their opinion, the climate became more and more arid in the course of the period (Frumkin *et al*. 1994: 323, fig. 6; Frumkin 1997: 240, fig. 22-4).

Patrich (1995: 473) is of the opinion that the prosperity and density of the Negev settlements, in the area to the west of the territory of interest, should be attributed more to state encouragement and human labor, than to major climatic factors. He thinks that if a climatic change did occur, it was on a minor scale — perhaps increasing the average yearly precipitation by not more than 50mm and increasing only slightly the number of rainy days per annum (Patrich 1995: 473).

During 1979-1983, WHAS project team members collected Byzantine period sherds from 125 sites. At 52 of these sites, Byzantine sherds were predominant (MacDonald *et al*. 1988: 232-38, and 239, fig. 60). In addition, what we read as Late Roman-Byzantine, Byzantine-Umayyad, and Byzantine/Mamluk sherds were collected at a number of additional sites (MacDonald *et al*. 1988: 232-49).

On the TBAS project, where random squares as well as sites were investigated, team members collected Byzantine ceramics at the majority of the squares in Zones Busayra, 1, and 2 (MacDonald *et al*. 2004: 61-62). In addition, they collected sherds from the same period at slightly more than 50 percent of the 290 sites investigated (MacDonald *et al*. 2004: 61-62, and fig. 25).

The situation is similar farther south in the territory of the ARNAS project. Here again, Byzantine sites are a common occurrence (MacDonald *et al*. 2005: 288, 2006: 116-17). And the Byzantine sites in this area, like those in the areas of both the WHAS and the TBAS, are, for the most part, agricultural villages/hamlets.

Finally, Byzantine period sites are by far the most common within the SGNAS territory. This evidence does not come only from the collections of the SGNAS project (MacDonald *et al*. 1992: 97-112) but from the work of Politis *et al*. in the Southern Ghawrs (see, for example, Meimaris and Kritikakou-Nikolaropoulou 2005).

While the Southern Ghaws is noted for its Christian importance, there is evidence for churches throughout the territory of interest. For example, a hermitage in Wādī ʻAfrā (MacDonald 1980; MacDonald *et al*. 1988: 243-44), recycled Greek inscriptions, at both aṭ-Ṭafīlah and Buṣayra (Gagos 2004: 421-22), which probably came from churches, and toponyms with the name Dayr probably testify to such presence.

Once again, as for the Iron II period, there does not appear to be a correlation between good climatic conditions and the high population that is evidenced not only in this area but throughout the Levant during the Byzantine period. Here, again, the "filling up" may be due to increased populations elsewhere or, as Patrich indicates "state encouragement and human labor" (1995: 473). This necessitated the use of a peripheral area to "house" this increase. The people involved, during both the Roman (Nabataean) and Byzantine periods, would probably have been those who had been there all along plus newly-arrived immigrants.

The Islamic Period (AD 640-1917)

I will begin with the Islamic period in general. Then I will zero in on the Early, Middle, and Late divisions of this larger period. At the outset, it must be stated that there is not general agreement among Islamic scholars relative to the divisions within the period.

During the seventh and eighth centuries the Um-

ayyads established the Ḥajj Route — Syrian Hajj route (*Darb al-Ḥajj al-Shamī*) — as the principal road connecting Makkah with their capital in Damascus (Petersen 2001: 685). At the beginning, the route in Jordan followed a westerly track along the King's Highway in the Highlands at the Eastern Rim of the Wādī ʻAraba-Jordan Graben. During the Middle Islamic period the three fortresses of ʻAjlūn, al-Karak and ash-Shawbak protected this route in Transjordan. In the 16th century, the Ottomans made the Ḥajj Route part of a direct route between Makkah and the imperial capital at Constantinople (Petersen 2001: 685). The route was then changed so that it now lay along the edge of the desert. Part of the reason for this was the fact that a more easterly route was more accessible during all periods of the year. It, unlike the direction of the previous one, would not be so affected by the flooding of the wadis in their western extremities. This route is the one now followed, in part, by the modern Desert Highway.

While southern Jordan was under the influence of Damascus during the Umayyad period, it was Egypt who exerted influence during the Ayyubid and Mamluk periods. During the Ottoman period, the Turkish sultans from Constantinople were the dominating power. It was only for a short period of time, between AD 1099 and 1187 that the Crusaders were in control. It was the Ayyubid period that marked the return of Muslim control to the area.

Relative to the climate during the Islamic period, palaeoclimatic research points to two additional humid intervals that occurred in our area of interest after the Byzantine period. They are the Mamluk period (12th-14th centuries) and the late Ottoman period (the 19th and early 20th twentieth centuries) (Issar 1998: 125).

Early Islamic Period (AD 640-1099)

Evidence for Early Islamic presence is sparse on the Transjordanian Plateau between Wādī al-Ḥasā and Rās an-Naqab. However, in the Southern Ghawrs the situation is somewhat different. There appears to have been human presence in the Southern Ghawrs throughout the Islamic period. Here, the inhabitants were engaged, during the late Early and Middle Islamic periods, in the growing and processing of indigo and sugar cane, especially in the area of aṣ-Ṣāfī (Whitcomb 1992: 116-17). In addition, occupation at Dayr ʻAyn ʻAbāṭa, just to the north of Wādī al-Ḥasā in the Southern Ghawrs, continued into the Early Islamic period (Politis 1995: 486, 1997: 47).

How can one explain the drastic shift in the territory of interest from numerous sites during the Byzantine period to relatively few during the succeeding period? Climate? Change in religion?

Middle Islamic (Crusader [AD 1099-1187]; Ayyubid [AD 1187-1250]; Mamluk [AD 1250-1517]) Period

The Crusader armies arrived in the Levant in AD 1099. They built a series of forts in the territory of interest that included aṭ-Ṭafīla, ash-Shawbak, Wuʻayra — just outside Petra, and al-Ḥabīs — within it. These Crusader-controller installations all impeded Islamic communications between Egypt and Syria (Milwright 2006: 4).

The castle at aṭ-Ṭafīla, generally dated to the Ottoman period, may well be the site of the Frankish fortress mentioned in a Latin document dated AD 1239 that lists the castles of Outrejourdain. It seems likely that the castle occupied the same site as the present rectangular one (Johns 1937: 96; Pringle 1997: 98, no. 214, 2001: 680; MacDonald *et al*. 2004: 300-02).

A castle called al-Salʻ was captured from the Franks in Ramadan 584 H/AD 1188-89 by the Ayyubid amir along with al-Karak and ash-Shawbak. A Latin list of castles in Muslim hands around 1239 refers to it as *Celle*. Salʻ is listed in the territories of Karak in ca. 1300. It is not stated whether it was still functioning as a fort by this time (the account may, however, contains anachronistic data) (Milwright 2006: 10). Khirbat as-Silʻ, a natural rock castle some 10 km south of aṭ-Ṭafīla, is sometimes attested as its location. Here, medieval occupation is attested by surface finds of pottery (Zayadine 1985: 164-66, fig. 9; Lindner 1992: 145-46, note 1; Pringle 2001: 680; however, see MacDonald *et al*. 2004: 276 where no Islamic pottery is reported).

In 1115 Baldwin I founded the castle of ash-Shawbak, or 'Mount Royal', to protect the southern approaches to Palestine, control the desert route, and to act as a center for Frankish settlements. It stood on one of the main routes between Cairo and Damascus. Moreover, it threatened the free traffic of Syrian pilgrims making the annul ḥajj to the Holy Cities of Makkah and al-Medina. As such, Baldwin was able to extract payments from merchants and pilgrims passing through Jordan via the King's Highway (*darb al-malik*, and also *darb al-sulṭan*

and *ṭarīq ar*-Raṣīf) and other routes farther east (Milwright 2006: 3-4). The castle contains the remnants of two churches — one is dated to AD 1116 according to Milwright (2006: 3), 1118 according to Pringle (2001: 678).

Two other Frankish castles in the area of interest are that of al-Wu'ayra, northeast of Petra on the north side of Wādī Mūsā, and al-Ḥabīs, within Petra. The former probably dates from the 1140s and its Christian nature is demonstrated by the existence of a chapel (Pringle 2001: 681). The latter dates to the period AD 1116 to ca. 1188 (Hammond 1970: 35). The castle of al-Wu'ayra declined in status under Ayyubid rule, which indicates that it was of greater strategic significance to the Latins of Oultrejourdain (Milwright 2006: 26). The fort of al-Ḥabīs appears to have been abandoned close to the end of the 12th century (Hammond 1970: 35).

Ṣalāḥ al-Dīn, an Ayyubid leader, defeated the Crusaders in the Battle of Ḥiṭṭīn in July 1187. In 1187-88 the Crusader castles of Outrejourdain fell to his armies. Finally, the Latin Kingdom ended in Syria-Palestine by 1291. By this time, the Mamluks (AD 1250-1517) had replaced the Ayyubids as the dominant power.

During the Ayyubid and Mamluk periods, with the exception of ash-Shawbak and the Southern Ghawrs, the area south of the Wādī al-Ḥasā appears to have been the least economically developed part of Jordan (Milwright 2006: 20). The most economically significant crop, it appears, was the sugar cane grown in the Dead Sea Ghawr (Whitcomb 1992: 116-17) and the Jordan valley.

Except for a brief period, the Islamic population of southern Jordan did not appear to have an interest in the copper resources of the Wādī Fīdān/ Faynān region (Grattan *et al*. 2007). The interest that was shown could have taken place at the end of the Mamluk or the beginning of the Ottoman period (see Grattan 2007; Grattan *et al*. 2007). The main interest of the Islamic rulers in the south was that of safe passage for the pilgrims on their way to Makkah and al-Medina.

Late Islamic (Turkish-Ottoman [AD 1517-1917]) Period

A more arid phase begins at least around AD 1400, if not earlier, in late Mamluk times (Ghawanmeh 1995). This continues until Modern times.

The early Ottoman period was one of prosperity and a time of renewed stability and investment in the Wādī al-Ḥasā area and in Jordan in general. This was due to the fact that the area was included in a great and well-governed empire (Hütteroth and Abdulfattah 1977: 7). Much of the interest in the Wādī al-Ḥasā area had to do with the defense of religious pilgrims on their way to Makkah. These improvements in stability and the extension of cultivation have led Hütteroth and Abdulfattah (1977; see also Hütteroth 1975) to call this the golden age of the Ottoman Empire (Hill 2006: 60). However, there was a 40-50 % change in the density of population between 1596/97 and ca. 1880 AD. The reason is the general decline of the administrative and fiscal organization of the state, which began at the end of the 16th century (Hütteroth and Abdulfattah 1977: 56-58). The picture of the country in the late 16th century is similar to that of the late 19th century when migrations into the country on the part of the Druze, Armenians, and Circassians began.

It was during the reign of Suleiman the Magnificent (AD 1494-1566) that the route to Makkah was changed so that it now lay along the edge of the desert. The WHAS found evidence of this route in the form of a bridge and segments of a paved road in the eastern segment of Wādī al-Ḥasā (MacDonald *et al*. 1988: 280). These structures would have been important especially during the rainy months of the year. Members of the TBAS project found remnants of milestones at Jurf ad-Darāwīsh (MacDonald *et al*. 2004: 385) and probably a watchtower, Rujm al-Ḥajj, just north of Jurf ad-Darāwīsh (MacDonald *et al*. 2004: 386). In addition, there were other Ottoman routes through the territory. For example, the *Darb ar-Rasīf* went from Ma'ān on the plateau to Garandal in the central Wādī 'Araba.

During the Ottoman period, within the area of interest, forts and watchtowers along this route included Qal'at al-Ḥasā (18th century [1757-74]), Qal'at al-'Unayza (late 16th century [1576] and Qal'at Ma'ān (16th century [1531]). As an oasis, Ma'ān was the largest settlement on the Ḥajj route (in Jordan) and pilgrims spent two days there resting and buying supplies for the next stage of the journey (Petersen 2001: fig. 28.1, p. 687 and p. 690-91).

To the west, as mentioned previously, there is an Ottoman fort at aṭ-Ṭafīla (Johns 1937: 96; Pringle 1997: 98, no. 214, 2001: 680; MacDonald *et al*. 2004: 300-02).

Late in the Ottoman period the Hejaz Railway was built. The initial plan was that the railway

would go from Damascus to Makkah and ultimately to the Yemen. However, it never got farther than al-Medina (1,789km from Damascus to al-Medina) largely because of local political objections. A primary concern in building the route was to bring pilgrims to the holy cities of Makkah and al-Medina. However, military and commercial ambitions were not far behind. The line would follow the centuries old Ḥajj route well away from the coast and the whole enterprise was entirely Turkish funded and largely built by the Turkish army Railway Battalions of conscript labor. The railway reached Ma'ān in 1904 and its terminus at al-Medina in 1908. Passenger traffic accounted for about half the total revenue generated by the railway, though in fact this was largely concentrated to the north. Within the Hejaz proper, most traffic comprised pilgrims and troop movements. T. E. Lawrence (1935) was regarded as the "principal expert" on it. The railway was subject to allied intelligence as early as 1915. The harassment of the line, designed to keep the Turks bottled up in the Hejaz, is well known. In southern Jordan the railway continues to provide: rails are now used as roof beams and sleepers as fence posts.

Within the territory of interest, Ottoman railway stations are located at al-Ḥasā, Jurf ad-Darāwīsh, and Ma'ān.

There are also many Ottoman period villages and towns in the territory of interest in the southern segment of the Transjordanian Plateau (see MacDonald *et al.* 1988, 1992, 2004, 2005). These settlements would have provided provisions for those who first worked on building the roads, the railway, and its stations. In addition, all would have to be manned and maintained. Once the routes and railway were established, there would be the need for providing for those who traveled along them. Towards this end, the farmers and pastoralists of the region would have provided wheat, fruit, vegetables, goats, sheep, and their byproducts.

In the Southern Ghawrs there were Ottoman period village at Fīfā (MacDonald *et al.* 1992: 123). This is attested not only by archaeology but by the visitors to the area in the 19th century. Furthermore, the aqueduct in Wādī Khunayzīr probably dates to the period (MacDonald *et al.* 1992: 178 [Photo 32], 261 [Site 112]).

There is record of Turkish taxation of the area (see Hütteroth 1975; Hütteroth and Abdulfattah 1977, 1978).

Conclusions

The Iron II, Roman (and Nabataean), Byzantine, and the very end of the Late Islamic Age were times when the southern segment of the Transjordanian Plateau was "filling up". During these periods, there is ample evidence for towns, villages, hamlets, farms, and seasonal camping sites. Conversely, the Pottery Neolithic, the Early-Late Bronze, the Persian-Hellenistic, and the Early Islamic — with the exception of the Southern Ghawrs — periods were ones in which there seems to have been little in the way of human presence in the area. During these latter periods, times of "emptying out", pastoralism appears to have been the primary mode of subsistence.

No one factor can be seen as responsible for the rise and fall of population numbers in the region from Wādī al-Ḥasā to Rās an-Naqab. Climate, certainly, must be taken into consideration in an attempt to understand the dynamics of the "filling-up" and "emptying-out" of the area. However, other factors must also be considered.

For people to settle in an area, there is the need for water and arable land to grow the crops that are needed by both humans and beasts, whether domestic or wild. Moreover, both would have to develop adaptive strategies to content with changes in climate, deterioration of land resources, and natural occurrences.

Other important resources in the area would have been copper, manganese, bitumen, and salt. But in order to "harvest" these resources there would have been the need for appropriate technologies. Moreover, these would have to be improved and developed through time. For example, developments such as the plow and terracing would have increased food production. Moreover, new technologies needed to be developed relative to the extraction of copper, its smelting on site, and/or its "shipping" elsewhere for processing.

In order for all the above to succeed, there would have been the need of a stable government by such as the Assyrians, Romans, Byzantines, and Ottomans. It would have been advantageous for these governments to insure that conditions were conducive to new developments in hydrology, food production, the extraction of minerals, and that the trade routes were both secure and that needed services were available along them.

Stable governments would have seen that traders would be provided with information relative to

which routes were passable or not at certain times of the year, and whether or not the required services would be provided along the desired route. Relative to the needs of pilgrims on their way to Makkah and al-Medina, there would be the need again for security and the services that pilgrims require in the form of water, food, places for rest, animals, etc.

In conclusion, it appears that a number of factors have to be taken into consideration when attempting to understand the dynamics involved in understanding why there were periods of "filling up" and "emptying out" as far as human presence/absence in the area between Wādī al-Ḥasā and Rās an-Naqab is concerned. No one factor can explain the ebb and flow of human presence/absence in the region.

References

Barker, G.W. 1999. Environment and Land Use in the Wadi Faynan, Southern Jordan: the Third Season of Geoarchaeology and Landscape Archaeology (1998). *Levant* 31: 255-92.

Bartlett, J.R. 1989. *Edom and the Edomites*. Sheffield, UK: Journal for the Study of the Old Testament Press.

Bender, F. 1974. *The Geology of Jordan*. Trans. M. K. Khdeir. Berlin: Gebruder Borntraeger.

—— 1975. Geology of the Arabian Peninsula: Jordan. *United States Geological Survey*. Professional Paper 561-1.

Bennett, C.-M. 1966. Fouilles d'Umm el-Biyara. Rapport préliminaire. *Revue Biblique* 73: 372-403, figs. 1-4, pls. 14-25.

Bennett, C.-M., and Bienkowski, P. 1995. *Excavations at Tawilan in Southern Jordan*. British Academy Monographs in Archaeology 8. Oxford, UK: British Institute at Amman for Archaeology and History.

Bienkowski, P. 1997. Tawilan. Pp. 156-58 in E.M. Meyers (ed.), *The Oxford Encyclopedia of Archaeology in the Near East 5*. New York/Oxford: Oxford University Press.

—— 2002. *Busayra: Excavations by Crystal-M. Bennett 1971-1980*. British Academy Monographs in Archaeology No. 13. Oxford: Oxford University Press.

Bienkowski, P., and van der Steen, E. 2001. Tribes, Trade, and Towns: A New Framework for the Late Iron Age in Southern Jordan and the Negev. *BASOR* 323: 21-47.

Bisheh, G., Farajat, S., Palumbo, G. and Waheeb, M. 1993. The Cultural Resources Management Project in Jordan: Archaeological Survey of the Ras an-Naqab – Aqaba Highway Alignment, 1992. *ADAJ* 37: 119-33.

Brown, R.M. 1988. Report of the 1987 Excavations at el-Wueira. Report to the Department of Antiquities.

Chesson, M.S., Makarewicz, C., Kuijt, I. and Whiting, C. 2005. Results of the 2001 Kerak Plateau Early Bronze Age Survey. *AASOR* 59: 1-62 Boston, MA: American Schools of Oriental Research.

Dalley, S. and Goguel, A. 1997. The Sela Sculpture: A Neo-Babylonian Rock Relief in Southern Jordan. *ADAJ* 41: 169-76.

Danin, A. 1995. Man and the Natural Environment. Pp. 24-37 in T. E. Levy (ed.), *The Archaeology of Society in the Holy Land*. London and Washington: Leicester University [paperback edition 1998].

Dever, W.G. 1995. Social Structure in the Early Bronze IV Period in Palestine. Pp. 282-96 in T. E. Levy (ed.), *The Archaeology of Society in the Holy Land*. London and Washington: Leicester University [paperback edition 1998].

Finkelstein, I. 2005. Khirbet en-Nahas, Edom and Biblical History. *Tel Aviv* 32: 119-25.

Freeman, P.W.M. and McEwan, L.M. 1998. The Wadi Faynan Survey, Jordan: a Preliminary Report on Survey in Area WF2 in 1997. *Levant* 30: 61-68.

Fritz, V. 1994. Vorbericht über die Grabungen in Barqa el-Hetiye im Gebiet von Fenan, Wadi el-`Araba (Jordanien) 1990. *Zeitschrift des Deutschen Palästina-Vereins* 110: 125-50.

—— 1996. Ergebnisse einer Sondage in Hirbet en-Nahas, Wadi el-`Araba (Jordanien). *Zeitschrift des deutschen Palästina-Vereins* 112: 1-9.

Frumkin, A. 1997. The Holocene History of the Dead Sea Levels. Pp. 237-48 in T.M. Niemi, A. Ben-Avraham and J. R. Gat (eds.), *The Dead Sea: The Lake and Its Setting*. New York: Oxford University Press.

Frumkin, A., Magaritz, M., Carmi, I. and Zak, I. 1991. The Holocene Climatic Record of the Salt Caves of Mount Sedom, Israel. *Holocene* 1/3: 191-200.

Frumkin, A., Carmi, I. and Zak, I. and Magaritz, M. 1994. Middle Holocene Environmental Change Determined from the Salt Caves of Mount Sedom, Israel. Pp. 315-32 in O. Bar-Yosef and R.S. Kra (eds.), *Late Quaternary Chronology and Paleoclimcates of the Easernt Mediterranean*. RADIOCARBON. Tucson: University of Arizona.

Gagos, T. 2004. Two "Recycled" Inscriptions from the Tafila-Busayra Archaeological Survey. Pp. 421-22 in B. MacDonald (ed.), *The Tafila-Busayra Archae-*

ological Survey 1999-2001, West-Central Jordan. Archaeological Reports 9. Boston, MA: American Schools of Oriental Research.

Glueck, N. 1934. *Explorations in Eastern Palestine, I*. Annual of the American Schools of Oriental Research 14 (1933-1934), eds. M. Burrows and E. A. Speiser. Philadelphia, PA: American Schools of Oriental Research.

Goldberg, P. 1995. The Changing Landscape. Pp. 40-54 in T. Levy (ed.), *The Archaeology of Society in the Holy Land*. London: Leicester University.

Goodfriend, G.A. 1990. Rainfall in the Negev Desert during the Middle Holocene, Based on a 13c of Organic Matter in Land Snail Shells. *Quarternary Research* 28: 374-92.

Gopher, A. 1995. Early Pottery-Bearing Groups in Israel – the Pottery Neolithic Period. Pp. 205-21 in T. E. Levy (ed.), *The Archaeology of Society in the Holy Land*. London and Washington: Leicester University.

Grattan, J., Abu Karaki, L., Hine, D., Toland, H., Gilbertson, D., al-Saad, Z. and Pyatt, B. 2005. Analyses of Patterns of Copper and Lead Mineralization in Human Skeletons Excavated from an Ancient Mining and Smelting Centre in the Jordanian Desert: a Reconnaissance Study. *Mineralogical Magazine* 69.5: 653-66.

Grattan, J., Gilbertson, D.D. and Hunt, C.O. 2007. The Local and Global Dimensions of Metalligerous Pollution Derived from a Reconstruction of an Eight Thousand Year Record of Copper Smelting and Mining at a Desert-Mountain Frontier in Southern Jordan. *Journal of Archaeological Sciences* 34: 83-110.

Hallo, W.W. and Younger, K. L. (eds.). 2000. *The Context of Scripture*. Vol. II: Monumental Inscriptions from the Biblical World. Leiden: Brill.

Hammond, P.C. 1959. The Nabataean Bitumen Industry at the Dead Sea. *Biblical Archaeologist* 22: 40-48.

—— 1970. *The Crusader Fort on El-Habis at Petra, Its Survey and Interpretation*. Research Monograph No. 2. Middle East Center. Salt Lake City, Utah: University of Utah.

Harlan, J. 1988. Natural Resources. Pp. 40-47 in B. MacDonald (ed.), *The Wadi el Hasa Archaeological Survey 1979-1983, West-Central Jordan*. Waterloo, ON: Wilfrid Laurier University.

Hart, S. 1987a. Five Soundings in Southern Jordan. *Levant* 19: 33-47.

—— 1987b. The Edom Survey Project 1984-85: The Iron Age. *SHAJ* III: 287-90. Amman: Department of Antiquities.

—— 1988. Excavations at Ghrareh, 1986: Preliminary Report. *Levant* 20: 89-99.

Hart, S. and Falkner, R.K. 1985. Preliminary Report on a Survey in Edom, 1984. *ADAJ* 29: 255-77.

Hauptmann, A. 2000. *Zur frühen Metallurgie des Kupfers in Fenan*. Vol. Beiheft 11. *Der Anschnitt*. Bochum.

Hauptmann, A. and Weisgerber, G. 1987. Archaeometallurgical and Mining-Archaeological Investigation in the Area of Feinan, Wadi `Araba (Jordan). *ADAJ* 31: 419-37.

—— 1992. Periods of Ore Exploration and Metal Production in the Area of Feinan, Wadi Arabah, Jordan. *SHAJ* IV: 61-66. Amman: Department of Antiquities.

Hill, J.B. 2006. *Human Ecology in the Wadi al-Hasa: Land Use and Abandonment through the Holocene*. Tucson, AZ: The University of Arizona.

Hirschfeld, Y. 2004. A Climatic Change in the Early Byzantine Period? Some Archaeological Evidence. *Palestine Exploration Quarterly* 136.2: 133-49.

Hütteroth, W.-D. 1975. The Pattern of Settlement in Palestine in the Sixteenth Century: Geographical Research on Turkish Defter-I Mufassal. Pp. 3-10 in M. Ma'oz (ed.), *Studies on Palestine During the Ottoman Period*. Jerusalem: Magnes.

Hütteroth, W.-D. and Abdulfattah, K. 1977. *Historical Geography of Palestine, Transjordan and Southern Syria in the Late 16th Century*. Erlanger Geographische Arbeiten 5. Erlangen: Frankische Geographische Gesselfschaft.

—— 1978. *Palastina und Transjordanien im 16 Jahrhundert Wirtschaftsstruktur landlicher Siedlungen nach osmanischcen Steuerregistern*. Beihefte zum Tübingen Atlas des Vorderen Orients 19. Wiesbaden: Reichert.

Issar, A.S. 1995. Climatic Change and the History of the Middle East. *American Scientist* 83: 350-55.

—— 1998. Climatic Change and History During the Holocene in the Eastern Mediterranean Region. Pp. 113-28 in A. S. Issar and N. Brown (eds.), *Water, Environment and Society in Times of Climatic Change*. Dordrecht: Kluwer Academic Publisher.

Issar, A.S. and Govrin, Y. 1991. Climatic Change and the Desertification of the Negev at the end of the Byzantine Period. *Cathedra* 51: 67-83 (in Hebrew).

Issar, A.S. and Makover-Levin, D. 1995. Flourishing and abandonment of the desert settlements during the Roman- Byzantine period: a "climatic change" point of view. *Michmanim* 8: 17-22 (in Hebrew).

Kark, R. 1984. Land ownership and spatial change in nineteenth century Palestine: an overview. Pp. 183-96 in M. Roscizewsky (ed.), *Transition from Spontaneous to Regulated Spatial Organization*. Warsaw: International Geographical Union.

Killick, A.C. 1989. Udhruh. Pp. 576-80 in D. Homès-Fredericq and J. B. Hennessy (eds.), *Archaeology of Jordan. II2. Field Reports: Sites L-Z.* Leuven: Peeters.

Kitchen, K.A. 1992. The Egyptian Evidence on Ancient Jordan. Pp. 21-34 in P. Bienkowski (ed.), *Early Edom and Moab: The Beginning of the Iron Age in Southern Jordan*. Sheffield Archaeological Monographs 7. Sheffield: J. R. Collis.

—— 2003. *On the Reliability of the Old Testament*. Grand Rapids, MI: Eerdmans.

Kohler-Rollefson, I. 1988. The Aftermath of the Levantine Neolithic Revolution in the Light of Ecological and Ethnographic Evidence. *Paléorient* 14 (1): 87-93.

Knauf, E.A. 1992. The Cultural Impact of Secondary State Formation: The Cases of the Edomites and Moabites. Pp. 47-54 in P. Bienkowski (ed.), *Early Edom and Moab: The Beginning of the Iron Age in Southern Jordan*. Sheffield, UK: Collis.

LaBianca, Ø.S. and Younker, R.W. 1995. The Kingdoms of Ammon, Moab and Edom: The Archaeology of Society in Late Bronze/Iron Age Transjordan (ca. 1400-500 BCE). Pp. 399-411 in T. E. Levy (ed.), *The Archaeology of Society in the Holy Land*. London and Washington: Leicester University.

Lawrence, T.E. 1935. *The Seven Pillars of Wisdom*. (Cape, London).

Levy, T.E. 1995. Cult, Metallurgy and Rank Societies – Chalcolithic Period (ca. 4500-3500 BCE). Pp. 226-43 in T. E. Levy (ed.), *The Archaeology of Society in the Holy Land*. London and Washington: Leicester University.

Levy, T.E., Adams, R.B. and Shafiq, R. 1999. The Jamal Hamrat Fidan Project: Excavations at the Wadi Fidan 40 Cemetery, Jordan (1997). *Levant* 31: 293-308.

Levy, T.E., Adams, R.B., Najjar, M., Hauptmann, A., Anderson, J.D., Brandl, B., Robinson, M.A. and Higham, T. 2004. Reassessing the chronology of Biblical Edom: new excavations and ^{14}C dates from Khirbat en-Nahas (Jordan). *Antiquity* 78: 865-79.

Lindner, M. 1992. Edom Outside the Famous Excavations: Evidence from Surveys in the Greater Petra Area. Pp. 143-66 in P. Bienkowski (ed.), *Early Edom and Moab: The Beginning of the Iron Age in Southern Jordan*. Sheffield Archaeological Monographs 7. Sheffield, UK: Collis.

Lindner, M., Knauf, E.A. and Zeitler, J.P. 1996a. An Edomite Fortress and a Late Islamic Village near Petra (Jordan): Khirbat al-Mu`allaq. *ADAJ* 40: 111-35.

Lindner, M., Knauf, E.A., Zeitler, J.P. and Hübl, H. 1996b. Jabal al-Qseir: A Fortified Iron II (Edomite) Mountain Stronghold in Southern Jordan, Its Pottery and Its Historical Context. *ADAJ* 40: 137-66.

MacDonald, B. 1980. The Hermitage of John the Abbot at Hamman `Afra, Southern Jordan. *Liber Annuus* 30: 351-64.

—— 1984. Umm Ubtulah: A Nabataean and/or Roman Military Site Along the North Side of the Wadi el-Hasa in Southern Jordan. *ADAJ* 28: 183-89.

—— 1992. Other Islamic Period Sites. Pp. 119-25 in B. MacDonald (ed.), *The Southern Ghors and Northeast `Araba Archaeological Survey*. Sheffield Archaeological Monographs 5. Sheffield, UK: Collis.

—— 1994. *Ammon, Moab and Edom: Early States/Nations of Jordan in the Biblical Period (End of the 2nd and During the 1st Millennium B.C.)*. Amman, Jordan: Al Kutba Publishers.

—— 2000. *East of the Jordan: Territories and Sites of the Hebrew Scriptures*. Boston, MA: American Schools of Oriental Research.

—— 2001. Climatic Changes in Jordan through Time. Pp. 595-601 in B. MacDonald, R. Adams, and P. Bienkowski (eds.), *The Archaeology of Jordan*. Levantine Archaeology 1. Sheffield, UK: Sheffield.

—— 2005. Edom, Edomites. Pp. 231-37 in B. T. Arnold and H. G. M. Williamson (eds.), *Dictionary of the Old Testament: Historical Books*. Downers Grove, ILL: Inter-Varsity Press.

—— 2006. The southern Ghors and north-east Arabah: resources, sites and routes. Pp. 75-90 in P. Bienkowski and K. Galor (eds.), *Crossing the Rift: Resources, routes, settlement patterns and interaction in the Wadi Arabah*. Levant Supplement Series 3. Oxford, England: The Council for British Research in the Levant and Oxbow Books.

MacDonald, B., Banning, E.B., Clark, G.A., Majchrowicz, D., Coinman, N.R., Clark, G.A., Lindly, J., Donahue, J., Beynon, D.E., Harlan, J. R., Betlyon, J., King, G. and Piccirillo, M. 1988. *The Wadi el Hasa Archaeological Survey 1979-1983, West-Central Jordan*. Waterloo, ON: Wilfrid Laurier University.

MacDonald, B., ‘Amr, K., Broeder, N.H., Skinner, H.C.W., Meyer, C., Neeley, M.P., Reese, D.S. and Whitcomb, D.S. 1992. *The Southern Ghors and Northeast `Araba Archaeological Survey 1985-1986, Southern Jordan*. Sheffield Archaeological

Monographs 5. Sheffield, UK: Collis.

MacDonald, B., Adams, R.B. and Bienkowski, P. (eds.). 2001. *The Archaeology of Jordan*. Levantine Archaeology 1. Sheffield: Sheffield Academic Press.

MacDonald, B., Herr, L.G., Neeley, M.P., Gagos, T., Moumani, K. and Rockman, M. 2004. *The Tafila-Busayra Archaeological Survey 1999-2001, West-Central Jordan*. Archaeological Reports 9. Boston, MA: American Schools of Oriental Research.

MacDonald, B., Herr, L.G., Clark, G.A., Bradshaw, A. and Corbett, J. 2005. The Ayl to Ras an-Naqab Archaeological Survey, Southern Jordan – Phase 1 (2005): Preliminary Report. *ADAJ* 49: 277-98.

MacDonald, B., Herr, L.G., Quaintance, S., Tremblay, M. and Corbett, J. 2006. The Ayl to Ras an-Naqab Archaeological Survey, Southern Jordan – Phase 2 (2006): Preliminary Report. *ADAJ* 50: 107-20.

Meimaris, Y.E. and Kritikakou-Nikolaropoulou, K.I. 2005. *Inscriptions from Palestina Tertia*. Vol. Ia: *The Greek Inscriptions from Ghor es-Safi (Byzantine Zoora)*. Athens: National Hellenic Research Foundation.

Milwright, M. 2006. Central and Southern Jordan in the Ayyubid Period: Historical and Archaeological Perspectives. *Journal of the Royal Asiatic Society*, Series 3, 16, 1: 1-27.

Najjar, M., Hauptmann, A., Weisgerber, G. and Bachmann, H.G. 1995. The Early Bronze Age at Faynan/ Wadi `Araba: A Period of New Technology in Copper Production. *SHAJ V:* 519-21. Amman: Department of Antiquities.

Nicholson, J. 2005. *The Hejaz Railway*. London: Stacey International; Riyadh: Al Turath.

Parker, S.T. 1986. *Romans and Saracens: A History of the Arabian Frontier*. American Schools of Oriental Research Dissertation Series 6. Philadelphia, PA: American Schools of Oriental Research.

—— 2006. *The Roman Frontier in Central Jordan: Final Report on the Limes Arabicus Project 1980-1989*. Washington, D.C.: Dumbarton Oaks Research Library and Collection.

Patrich, J. 1995. Church, State and the Transformation of Palestine – The Byzantine Period (324-640 CE). Pp. 470-87 in T. E. Levy (ed.), *Archaeology of Society in the Holy Land*. London and Washington: Leicester University.

Petersen, A. 2001. Ottoman Hajj Forts. Pp. 685-91 in B. MacDonald, R. Adams and P. Bienkowski (eds.), *The Archaeology of Jordan*. Levantine Archaeology 1. Sheffield, UK: Sheffield.

Politis, K.D. 1993. The 1992 Season of Excavation and the 1993 Season of Restorations at Deir `Ain `Abata. *ADAJ* 37: 503-20.

—— 1995. Excavations and Restorations at Dayr `Ayn `Abata. *ADAJ* 39: 477-91.

—— 1997. Excavations and Restorations at Dayr `Ayn `Abata 1995. *ADAJ* 41: 341-50.

—— 1999. Tuleilat Qasr Musa Hamid. *ADAJ* 43: 543-44.

Pringle, D. 1997. *Secular Buildings in the Crusader Kingdom of Jerusalem: An Archaeological Gazetteer*. Cambridge, UK: Cambridge University.

—— 2001. Crusader Castles in Jordan. Pp. 677-84 in B. MacDonald, R. Adams, and P. Bienkowski (eds.), *The Archaeology of Jordan*. Levantine Archaeology 1. Sheffield, UK: Sheffield.

Pritchard, J.B. (ed.). 1969. *Ancient Near East Texts Relating to the Old Testament*. Third Edition with Supplement. Princeton, NJ: Princeton University.

Rollefson, G.O., and Kohler-Rollefson, I. 1989. The Collapse of Early Neolithic Settlements in the Southern Levant. Pp. 59-72 in I. Hershkovitz (ed.), *People and Culture in Change: Proceedings of the Second Symposium on Upper Paleolithic, Mesolithic, and Neolithic Populations of Europe and the Eastern Mediterranean Basin*. British Archaeological Reports International Series vol. 508. Oxford: BAR.

—— 1992. Early Neolithic Exploitation Patterns in the Levant: Cultural Impact on the Environment. *Population and Environment* 13: 243-54.

Rosen, A.M. 1995. The Social Response to Environmental Change in Early Bronze Age Canaan. *Journal of Anthropological Archaeology* 14: 26-44.

Rosenthal-Heginbottom, R. 2003. *The Nabataeans in the Negev*. Haifa, Israel: Reuben and Edith Hecht Museum.

Salibi, K. 1998. *The Modern History of Jordan*. Revised Edition. London/New York: Tauris.

Singer-Avitz, L. 1999. Beersheba – A Gateway Community in Southern Arabian Long-Distance Trade in the Eighth Century B.C.E. *Tel Aviv* 26: 3-75.

Waheeb, M. 1996. Archaeological Excavations at Ras an-Naqab - `Aqaba Road Alignment: Preliminary Report (1995). *ADAJ* 40: 339-48.

Weiss, H., Courty, M.-A., Wetterstrom, W., Guichard, F., Senior, L., Meadow, R. and Curnow, A. 1993. The Genesis and Collapse of Third Millennium North Mesopotamian Civilization. *Science* 261: 995-1004.

Whitcomb, D.S. 1992. The Islamic Period as Seen from Selected Sites. Pp. 112-18 in B. MacDonald (ed.), *The Southern Ghors and Northeast `Araba Archaeological Survey*. Sheffield Archaeological Mono-

graphs 5. Sheffield, UK: Collis.

Whiting, C. 2005. Khirbat ad-Dabba/Wadi al-`Arja. *Munjazat* 6: 50-51.

Wright, K., Najjar, M., Last, J., Moloney, N., Flender, M., Gower, J., Jackson, N., Kennedy, A. and Shafiq, R. 1998. The Wadi Faynan Fourth and Third Millennia Project, 1997: Report on the First Season of Test Excavations at Wadi Faynan 100. *Levant* 30: 33-60.

Zayadine, F. 1985. Caravan Routes between Egypt and Nabataea and the Voyage of Sultan Baybars to Petra in 1276. *SHAJ II*: 159-74. Amman: Department of Antiquities.

—— 1999. Le relief néo-babylonien à Sela` prés de Tafileh: Interprétation historique. *Syria* 76: 83-90.

Zohary, M. 1962. *Plant Life in Palestine: Israel and Jordan*. New York: Ronald.