Which Way Out of Egypt? Physical Geography Related to the Exodus Itinerary

8

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Abstract

The Exodus narrative is rich with geographic references that are properly understood in the context of the ancient landscape of the eastern Nile Delta and adjacent Sinai Peninsula. Changes in the physical geography of the region reflect dynamic interactions between the Nile river system, the Mediterranean Sea, and tectonics of the Red Sea rift system. Coordinating field geology, archaeological sites, digital topography, and satellite imagery with Geographic Information Technology resulted in a map depicting the physical geography of the area of interest during the Bronze Age. The map reveals different positions of the Mediterranean coastline with associated lagoons and the existence of Pelusiac Nile distributaries, lakes, and wetlands. The restored geography constrains the path of the ancient "Ways of Horus," the militarized coastal road between Egypt and the land of the Philistines, but also provides a plausible map of the region that is described in the Exodus texts.

The relationship of the Exodus narrative to the natural geography in which it is set is no less important for understanding its meaning than historical, cultural, religious, linguistic, and literary contexts that are the subject of other contributions in this volume. Like a cryptic text in a palimpsest manuscript, ancient landscapes of the Near East are hidden beneath the veneer of desert sand and the infrastructure of human development. The purpose of this project is to create a map that depicts the natural geography of the eastern Nile Delta and northwestern Sinai during the Late Bronze Age, some 3,500–3,200 years before present. This map provides a geographic context for the history and archaeology of ancient Egypt with implications for the setting of the biblical Exodus.

Introduction

Many editions of the Hebrew Tanakh and Christian Holy Bible feature a map showing one or multiple alternative Exodus routes out of the Nile Delta into the Sinai Peninsula. The routes are

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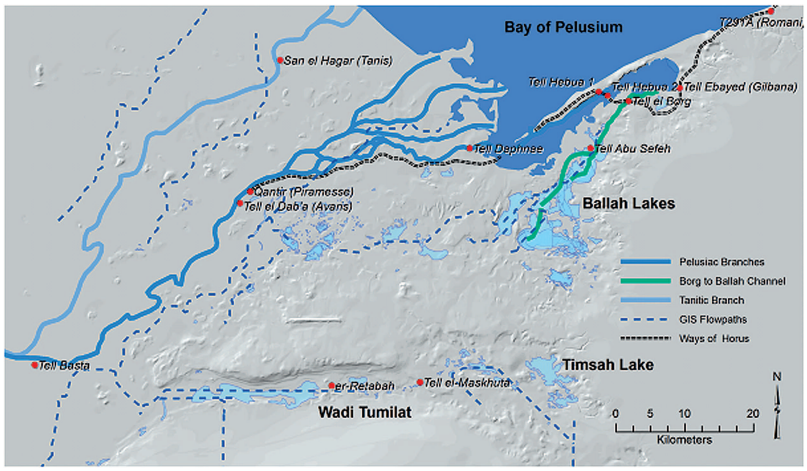

Fig. 8.1 Physical geography of the eastern Nile Delta and northwest Sinai during the Late Bronze Age. This illustration shows relief with shading derived from digitized topographic map contours. See text for sources of other geographic information

based upon various interpretations of the itineraries contained in the scriptures (Exod 12–19; Num 33). Archaeological excavations and studies of ancient texts during the past century contribute information relevant to the Exodus itinerary. For example, Piramesse, Sukkoth, and Migdol of the Exodus narrative are reasonably identified with locations known from ancient Egyptian archaeology and epigraphy (Bietak, Chap. 2). Other locations in the itinerary, such as Etham, Pi Hahiroth, Baal Zephon, and especially the Re(e)d Sea, remain ambiguous or undiscovered. Bible maps generally show the *modern* geography of settlements, river courses, lakes, and coastlines. However, geologic studies reveal changes in the land that have implications for some of these problematic locations and overland routes traveled by ancient people. In particular, surveys in the region over the past 40 years have identified and delineated abandoned Nile distributaries, significant ancient inland lakes (now dry or changed), the migrating Mediterranean coastline, and overall evolution of the Nile Delta plain. This chapter presents a map of the natural geography of the region during the Bronze Age based upon multiple sources from cartography, archaeology, and geology (Fig. 8.1).

Methods: Cartography

Figure 8.1 was complied with the ArcMap (version 10) Geographic Information System (GIS). GIS uses computing to organize and analyze spatial data coordinated to a particular geographic grid. With GIS, physical terrain may be depicted effectively from digitized land surface elevation data. High-resolution surface elevation data, publically available for many countries, was not available for Egypt at the time of this study. However, high-resolution surface elevation data contain the "overprint" of human infrastructure, such as roads, canals, bridges, and buildings. These structures and modifications of the terrain can influence GIS applications used to predict natural water flow or most effective overland travel routes. Such GIS applications are now routinely employed in the study of ancient cultures (Wilkinson 2003). A collection of vintage Survey of Egypt topographic maps at various scales was used to create the terrain model for this study.[1] The region of interest was relatively uninhabited when the maps were produced between 1900 and 1945. Features added to the GIS project included elevation data (digitized contours), outlines of inland water bodies, and locations of archaeological sites (tells). The Suez Canal (originally completed in 1869) is the most significant feature on the Survey of Egypt maps that was not included in Fig. 8.1.

[1] Maps used to create the terrain model in Fig. 8.1 are from the Survey of Egypt collection (British War Office, Intelligence Division) at the Center for Ancient Middle Eastern Landscapes, Oriental Institute, University of Chicago.

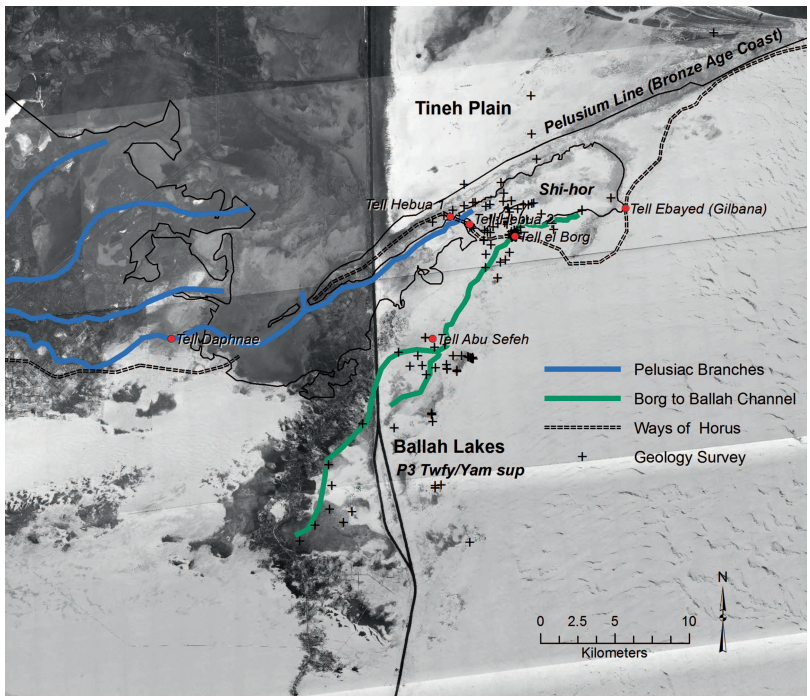

Fig. 8.2 Georectified CORONA satellite photographs (December 1968), showing the Mediterranean coast during the Late Bronze Age (*single black trace*), Pelusiac Nile branches (*blue traces*), flowpath of a channel between Tell el-Borg and the area of the former Ballah Lakes (*green traces*), the Ways of Horus road (*double*, *dashed black trace*), and field study locations (*crosses*). The Suez Canal is the linear feature running north–south in the center of the photographs. CORONA images acquired from US Geological Survey, EROS Data Center, Sioux Falls, SD

Methods: Landscape and Surface Geology

The depiction of ancient physical geography in this project is informed by a general understanding of landscape evolution in the region over the past 5,000 years (summarized below). Locations of ancient Nile branches and the Mediterranean coastline in Fig. 8.1 were derived from previous studies by Bietak (1975), Marcolongo (1992), Coutellier and Stanley (1987), Stanley (2002), Hoffmeier and Moshier (2006), and Moshier and El-Kalani (2008). Satellite imagery reveals large-scale surface features and patterns that are difficult to recognize on the ground. Contemporary digital space imagery offers remarkable resolution (size of visible objects) and records a range of emitted or reflected bands on the electromagnetic spectrum. However, many areas of archaeological and historical interest have been altered or covered in recent years by agricultural projects, urbanization, and other human modifications of the land. We used declassified spy satellite photos from the CORONA mission (1960–1972) to identify surface features, such as ancient coastlines and river channels. Figure 8.2 is a mosaic of CORONA photos rectified to the geographic grid, showing the locations of archaeological sites and interpretations of ancient surface features.

Methods: Modeling Surface Hydrology

Using the DEM as a representation of the natural landscape, GIS subroutines are available to determine where surface water should accumulate and flow along channel pathways (Spatial Analyst Hydrology tools in ArcMap). Pathways with the strongest "flow accumulation" for the DEM in this study are plotted on the map (GIS Flowpaths in Fig. 8.1). The purpose of this exercise is to show the plausibility of flow along or near the routes of suspected ancient Nile distributaries.

Results: Depiction of Ancient Geography

The modern Nile Delta is a broad wedge of sediment deposited by shifting distributaries

and advancing delta-front lobes, revealed by sediment borings from beneath the delta plain (Sneh et al. 1986; Coutellier and Stanley 1987). The constructive phase of the delta began between 9,000 and 8,000 years ago as rising sea level began to stabilize after the end of the last Ice Age. Subsequently, seven branches (distributaries) spread out across the delta plain pushing the coastline seaward as much as 10 m per year. Annual flooding between August and October delivered fresh clay, silt, and organic matter to fertile agricultural fields on the flood plain. Ancient maps by Herodotus (ca. 450 BC) and Strabo (63 BC) depict these branches, and more ancient Egyptian inscriptions refer to some of them (Said 1981).

The physical and cultural geography of Lower Egypt during the Bronze Age was influenced by channels of the Pelusiac branch flowing in a northeasterly direction across the eastern delta plain toward the northwest Sinai (Fig. 8.1). Sediment from the Pelusiac branch started forming an offshore, delta-front cone about 7500–7000 years BP (Coutellier and Stanley 1987). The maximum landward migration of the Mediterranean shoreline due to sea level rise after the last glacial episode was completed about 5000 years BP. For the next 1,500 years (through the Late Bronze Age), the Mediterranean coast in the northwest Sinai was situated along a linear structural feature known as the Pelusium Line (Fig. 8.2). By 3500 years BP the delta plain of the Pelusiac branch was beginning to build out beyond the Pelusium Line. Extensive harbors were maintained during the Second Intermediate Period to early New Kingdom in the Pelusiac channel at Tell Dab^{c}a (the Hyksos capital Avaris), as identified and mapped by sediment coring and geomagnetic surveys (Tronchére et al. 2011). Some segments of the ancient distributaries were canalized in ancient times and remain part of the modern irrigation system.

As many as four sub-distributaries of the Pelusiac bifurcated northeast of Tell Dab^{c}a (Bietak 1975; plotted in Fig. 8.1). Dominant flow in the sub-distributaries shifted over time to the westerly channels. Low Nile discharges starting about 1200 BC (during Dynasties XX and XXI) are probably responsible for initial silting and abandonment of Pelusiac channels and eventual shift of flow to the Tanitic branch (Said 1993). Westward tilting of the delta region, related to regional tectonic activity, may also be a factor in the abandonment of eastern branches and shift of dominant flow to more central and western branches (el-Gamili and Shaaban 1988). Sneh and Weissbrod (1973) identified the defunct Pelusiac branch where it crossed the Tineh plain, east of the Suez Canal, to the late period site of Pelusium. Rapid accretion of beach sand up to 10 km wide along the eastern margin of the Tineh plain finally closed the connection between the Pelusium branch and the sea in the early 800s AD (Goodfriend and Stanley 1999).

A significant interpretation of the physical geography of the eastern Nile Delta during the New Kingdom or the Late Bronze Age, including topography, archaeological sites, inland lakes, abandoned Nile channels, and Mediterranean coastal features, resulted from the work of Manfred Bietak and the excavations at Tell Dab^{c}a (Bietak 1975, 1996 and Chap. 2). Their map provides a context for the cultural geography of Middle through New Kingdom Egypt. Publication of the map preceded archaeological discoveries in the far reaches of eastern delta (technically in the northwest Sinai) after 2000. The investigations at Tell el-Borg (1999–2008) included a geological survey conducted by the author of the region around Tell el-Borg and south to the area of the ancient Ballah Lakes (Moshier and El-Kalani 2008). One contribution from this study is the recognition of a previously unknown early Nile branch that flowed through the area of the Ballah Lakes northeastward to the site of Tell el-Borg (Fig. 8.2). The channel appears to have debouched into a lagoon behind a barrier island strand along the Mediterranean coast. Hoffmeier and Moshier (2006) explored the historical implications of the emerging paleogeography of this region with specific consideration of (a) the early Nile branch, (b) the possible identification of the Ballah Lakes with the biblical *yām sûp* or Re(e)d Sea, (c) the route of the Ways of Horus (the coastal military road between Egypt and Canaan), and (d) the possible

association of the ancient lagoon as the site of the Sea People's invasion during the reign of Ramesses III.

The locations of many inland shallow lakes in the eastern delta may reflect ancient Nile drainage patterns. The chain of lakes east of Tell el-Dab^{c}a may reflect an ancient flow route (Fig. 8.1). The string of wetlands and lakes along the present Suez Canal Zone follows the north-to-south oriented crustal extension and rifting that opened the Gulf of Suez. Maps prepared in the nineteenth century before canal construction show water in the Ballah Lakes and Lake Timsah, but the area of the Great Bitter Lake was a broad salt marsh.[2] The Ballah Lakes are now mostly drained, with one area east of the Suez Canal (adjacent to the Al-Salam Bridge) holding water retained by the natural shoreline and levees for aquaculture. Some nineteenth-century maps indicate that the Ballah Lakes may have connected to the Manzalla Lagoon (Gardiner 1918). However, a 2.5 km stretch of land between Ballah and Manzalla, occupied by the present city of Qantara, is known historically as a land bridge (as the Arabic name implies) between the delta region and the Sinai. Vintage maps indicate that the topographic depression occupied by the Ballah Lakes was subject to inundation during annual Nile floods, even in recent centuries.

Wadi Tumilat is a valley that runs west to east between the present cities of Zagazig (Tell Basta) in the delta and Ismailia on the northern shore of Lake Timsah. The valley is probably related to pre-Nile drainage (Pliocene–Pleistocene), which may have originally drained water from west to east (from the Sinai toward the present delta) (Said 1981). It is known to have experienced inundations from one end to the other during particularly high floods. A lake occupied the western half of the valley during the third millennium BC (Bietak 1975). It is not clear whether or not the wadi served as an active modern Nile distributary, but Pharaoh Necho II (610–595 BC) and Persian Emperor Darius I (Persian, 550–486 BC) directed canal projects to create a water connection between the Nile and Gulf of Suez (Redmount 1995).

Implications for the Toponymy and Geography of Exodus

Several locations with probable or tentative associations with geographic references in the Exodus text are depicted in Fig. 8.1. The Israelite people in Egypt are said to have built the "supply cities" of Pithom and Rameses (Exod 1:11), but no geographical location is offered in the Torah. Nearly a century ago, Sir Alan Gardiner demonstrated that Ramesses of the Pentateuch (Gen 47:11; Exod 1:11, 12:37; Num 33:3 and 5) was one and the same as Pi-Ramesses, the Delta residence of Ramesses II and his successors (Gardiner 1918: 261–267).[3] Rameses (Piramesse) is now identified with the site at Qantir after the pioneering work of Labib Habachi in the 1940s and 1950s (Habachi 1954, 2001: 65–84). It is situated along the ancient Pelusiac branch in the eastern delta just northeast of Tell el Dab^{c}a (Hyksos Avaris).

Pithom only occurs in Exodus 1:11 and is not listed in the Exodus itinerary. Its location has long been a topic of archaeological investigation (Naville 1888, 1924; Petrie 1906). There is firm textual and archaeological evidence for locating Pithom in Wadi Tumilat at Tell er-Retabeh. Early on, however, Naville maintained that it was Succoth (Naville 1888: 4), while Petrie who worked at Retabeh 20 years later thought that it was Pi-Ramesses and Rameses of Exodus (Petrie 1906: 28; 1911: 33–34). The tendency now, however, is to identify it as Pi-Atum

[2] An 1831 map by George Long (Society for the Diffusion of Useful Knowledge, Great Britain) describes Lake Timsah as "... dry except during the inundations. Salt marsh below the surface of the sea at Suez."

[3] At this early date, Gardiner thought that Pi-Ramesses was located at Pelusium. He would later abandon that for Tanis and then finally accepted Habachi's (1954, 2001) locating it at Qantir (Gardiner 1962: 258).

(Pithom) of Pap. Anastasi V: 51–61.[4] Scientific investigations of Tell el-Retabeh resumed in 2007 by a Polish-Slovak mission (Rzebka et al. 2009: 241–280; 2011: 139–184).

It is also clear from Ramesside period texts that the Egyptian toponym *tkw*, which when written in Hebrew, is Succoth (Muchiki 1999: 232–233) of Exodus 12:37 and 13:30 and Numbers 33:5–6. While *tkw* in Egyptian texts refers to the Wadi Tumilat of today (Kitchen 1998: 73–78), it also appears to have been connected with the site of Tell el-Maskhuta. Maskhuta is the Arabic name of the present-day village that partially occupies the archaeological site, and linguistically **Ma*skhut*a** preserves that ancient name *tkw*, *sukkot*, in Hebrew.

The initial movement of route described in Exodus appears to have been from Piramesse to the Wadi Tumilat, thereby seeking to avoid the Ways of Horus, the northern military highway out of Egypt (cf. Exod 13:17 where it is called "the way of the Land of the Philistines"). By moving toward the Wadi Tumilat, the Hebrews were trying to escape via the other and more southerly route out of Egypt, namely, the Way of Shur as it is known in the Bible (Gen 16:7, 20:1, 25:18). The Egyptian name of this road, presently not known to us, was primarily used for travel to Sinai originating from the locations at base of the Delta (e.g., Memphis). Travelers attempting a direct (straight) route between Piramesse and the central Wadi Tumilat would first encounter the Bahr el-Baqar swamps (east and south of Piramesse) and next the highest elevations of the sandy El Jisr Plateau on the north side of the Wadi (although the elevations do not regularly exceed 25 m above sea level). A more reasonable route would have been south along the Pelusiac channel toward the other great Rameside city in the eastern delta at Bubastis (Tell Basta) and approaching the western entrance of the Wadi Tumilat.

"Etham on the edge of the wilderness (Exod 13:20)" is probably at the eastern end of the Wadi Tumilat, possibly near the shores of Lake Timsah. The Hebrew writing of *'etam*, like the name Pithom, preserves the name of Atum (Muchiki 1999: 230), the Patron deity of *tkw*. The inscribed block of Ramesses II smiting foreigners discovered by Petrie at Retabeh demonstrates Atums status as "Lord of Tje(k)u" (Petrie 1906: pl. 30). Furthermore the Arabic name Wadi Tumilat clearly preserves the name Atum, a reminder of the sun god's influence in the area over the centuries.

Lake Timsah would be a logical candidate for the Re(e)d Sea, but the narrative records an abrupt "turning back" (Heb. *šub*) (Exod 14:2) to a new location before coming "the sea" (*hayam*), a body of water different than Lake Timsah. This next camp destination is "near Pi-Hahiroth, between Migdol and the sea" and "directly opposite Baal Zephon" (Exod 14:2).[5] Migdol can be associated with a fortress of the same name guarding the Ways of Horus in the northwest Sinai along the Mediterranean coast (Gardiner 1920; Hoffmeier 2008b). "Turning back" to the north would put the Hebrew escapees in the midst of the Ballah Lakes, which was the fortified east frontier zone that included the fortified sites of Tjaru (Sile), i.e., Hebua I and Hebua II (Abd el-Maksoud 1998; Abd el-Maksoud and Valbelle 2005, 2011) and Tell el-Borg (Hoffmeier and Abd El-Maksoud 2003).

The Egyptian geographical term *p3 twfy* refers to an area of freshwater and abundant fish, reeds, and rushes (cf. Pap. Anastasi III 2:11–12). The Egyptian *p3 twfy* has long been linguistically associated with the Hebrew *yām sûp* or Re(e)d Sea of Exodus 14 and 15 (Gardiner 1947; Lambdin 1953: 153; Hoffmeier 2005). Gardiner called attention to the parallelism between the two bodies of water on Egypt's NE frontier in Pap. Anastasi III (2:11–12), *š-ḥr* (Shi-hor of Josh 13:3; Jer 2:18, clearly on the eastern frontier). He went on to make the following observation: "'the papyrus marshes

[4] For a detailed discussion of history of excavations at this site and the debate surrounding its identification see Kitchen (1998) and Hoffmeier (2005: 58–65; 2008a).

[5] For a detailed study of this toponym cluster see Cazelles (1955), Scolnic (2004), and Hoffmeier (2005).

(*p3 ṯwf*) come to him with papyrus reeds, and the Waters of Horus (*P-shi-Ḥor*) with rushes:' the connection of *P3-ṯwf* with Biblical יַם־סוּף Yam-sûph 'Sea of Reeds' (Heb. *Sûph* and Eg. *ṯwf* are the same word) and that of *P3-š-Ḥr* 'the Waters of Horus' with Biblical שִׁיחוֹר Shiḥor are beyond dispute" (Gardiner 1947: 201*). Bietak went a step further and identified the northern lake in Egyptian texts—what the French team of Dominique Valbelle and Bruno Marcolongo called the "eastern" or the "paleo-lagoon"—situated east of the sites of Hebua I and II and Tell el-Borg (Valbelle, et al. 1992; Marcolongo 1992)—with *P3-š-Ḥr* (Bietak 1975). Bietak identified the more southerly lake with *P3-ṯwfy* and the Biblical יַם־סוּף Yam-sûph Sea of Reeds. Over the past 40 years, he has continued to champion these identifications (Bietak 1987: 166–168; 1996: 2). The archaeological and geological investigations we conducted in northern Sinai between 1998 and 2008 have further clarified the history and their dimensions during the New Kingdom Period. Our work only supports the identifications Gardiner and Bietak proposed, viz., that *P3-ṯwfy* of Ramesside Period texts and *yam sûp* of the Exodus narratives should be identified with the Ballah Lake system and that *š-ḥr*/Shi-hor of Egyptian and biblical texts is the eastern lagoon.

Conclusions

A map depicting the physical geography of the eastern Nile Delta and northwest Sinai during the Bronze Age is based upon the results of archaeological surveys and excavations, geological surveys, vintage cartographic surveys, and information from space images (Fig. 8.1). The restored geography, showing the ancient coastlines, abandoned Nile distributaries, lagoons, lakes, and wetlands, provides context for the locations of archeological sites and established travel routes.

Computer modeling with GIS routines for surface hydrology suggests flowpaths that are consistent with the mapped routes of abandoned Nile distributaries and provides clues for yet unmapped channels. Geographic references in the Exodus narrative should be understood in the context of this ancient landscape.

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